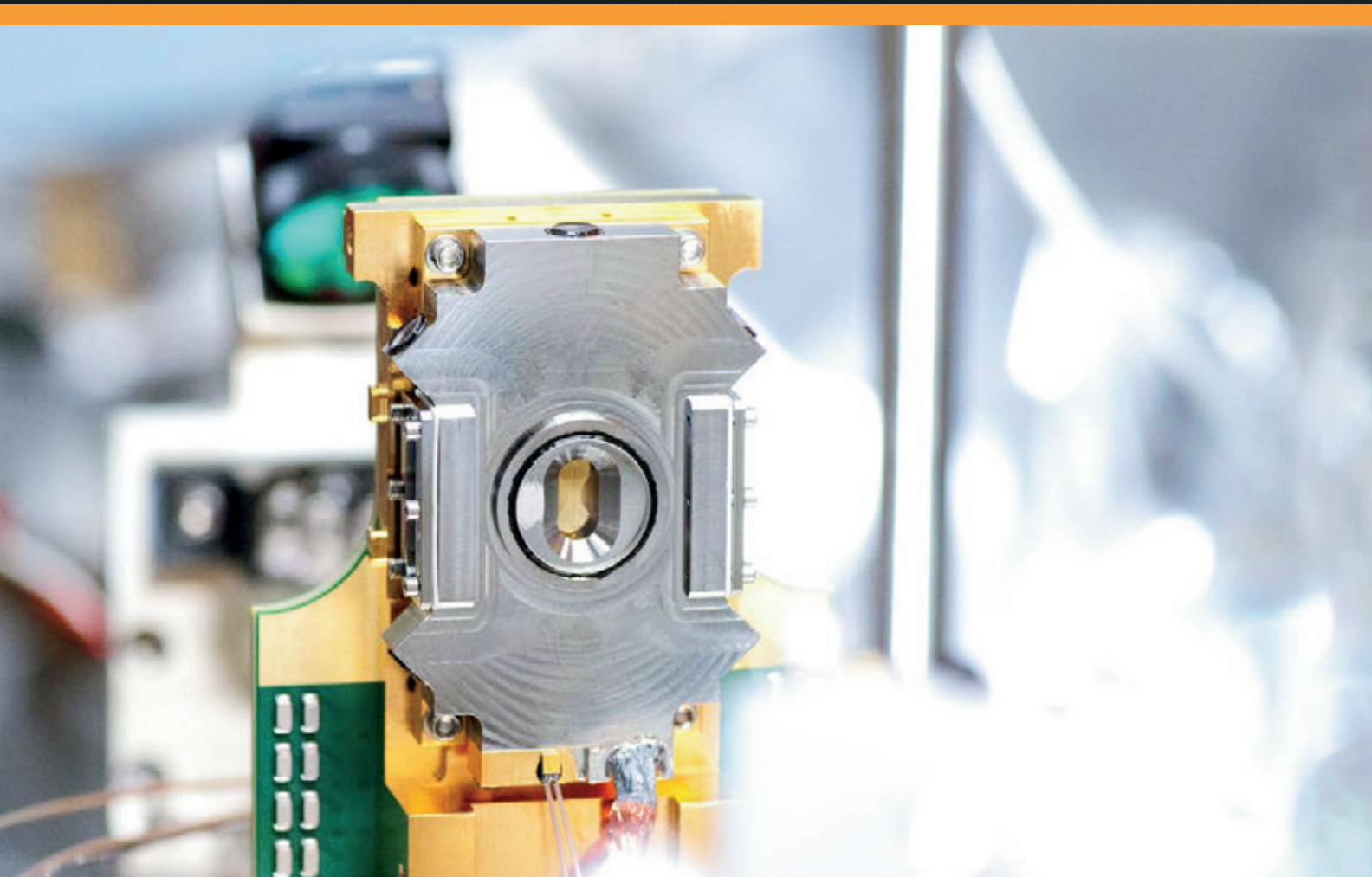




2021 Annual Report





Dear Stockholders,

We believe the 21st century will be powered by quantum computers. We expect these machines will open the doors to an amazing new era where “smart devices” are actually smart, computers can program themselves, batteries are light and powerful enough to enable flying cars, society is able to pause or even reverse climate change, we have cures for diseases such as cancer, Alzheimer's and diabetes, and with luck, reverse aging itself (which at my age, can't come soon enough).

We see a massive opportunity in the large markets we are targeting. We believe the Total Addressable Market (TAM) for quantum computing is likely larger than the existing classical hardware and software markets combined. As a test of this theory, what would general artificial intelligence¹ be worth alone?

IonQ is not alone in this belief; we compete against some of the largest technical companies and even the largest countries in the world. And despite that--amazingly--our little company leads the world today with the best² commercially available quantum computers. We have a window of opportunity to establish IonQ as the industry commercial standard in this space. When you hear, “the promise of quantum computing is 10 or more years away,” we do not agree, as we, fortunately do *not* believe that to be true for IonQ. Our intent is to move quickly to solidify and extend our current leadership position in the marketplace. This strategy is not without challenges; it requires significant investment and focused execution.

Some readers may not be aware of our plans for quantum and how we plan to power the next industrial revolution with IonQ at the forefront. Here is our eight-point plan to get there:

1. Build a quantum computer with 35 algorithmic qubits³

As you have heard us say, the power of a quantum computer is not a function of the number of physical qubits, but instead, the number of “useful qubits,” or what we call “algorithmic qubits.” We recently announced our latest IonQ Aria quantum computer with a record-breaking 20 algorithmic qubits. Our goal is to get to 35 algorithmic qubits in a single quantum computer without error correction. The 35 algorithmic qubit milestone is key for unlocking many of the most important near-term applications of quantum computing, such as quantum machine learning. We believe the way to get there is by reducing native error rates.

Every quantum computation goes through three steps where errors can occur:

1. **Quantum State Preparation**, where we initialize the qubits;
2. **Computation**, where we run an algorithm made up of a series of quantum gates; and
3. **Measurement**, where we read out the final state of each qubit after the calculation (also known as “state detection” or “readout”).

We recently announced⁴ that our new barium-based quantum computer achieved an amazingly low SPAM error of 0.04%. SPAM errors, or **S**tate **P**reparation **A**nd **M**easurement errors, refer to sources of error #1 and #3, described above. This SPAM error rate could achieve more than 2,000 algorithmic qubits if we could ignore errors related to the computation or quantum gates (#2 above). In other words, we have already fixed two sources of error necessary to achieve our 35 algorithmic qubit goal.

¹ https://en.wikipedia.org/wiki/Artificial_general_intelligence

² <https://ionq.com/news/february-23-2022-ionq-aria-further-leads>

³ <https://ionq.com/posts/february-23-2022-algorithmic-qubits>

⁴ <https://ionq.com/posts/march-03-2022-deep-dive-barium-spam>

As for the error related to quantum gates, we recently announced⁵ that, by using barium qubits in our systems, the fundamental limit for two-qubit gate errors is closer to 0.02% (as compared to 0.1% for ytterbium). Although this improvement might seem small, this meaningful difference should allow us to achieve 35 algorithmic qubits and beyond. It might not seem like much, but as you approach an error of 0%, small increases like this have an outsized impact.

2. Supersede Moore’s Law and create a new price-performance ratio of quantum computers

In 1965, Gordon Moore published a paper in which he observed that the number of transistors in computer chips was doubling roughly every one to two years. Related to Moore’s Law is the price-performance ratio of computers. Loosely stated, a given amount of money will buy twice as much computing power two or three years from now. Or more simply stated, when you buy a new computer, you expect it to be two times better for roughly the same price.

In quantum, every time you add a single algorithmic qubit, you double the computational power of the machine. Similar in spirit to Moore's law, if we added a single qubit every year, you should expect to pay the same amount as today.

Our roadmap reflects qubit growth at a much faster rate with 35 algorithmic qubits expected in 2024 to 64 algorithmic qubits expected in 2025, the latter of which is a machine that is 2^{29} or 536,870,912 times more powerful.

What would you expect to pay for this machine? Clearly the price of the quantum computer cannot scale to the same degree as the computational power it delivers.

As much as we are focused on increasing the computational capabilities, we are similarly focused on reducing the price per algorithmic qubit. This year, we are building up our production engineering team, an effort that we hope will put us on a trajectory to reduce the size and weight of our future quantum computers. We are also making technical investments in photonics technologies used in the telecom industry to further shrink and integrate our system components.

As we put more of the system on a chip and shrink the quantum computer, we expect our cost per qubit to shrink and the performance to rise. This is also why we believe that building a quantum computer that can operate without the need for near absolute-zero temperatures is so important. We will continue to invest in innovation that realizes the economic balance that kept Moore’s law going: exponentially more powerful quantum computers available at modestly increasing prices.

3. Network multiple quantum computers together to create incredibly powerful quantum computers

No matter what technology you use for a qubit, sooner or later you can’t get more qubits on a chip to get to scale. At a certain point, every quantum computing manufacturer will need to network several systems together.

In classical computing, networking is enabled by communication.

In quantum computing, networking allows entanglement of qubits across different quantum computers. Qubits don’t differentiate between being entangled together on a chip and being entangled *across* chips. The qubits can be next to each other—or miles apart. And once they are all networked, they work together as a single quantum computer.

As I mentioned, we recently announced a new IonQ system using barium qubits. Barium allows us to leverage the same lasers and silicon photonics technology used by telecom and data center networking devices. We are

⁵ <https://ionq.com/news/march-03-2022-barium-demonstrates-leading-readout>

now working on adding networking to our quantum computers, and we will know we are successful when we have a network that operates at room temperature using a simple fiber optic cable. This is work we first envisioned in 2007, when our co-founder, Chris Monroe, demonstrated how to network two ion trap systems together with a technology called photonic interconnects.⁶ Today, we are productizing that experiment and expect to incorporate it at commercial scale to build increasingly powerful quantum computers.

Our quantum computers allow any qubit to entangle with any other qubits; we call this “all-to-all” connectivity. And with an optical switch between the quantum computers, we believe the “all-to-all” connectivity of the IonQ’s qubits can be maintained across all the machines in the quantum network.

4. Implement low overhead error correction

As you increase the number of algorithmic qubits in a quantum computer, you need to decrease their error rates correspondingly. You can do that either by reducing the native error rate (described in #1, “Quantum State Preparation,” above) or by introducing error correcting codes to make up for the loss in fidelity.

The overhead of the error correcting code is a function of the error you are trying to overcome. In 2020, IonQ staff, Duke University and the University of Maryland demonstrated the world's first error corrected qubit with an outstandingly low overhead of only 13:1.⁷ This innovation overturns the conventional wisdom that error-corrected qubits will require thousands, if not millions, of physical qubits to realize.

By networking multiple systems together, we hope to increase the number of physical qubits so we can start to introduce error correction and increase the resulting number of algorithmic qubits. We have proven our ability to increase the number of physical qubits on a chip within a single system and, in the future, anticipate increasing that number to maybe hundreds, or even thousands of qubits. We expect that the combination of networking and the number of qubits on a single chip will allow us to scale to much more powerful quantum computers. You can see why integration, and the benefits it creates in scaling, fidelity and cost, is so important.

5. Increase gate speeds

We expect that “all-to-all” connectivity, low error-correction overhead and likely new N-Qubit gates⁸ will dramatically hasten the speed of an entire quantum computation. But it also helps to improve the speed of individual gates. Ion trap gate speeds are currently slower compared to other technologies, but that's not as large of an issue because ion qubits last (coherence time) far longer than the manufactured qubits used by many of our competitors. Furthermore, gate speeds on trapped ion systems are a function of the laser power one applies to the qubits.

We recently announced⁹ a new quantum computer based on qubits that use barium. Barium qubits use a laser in visible light that is much easier on optics and, as a result, should allow us to increase our laser power, significantly improving gate speeds.

In the future, improved gate speeds will be required to allow large quantum circuits to be run, but current customer needs are not complex enough or long enough for gate speed to be a blocker to commercialization.

6. Create the next generation of machine learning and chemistry applications

We are working to increasingly invest in applications that are stepping stones to our larger goals. For instance, our recent announcement¹⁰ with Hyundai on battery chemistry that works toward better and lighter batteries. Our primary focuses this year will be in machine learning, chemistry and finance applications.

⁶ <https://opg.optica.org/josab/abstract.cfm?uri=josab-24-2-300>

⁷ <https://arxiv.org/abs/2009.11482>

⁸ <https://ionq.com/news/february-10-2022-duke-ionq-new-qc-gate>

⁹ <https://ionq.com/news/december-08-2021-ionq-announces-new-barium-qubit-technology>

¹⁰ <https://ionq.com/news/january-19-2022-ionq-and-hyundai-partner-to-advance-batteries>

We expect to release libraries and web service endpoint APIs that allow application developers to access early quantum computers for inclusion in their applications.

This year, we also expect to significantly increase our investment in the second generation of our operating system, compilers and language tools to support application developers.

7. Invest for the long term

We believe that a fundamental measure of our success will be the stockholder value we create over the long term. Becoming a self-sustaining business is a priority in order to capture the ever expanding TAM.

In the short term, we will focus our investments in a way that we hope will bring a quantum computer with quantum advantage to market. At this stage, we are a front-runner in a space race for long-term leadership in the quantum computing industry and speed is critical to achieving the potential of our business model. However, we will maintain our emphasis on long-term profitability and capital management.

As with many fast-growing technology companies, we expect that almost all of our free cash flow will be invested back into research and development in order to improve performance, increase integration, drive down cost and bring follow-on products to market as fast as possible. When someone buys time on one of our quantum computers, they are helping pay for development of the next generation of quantum computers, which we expect will be more powerful and also ultimately benefit from cost efficiencies relative to current quantum computers.

We will work hard to spend wisely and maintain a lean culture that preserves capital. We understand the importance of continually reinforcing a cost-conscious, ROIC-centric culture.

8. Attract, develop and retain a world-class team

We know our success will be greatly affected by our ability to attract and retain a versatile, talented, diverse, inclusive, and motivated employee base, each of whom must think and act like owners, which is why we plan to prioritize compensating employees primarily with equity. We are pleased with our momentum in growing our talent base since becoming a public company.

Conclusion

You may ask if, in the future, IonQ will be known as the company that makes the best quantum computers? I prefer to envision us as the company that is building the technology that makes everything else possible. Look for the “Powered by IonQ” sticker on batteries, self-driving cars, and vaccines of the future.

Lastly, on behalf of myself and the IonQ team, I want to express my gratitude for your support last year as we became the world’s first public quantum computing company. We are proud to be trailblazing for our industry, and would not be here without your enthusiasm for IonQ.

Best,

Peter Chapman

Peter Chapman
President and Chief Executive Officer
IonQ, Inc.

**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION**
Washington, D.C. 20549

FORM 10-K

(Mark One)

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2021

OR

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934 FOR THE TRANSITION PERIOD FROM _____ **TO** _____

Commission File Number 001-38542

IONQ, INC.

(Exact name of Registrant as specified in its charter)

Delaware
(State or other jurisdiction of
incorporation or organization)

4505 Campus Drive
College Park, MD 20740
(Address of principal executive offices)

85-2992192
(I.R.S. Employer
Identification No.)

20740
(Zip Code)

Registrant's telephone number, including area code: (301) 298-7997

Securities registered pursuant to Section 12(b) of the Act:

<u>Title of each class</u>	<u>Trading Symbol(s)</u>	<u>Name of each exchange on which registered</u>
Common Stock, \$0.0001 par value per share	IONQ	New York Stock Exchange
Warrants, each exercisable for one share of common stock for \$11.50 per share	WS	New York Stock Exchange

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the Registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

Indicate by check mark if the Registrant is not required to file reports pursuant to Section 13 or 15(d) of the Act. Yes No

Indicate by check mark whether the Registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the Registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the Registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the Registrant was required to submit such files). Yes No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer	<input type="checkbox"/>	Accelerated filer	<input type="checkbox"/>
Non-accelerated filer	<input checked="" type="checkbox"/>	Smaller reporting company	<input checked="" type="checkbox"/>
Emerging growth company	<input checked="" type="checkbox"/>		

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report.

Indicate by check mark whether the Registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes No

The aggregate market value of the voting and non-voting common equity held by non-affiliates of the Registrant, based on the closing price of \$10.69, per share of the Registrant's common stock on the New York Stock Exchange on June 30, 2021, was \$312.7 million. This calculation excludes shares of the registrant's common stock held by current executive officers, directors and stockholders that the registrant has concluded are affiliates of the registrant. This determination of affiliate status is not a determination for other purposes.

The number of shares of registrant's common stock outstanding as of March 15, 2022 was 197,671,494.

DOCUMENTS INCORPORATED BY REFERENCE
None.

Table of Contents

	<u>Page</u>
PART I	
Item 1. Business	1
Item 1A. Risk Factors	16
Item 1B. Unresolved Staff Comments	50
Item 2. Properties	50
Item 3. Legal Proceedings	50
Item 4. Mine Safety Disclosures	50
PART II	
Item 5. Market for Registrant’s Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities	51
Item 6. [Reserved]	51
Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations	52
Item 7A. Quantitative and Qualitative Disclosures About Market Risk	64
Item 8. Financial Statements and Supplementary Data	64
Item 9. Changes in and Disagreements With Accountants on Accounting and Financial Disclosure	65
Item 9A. Controls and Procedures	65
Item 9B. Other Information	66
Item 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspections.	66
PART III	
Item 10. Directors, Executive Officers and Corporate Governance	67
Item 11. Executive Compensation	72
Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters	78
Item 13. Certain Relationships and Related Transactions, and Director Independence	81
Item 14. Principal Accountant Fees and Services	86
PART IV	
Item 15. Exhibit and Financial Statement Schedules	88
Item 16. Form 10-K Summary	91

In this report, unless otherwise stated or the context otherwise indicates, the terms “IonQ, Inc.,” “the company,” “we,” “us,” “our” and similar references refer to “IonQ” and our other registered and common law trade names, trademarks and service marks are property of IonQ, Inc. All other trademarks, trade names and service marks appearing in this annual report are the property of their respective owners. Solely for convenience, the trademarks and trade names in this report may be referred to without the ® and ™ symbols, but such references should not be construed as any indicator that their respective owners will not assert their rights thereto.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K (this “Annual Report”) contains statements that may constitute “forward-looking statements” within the meaning of Section 27A of the Securities Act of 1933, as amended (the “Securities Act”) and Section 21E of the Securities Exchange Act of 1934, as amended (the “Exchange Act”) that involve substantial risks and uncertainties. All statements contained in this Annual Report other than statements of historical fact, including statements regarding our future results of operations and financial position, our business strategy and plans, and our objectives for future operations, are forward-looking statements. The words “believes,” “expects,” “intends,” “estimates,” “projects,” “anticipates,” “will,” “plan,” “may,” “should,” or similar language are intended to identify forward-looking statements. These forward-looking statements include statements concerning the following:

- our financial and business performance, including financial projections and business metrics;
- changes in our strategy, future operations, financial position, estimated revenues and losses, projected costs, prospects and plans;
- the implementation, market acceptance and success of our business model and growth strategy;
- our expectations and forecasts with respect to market opportunity and market growth;
- the ability of our products and services to meet customers’ compliance and regulatory needs;
- our ability to attract and retain qualified employees and management;
- our ability to adapt to changes in consumer preferences, perception and spending habits and develop and expand our product offerings and gain market acceptance of our products, including in new geographies;
- our ability to develop and maintain our brand and reputation;
- developments and projections relating to our competitors and industry;
- our expectations regarding our ability to obtain and maintain intellectual property protection and not infringe on the rights of others;
- the impact of health epidemics, including the COVID-19 pandemic, or geopolitical tensions, such as Russia’s recent incursion into Ukraine, on our business and the actions we may take in response thereto;
- the impact of the COVID-19 pandemic on customer demands for cloud services;
- expectations regarding the time during which we will be an emerging growth company under the Jumpstart Our Business Startups Act of 2012 (the “JOBS Act”);
- the volatility in the global economy and the credit and financials markets, including market disruptions and significant inflation and interest rate fluctuations;
- our future capital requirements and sources and uses of cash;
- our ability to obtain funding for our operations and future growth; and
- our business, expansion plans and opportunities.

You should not rely on forward-looking statements as predictions of future events. We have based the forward-looking statements contained in this Annual Report primarily on our current expectations and projections about future events and trends that we believe may affect our business, financial condition and operating results. The outcome of the events described in these forward-looking statements is subject to risks, uncertainties and other factors described in the section titled “Risk Factors” and elsewhere in this Annual Report. A summary of selected risks associated with our business are set forth below. Moreover, we operate in a very competitive and rapidly

changing environment. New risks and uncertainties emerge from time to time, and it is not possible for us to predict all risks and uncertainties that could have an impact on the forward-looking statements contained in this Annual Report. The results, events and circumstances reflected in the forward-looking statements may not be achieved or occur, and actual results, events or circumstances could differ materially from those described in the forward-looking statements.

In addition, statements that “we believe” and similar statements reflect our beliefs and opinions on the relevant subject. These statements are based on information available to us as of the date of this Annual Report. And while we believe that information provides a reasonable basis for these statements, that information may be limited or incomplete. Our statements should not be read to indicate that we have conducted an exhaustive inquiry into, or review of, all relevant information. These statements are inherently uncertain, and investors are cautioned not to unduly rely on these statements.

The forward-looking statements made in this Annual Report relate only to events as of the date on which the statements are made. We undertake no obligation to update any forward-looking statements made in this Annual Report to reflect events or circumstances after the date of this Annual Report or to reflect new information or the occurrence of unanticipated events, except as required by law. We may not actually achieve the plans, intentions or expectations disclosed in our forward-looking statements, and you should not place undue reliance on our forward-looking statements. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, joint ventures or investments.

PART I

Item 1. Business.

Overview

We are developing quantum computers designed to solve the world’s most complex problems, and transform business, society and the planet for the better. We believe that our proprietary technology, its architecture and the technology exclusively available to us through license agreements will offer us advantages both in terms of research and development, as well as the commercial value of our intended product offerings.

Today, we sell access to several quantum computers of various qubit capacities and are in the process of researching and developing technologies for quantum computers with increasing computational capabilities. We currently make access to our quantum computers available via three major cloud platforms, Amazon Web Services’ (“AWS”) Amazon Braket, Microsoft’s Azure Quantum and Google’s Cloud Marketplace, and also to select customers via our own cloud service. This cloud-based approach enables the broad availability of quantum computing as a service (“QCaaS”).

We are still in the early stages of commercial growth. Since our inception, we have incurred significant operating losses. Our ability to generate revenue sufficient to achieve profitability will depend heavily on the successful development and further commercialization of our quantum computing systems. Our net losses were \$106.2 million and \$15.4 million for the years ended December 31, 2021 and 2020, respectively, and we expect to continue to incur significant losses for the foreseeable future. As of December 31, 2021, we had an accumulated deficit of \$145.8 million. We expect that trend to continue for the next few years as we prioritize reaching the technical milestones necessary to achieve an increasingly higher number of stable qubits and higher levels of fidelity than that which presently exists—prerequisites for quantum computing to reach broad quantum advantage.

The Quantum Opportunity

Throughout human history, technological breakthroughs have dramatically transformed society and altered the trajectory of economic productivity. In the 19th century, it was the industrial revolution, powered by the scientific advances that brought us steam-powered machines, electricity, and advanced medicine. These technologies drastically improved human productivity and lengthened life expectancy.

In the 20th century, computing—arguably the greatest of all human inventions—leveraged human intelligence to run complex calculations, paving the way for profound advances in virtually every realm of human experience, including information processing, communication, energy, transportation, biotechnology, life sciences, agriculture and industry.

Since classical computing emerged in the mid-twentieth century, there has been exponential progress in computer design, with processing power roughly doubling every few years (Moore’s law). The true economic and social impact of computing is difficult to measure because it has so thoroughly permeated every aspect of life, altering the trajectory of society.

However, as transformative as computing has been, many classes of problems strain the ability of classical computers, and some will never be solvable with classical computing. In this traditional binary approach to computing, information is stored in bits that are represented logically by either a 0 (off) or a 1 (on). Quantum computing uses information in a fundamentally different way than classical computing. Quantum computers are based on quantum bits (qubits), a fundamental unit that can exist in both states 0 and 1 simultaneously (superposition). As a result, we believe that quantum computers can address a set of hard problems classical computing may never solve. The types of problems that currently defeat classical computing include: the simulation of quantum systems (e.g., in materials science or pharmaceuticals); number factoring for decryption;

and complex optimization problems. Many of these problems are fundamental, involving society's most pressing needs, such as how to live sustainably on our planet, how to cure diseases, and how to efficiently move people and goods. Classical computers cannot solve these problems because the calculations would take far too long (i.e., millions to trillions of years) or because the problems involve quantum systems that are far too complex to be represented on a classical computer, even if their remarkable pace of development were to continue indefinitely. While these problems are not solvable by today's quantum computers, we believe that a quantum computer currently offers the best possibility for computational power that could be used to solve them.

The future success of quantum computing will be based on the development of a computer with a substantially higher number of qubits than our current computers. We believe that we will find solutions to these challenges and that our proprietary technology and architecture and the technology exclusively available to us through exclusive license agreements will offer advantages both in terms of research and development as well as the ultimate product we wish to offer customers.

There are certainly thousands, if not millions, of important and fundamental unanswered questions about how the universe works and opportunities associated with the answers to those questions. We envision a future powered by quantum computing and believe the 21st century is poised to be the dawn of this era.

Our Strategy

Our mission is to be the leading quantum computing company enabling the new era of quantum computing. We intend to fulfill our mission by:

- ***Leveraging Our Technology.*** We believe that our technology offers substantial technological advantages compared to other competing quantum computing systems. We intend to build upon our technological lead by leveraging our world-class team of leaders and engineers who are pioneers in quantum computing, with proven track records in innovation and technical leadership. To date, we have developed and assembled six generations of quantum computer prototypes and systems, have constructed quantum operating systems and software tools, and have worked with leading cloud vendors, quantum programming languages and quantum software development kits.
- ***Offering QCaaS.*** We intend to provide QCaaS, complemented by access to quantum experts and algorithm development capabilities. We plan to manufacture, own and operate quantum computers, with compute units offered on a usage basis. Our quantum computing solution is currently delivered via AWS Amazon Braket, Microsoft's Azure Quantum and Google's Cloud Marketplace. We believe that by offering QCaaS, we can accelerate the adoption of our quantum computing solutions, while efficiently promoting quantum computing across our partner ecosystems.
- ***Selling Direct Access to Quantum Computers.*** We intend to sell direct access to the quantum computers we manufacture, with units offered on a whole system or usage basis. We believe that by offering direct access to quantum computing, we can assist select customers in deepening their application of quantum solutions.
- ***Continuing to Enhance Our Proprietary Position.*** We have exclusively licensed our core technology from the University of Maryland and Duke University, and our complex technology is protected by an extensive patent portfolio. We intend to continue to drive innovation in quantum computing and seek intellectual property protection where appropriate to enhance our proprietary technology position.
- ***Further Developing Our Quantum Computing Partner Ecosystem.*** We believe our relationships with leading technology enterprises and university research institutes will accelerate innovation, distribution and monetization of our quantum capabilities.

Market Opportunity: A Future Driven by Quantum Computing

The potential uses for quantum applications are widespread and address a number of problems that would be impossible to solve using classical computing technology. According to a 2020 report from P&S Intelligence, the

total addressable market of quantum computing is expected to be approximately \$65 billion by 2030. Below are a few of the use cases in which we believe quantum computers, if they are successfully developed, will become an important tool for businesses to remain competitive in the market over the coming years.

Quantum Simulations in Chemistry

We believe that there are thousands of problems that could benefit from these quantum algorithms across the pharmaceutical, chemical, energy and materials industries. An example of such a simulation problem is modeling the core molecule in the nitrogen fixation process to make fertilizer. Nature is able to fixate nitrogen (i.e., turn atmospheric nitrogen into more useful ammonia) at room temperature. Scientists, however, have only been able to achieve fixation using a resource-intensive, high-temperature, high-pressure process, called the Haber-Bosch process. A cornerstone of the global agriculture industry, the Haber-Bosch process consumes about one percent of the world's energy and produces about one percent of the world's carbon dioxide. Agronomists have attempted to model the core molecule in nature's nitrogen fixation process, but the molecule is too large for today's classical supercomputers to simulate. Understanding the quantum process used in nature to fixate nitrogen could lead directly to more efficient ways for scientists to do the same.

Quantum chemistry simulation is expected to impact multiple markets and become an essential tool in chemical industries. For example, computer-aided drug discovery in the pharmaceutical industry is limited by the computing time and resources required to simulate a large enough chemical system with sufficient accuracy to be useful. If future generations of more powerful quantum computers are successfully developed, we believe that we could improve the speed and accuracy of virtual high-throughput screening and improve the molecular docking predictions used in structure-based drug discovery, dramatically reducing the development cost of new drugs and reducing the time to market.

Quantum Algorithms for Monte Carlo Simulations

Monte Carlo simulations are probability simulations used to calculate the expected distribution of possible outcomes in hard-to-predict processes involving random variables. Such simulations are used pervasively in finance, banking, logistics, economics, engineering and applied sciences. A key parameter of Monte Carlo simulations is the degree of accuracy desired to attain with the result. To obtain 99.9% accuracy, a classical computer requires around one million simulations. Quantum algorithms, however, can achieve the same accuracy using only one thousand simulations, thereby significantly reducing the time it takes to perform Monte Carlo simulations. This is especially important when running these simulations is expensive.

One application of the quantum Monte Carlo algorithm is to price options for the financial industry. Simple options models are used ubiquitously in finance, the most famous of these being the Black-Scholes model. However, these models fail to capture the complexities of real markets, and financiers use more sophisticated simulations to obtain better model predictions. Currently, many of these models are limited by the number of simulations required to reach the desired accuracy within a fixed time budget. Quantum algorithms for Monte Carlo simulations could give some financial firms a competitive advantage by enabling them to price options more quickly.

Quantum Algorithms for Optimization

Optimization problems have enormous economic significance in many industries, and they often cannot be solved with classical computers due to their daunting complexity. Quantum algorithms are naturally suited for problems in which an exponential number of possibilities must be considered before an optimized output can be identified. It is widely believed that quantum computers will be able to arrive at a better approximate optimization solution than classical computers can, and with reduced computational cost and time. One method of quantum optimization is a hybrid method called the Quantum Approximate Optimization Algorithm, in which layers of quantum computations are executed within circuit parameters optimized using classical high-

performance computers. Because optimization issues bedevil so many complicated processes in industries ranging from logistics to pharmaceutical drug design to climate modeling, the application of quantum algorithms to optimization problems could have far-reaching impacts on society.

Quantum Machine Learning

Quantum computers can generate probability distributions that cannot be efficiently simulated on a classical computer. Similarly, there are probability distributions that can only be efficiently distinguished from each other using a quantum computer. In other words, quantum computers can “learn” things that are beyond the capabilities of classical computers. Quantum computing is likely to offer new machine-learning modalities, greatly improving existing classical machine learning when used in tandem with it. Examples of areas where quantum machine learning could have an impact are risk analysis in finance, natural language processing, and classification of multivariate chemical data. Machine learning is used broadly in industry today, and we believe quantum machine learning could have a similarly broad impact.

As with any completely new technology, the use cases imagined by us today are only a subset of the opportunities that will emerge if future generations of more powerful quantum computers are successfully developed, as users understand the power of quantum algorithms.

Remaining Challenges in Quantum Computing Evolution

One can compare any particular quantum algorithm’s performance to the best classical algorithm for the same problem. The point at which a quantum computer is able to perform a particular computation that exceeds its classical counterpart in speed or reduces its cost to solution is known as the point of “quantum advantage.”

Given the substantial research and development required to build a modern quantum computer that is both functional and practical, industry experts describe the remaining challenges in quantum computing to achieve quantum advantage as being solved in three phases. Although none of these challenges have yet been fully solved, we believe that we are well positioned to do so. A 2019 publicly available report by a leading third-party consulting firm describes these phases—and the associated technical barriers—as paraphrased below:

- *Noisy and intermediate-scale quantum (NISQ) computers:* The earliest stage of development will see component demonstrations and intermediate-scale system development with limited commercial application. The main technical barrier involves the mitigation of errors through improved fabrication and engineering of underlying qubit devices and advanced control techniques for the qubits. These devices are used for developing and validating fundamentally new quantum approaches to tackling difficult problems, but are not expected to generate substantial commercial revenues.
- *Broad quantum advantage:* In this stage, quantum computers are expected to provide an advantage over classical computers with a meaningful commercial impact. The main technical barrier is the deployment of quantum error-correcting codes that allow bigger applications to be executed. If this barrier can be overcome, we believe that quantum computing will offer practical solutions to meaningful problems superior to those provided by classical computers.
- *Full-scale fault tolerance:* This last stage will see large modular quantum computers with enough power to tackle a wide array of commercial applications relevant to many sectors of the economy. At this stage, classical computers are expected to no longer compete with quantum computers in many fields. The technical barrier will be the adoption of a modular quantum computer architecture that allows the scalable manufacturing of large quantum computer systems.

Building a Quantum Computer

Requirements for Building Useful Quantum Computers

Quantum computers are difficult to build and operate because the physical system of qubits must be nearly perfectly isolated from its environment to faithfully store quantum information. Yet the system must also be

precisely controlled through the application of quantum gate operations, and it must ultimately be measured with high accuracy. A practical quantum computer requires well-isolated, near-perfect qubits that are cheap, replicable, and scalable, along with the ability to initialize, control, and measure their states. Breakthroughs in physics, engineering, and classical computing were prerequisites for building a quantum computer, which is why for many decades the task was, and in some cases remains, beyond the limits of available technology.

To execute computational tasks, a quantum computer must be able to (i) initialize and store quantum information in qubits, (ii) operate quantum gates to modify information stored in qubits and (iii) output measurable results. Each of these steps must be accomplished with sufficiently low error rates to produce reliable results. Moreover, to be practical, a quantum computer must be economical in cost and scalable in compute power (i.e., the number of qubits and the number of gate operations) to handle real world problems.

The development of large-scale quantum computing systems is still in early stages, and several potential engineering architectures for how to build a quantum computer have emerged. We are developing quantum computers based on individual atoms as the core qubit technology, which we believe has key advantages in scaling. The ability to produce cheap error-corrected qubits at scale in a modular architecture is one of the key differentiators of our approach. Today, we have achieved many engineering firsts in this field and we believe that, with our focus on achieving additional technical milestones over the next few years, we are well positioned to bring quantum computing advantage to the commercial market.

Scientific Approaches to Quantum Computing

There are a variety of different approaches to (or architectures for) building a quantum computer, each of which involves tradeoffs in meeting the three functional and practical requirements outlined above. Roughly, approaches to performing a quantum computation fall into one of three categories: natural quantum bits, solid state or classical computer simulation.

Natural quantum bits: In natural qubit-based quantum computers, a system is built around naturally-occurring substrates exhibiting quantum properties.

- *Atoms:* In atomic-based quantum computers, the qubits are represented by internal states of individual atoms trapped and isolated in a vacuum. There are two categories within this approach: the use of ionized (charged) atoms and the use of neutral atoms.
- *Photons:* In this approach, the state of a photon, a particle of light, is used as the qubit. Various aspects of a photon, such as presence/absence, polarization, frequency (color) or its temporal location can be used to represent a qubit.

Solid state: In solid-state-based quantum computers, the qubits are engineered into the system.

- *Spins in semiconductors:* This approach uses the spins of individual electrons or atomic nuclei in a semiconductor matrix. There are two categories within this approach: (1) the use of electrons trapped in quantum dot structures fabricated by lithographic techniques and (2) the use of atomic defects (or dopants) that capture single electrons. The nuclear spin of the dopant atoms, or the nearby atoms to defects, are often used to store qubits.
- *Superconducting circuits:* This approach uses circuits fabricated using superconducting material that features quantum phenomena at cryogenic temperatures. Two states of the circuit, either charge states or states of circulating current, are used as the qubit.

Classical computer simulation: Classical computers in a data center can be used to simulate quantum computers. Although useful for small-scale quantum experiments, quantum simulation on classical computers is still bound by the same limitations of classical computing and would require an impractical number of data centers to tackle meaningful quantum problems.

Our Technology Approach

Our Approach to Quantum Computing: Trapped Ions

We have adopted the atom-based approach described above and use trapped atomic ions as the foundational qubits to construct practical quantum computers. We are pursuing a modular computing architecture to scale their quantum computers, meaning that, if successful, individual quantum processing units will be connected to form increasingly powerful systems. We believe that the ion trap approach offers the following advantages over other approaches:

- *Atomic qubits are nature's qubits:* Using atoms as qubits means that every qubit is exactly identical and perfectly quantum. This is why atomic qubits are used in the atomic clocks that do the precise timekeeping for mankind. Many other quantum systems rely upon fabricated qubits, which bring about imprecisions such that no single qubit is exactly the same as any other qubit in the system. For example, every superconducting qubit comes with a different frequency (or must be tuned to a frequency) due to manufacturing imprecision. Overall, we believe that systems relying upon fabrication of their qubits are more susceptible to error.
- *Trapped ion qubits are well-isolated from environmental influences:* When a quantum system interacts with its environment, the quantum state loses coherence and is no longer useful for computing. For example, in a superconducting qubit, the qubit tends to lose its coherence within approximately 10 to 50 microseconds. Even neutral atoms are perturbed to some extent when they are trapped in space. In contrast, trapped ion qubits are confined via electric fields in an ultra-high vacuum environment, and their internal qubits are hence perfectly isolated. As a result, the coherence of trapped ions can be preserved for about an hour, and may be able to be preserved for longer if isolation technology improves. Longer coherence times mean more computations can be performed before noise overwhelms the quantum calculation and are key to minimizing the overhead of error correction needed for large-scale quantum computers.
- *Lower overhead for quantum error-correction.* Quantum error-correction will likely be necessary to reduce the operational errors in any large-scale quantum computations relevant to commercial problems. Quantum error-correction uses multiple physical qubits to create an error-corrected qubit with lower levels of operational errors. For solid-state architectures, we estimate that it may take at least 1,000 physical qubits to form a single error-corrected qubit, while for near-term applications with ion traps the ratio is closer to 16:1.
- *Trapped ion quantum computers can run at room temperature:* Solid-state qubits currently require temperatures close to absolute zero (i.e., -273.15°C , or -459.67°F) to minimize external interference and noise levels. Maintaining the correct temperature requires the use of large and expensive dilution refrigerators, which can hamper a system's long-term scalability because the cooling space, and hence the system space, is limited. Trapped ion systems, on the other hand, can operate at room temperature. This is because the qubits themselves are not in thermal contact with the environment, as they are electromagnetically confined in free space inside a vacuum chamber. The laser-cooling of the qubits themselves is extremely efficient because the atomic ions have very little mass and this requires just a single low-power laser beam (microwatts). This allows us to minimize the system size as technology progresses, while scaling the compute power and simultaneously reducing costs.
- *All-to-all connectivity:* In superconducting and other solid-state architectures, individual qubits are connected via physical wires, hence a particular qubit can only communicate with a further-removed qubit by going through the qubits that lie in-between. In the trapped ion approach, however, qubits are connected by electrostatic repulsion rather than through physical wires. As a result, qubits in our existing systems can directly interact with any other qubit in the system. Our modular architecture benefits from this flexible connectivity, significantly reducing the complexity of implementing a given quantum circuit.
- *Ion traps require no novel manufacturing capabilities:* Ion trap chips consist of electrodes and their electrical connections, which are built using existing technologies. The trap chips themselves are not

quantum materials. They simply provide the conditions for the ion qubits to be trapped in space, and in their current state, they can be fabricated with existing conventional and standard silicon or other micro-fabrication technologies. By contrast, solid-state qubits, such as superconducting qubits or solid-state silicon spins, require exotic materials and fabrication processes that demand atomic perfection in the structures of the qubits and their surroundings; fabrication with this level of precision is an unsolved challenge.

Technological Complexity Creates Significant Barriers to Entry

Alongside the benefits of the trapped ion approach, there are several challenges inherent in it that serve as barriers-to-entry, strengthening the advantages of our systems. These key challenges include:

- *Complex laser systems*: One of the challenges of trapped ion quantum computing is the set of lasers required and the degree to which they must be stable to operate the system. Traditionally, these laser systems were assembled on an optical table on a component-by-component basis, which led to serious stability and reliability issues. We believe that we have resolved this issue from an engineering standpoint and that our future roadmap will further improve manufacturability.
- *Ultra-high vacuum (UHV) technology*: The conventional method to achieve UHV conditions for ion trapping experiments involves using vacuum chamber designs with carefully chosen materials, assembly procedures with cumbersome electrical connections, and a conditioning procedure to prepare and bake the chamber at elevated temperatures for extended periods of time. We have developed new approaches that we believe will substantially reduce the time and cost to prepare the UHV environment to operate the quantum computer.
- *Executing high fidelity gates with all-to-all connectivity*: While trapped ion qubits feature the highest fidelity entangling gates, it is nevertheless a major technical challenge to design a control scheme that enables all qubits in a system to form gates with each other under full software control. Through innovation in gate-implementation protocols, we believe that we have developed laser delivery and control systems that will allow us to implement fully programmable, fully connected gate schemes in our system.
- *Slow gate speeds*: Compared to their solid-state counterparts, trapped ions are widely believed to have slow gate speeds. While slow gate speeds are the case for many systems in operation today, both theoretical analyses and experimental demonstrations suggest this may not be a fundamental limit of trapped ion qubits (although this has not yet been demonstrated in commercial applications). In fact, high-fidelity gates with speeds comparable to those of solid-state qubits have been realized in several research laboratories. We expect that our future quantum computers based on barium ions will be faster, more powerful, more easily interconnected, and that feature more uptime for customers. Moreover, we believe that as systems with other qubit technologies scale up, their restricted connectivity and high error-correction overhead will significantly slow down their overall computation time, which we believe will make the trapped ion approach more competitive in terms of operational speed.

Our Trapped Ion Implementation

The specific implementation of our trapped ion systems leverages the inherent advantages of the substrate and creates what we believe is a path for building stable, replicable and scalable quantum computers.

Trapped Ion Infrastructure

Our systems are built on individual atomic ions that serve as the computer's qubits. Maintaining identical, replicable, and cost-effective qubits is critical to our potential competitive advantage, and we have developed a process to produce, confine and manipulate atomic ion qubits.

To create trapped atomic ion qubits using our approach, a solid source containing the element of interest is either evaporated or laser-ablated to create a vapor of atoms. Laser light is then used to strip one electron selectively from each of only those atoms of a particular isotope, creating an electrically charged ion. Ions are then confined in a specific configuration of electromagnetic fields created by the trapping structure (*i.e.*, the ion trap), to which their motion is confined due to their charge. The trapping is done in an UHV chamber to keep the ions well-isolated from the environment. Isolating and loading a specific isotope of a specific atomic species ensures each qubit in the system is identical. Two internal electronic states of the atom are selected to serve as the qubit for each ion. The two atomic states have enough frequency separation that the qubit is easy to measure through fluorescence detection when an appropriate laser beam is applied.

To build quantum computers, many atomic ions are held in a single trap, and the repulsion from their charges naturally forces them into a stable linear crystal (or chain) of qubits. The qubits are highly isolated in the UHV chamber, only perturbed by occasional collisions with residual molecules in the chamber, which provides near-perfect quantum memory that lasts much longer than most currently envisioned quantum computing tasks require. The qubits are initialized and measured through a system of external gated laser beams. An additional set of gated laser beams applies a force to selected ions and modulates the electrical repulsion between the ions. This process allows the creation of quantum logic gates between any pair of qubits, regardless of their distance within the crystal, which can be arbitrarily reconfigured in software.

System Modularity and Scalability

Today, all qubits in our systems are stored on a single chip, referred to as a quantum processing unit (“QPU”). QPUs can have several cores, or zones for trapping chains of ions, comparable to multicore central processing unit (“CPU”) chips in classical computing. Each core can contain up to about 100 qubits in a linear crystal, and dozens of cores can potentially be co-located in a single QPU. Within a QPU, some qubits can be physically moved between cores to accommodate quantum communication between the cores. This process of moving ions within a QPU is called “shuttling” and is achieved by modifying the electromagnetic fields that form the trap.

In addition to increasing the number of qubits per QPU, we believe we have identified, and we are currently developing, the technology needed to connect qubits between trapped ion QPUs, which may be commercially viable in the future. This technology, known as a photonic interconnect, uses light particles to communicate between qubits while keeping information stored stably on either end of the interconnect. The basic protocol for this photonic interconnect between ion traps in two different vacuum chambers was first realized by our co-founder Christopher Monroe’s research team in 2007. We believe this protocol can be combined with all-optical switching technology to enable multi-QPU quantum computers at large scale. We have deep expertise in photonics; while at Bell Labs, co-founder Jungsang Kim led a team to build the world’s largest optical switch. Photonic interconnects are designed to allow our systems to compute with entangled qubits spanning multiple QPUs, which we believe can open up the possibility of scaling quantum computers indefinitely, similar to how high-performance computers and data centers have been scaled.

Our quantum architecture is modular, meaning that if development of this architecture is successful, the number of qubits in a QPU, or the number of QPUs in a system, could be adjusted. Also, by allowing for each qubit in a system to entangle with any other qubit in that system, we believe that a system’s number of quantum gates could increase rapidly with each additional qubit added. This all-to-all connectivity is one of the key reasons we believe our systems will be computationally powerful.

Gate Configuration

Our qubits are manipulated (for initialization, detection, and forming quantum logic gates) by shining specific laser beams onto the trapped ions. Our systems employ a set of lasers and a sophisticated optical system to deliver beams precisely tailored to achieve this manipulation. The laser beams are tailored by programming

radio frequency (“RF”) signals using state-of-the-art digital chipsets, which are custom-configured to generate the signals for qubit manipulation. An operating system manages the quantum computer, maintaining the system in operation. It includes software toolsets for converting quantum programs from users into a set of instructions the computer hardware can execute to yield the desired computational results. To support system access from the cloud, we offer cloud management tools and application programming interfaces (“APIs”) that permit programming jobs to run remotely.

Our quantum gates are fully programmable in software; there is no “hard-wiring” of qubit connections in the quantum computing hardware. The structure of a quantum circuit or algorithm can therefore be optimized in software, and the appropriate laser beams can then be generated, switched, or modulated to execute any pattern of gate interactions. Our programmable gate configurations make our systems adaptable. Unlike quantum computer systems that are limited to a single class of problems due to their architecture, we believe that any computational problem with arbitrary internal algorithmic structure could be optimized to run on our system (although this has not been demonstrated at scale).

Quantum Error Correction

A key milestone in building larger quantum computers is achieving fault-tolerant quantum error-correction. In quantum error-correction, individual physical qubits prone to errors are combined to form an error-corrected qubit (sometimes referred to as a logical qubit) with a much lower error rate. Determining how many physical qubits are needed to form a more reliable logical qubit (the resource “overhead”) depends on both the error rate of the physical qubits and the specific error-correcting codes used. In 2020, our co-founder Dr. Monroe’s research team at the University of Maryland demonstrated the first error-corrected qubit using 13 trapped ion qubits. With our unique architecture, we believe quantum error-correction can be completely coded in software, allowing varying levels and depths of quantum error-correction to be deployed as needed. Because the ion qubits feature very low idle and native error rates and are highly connected, we expect the error-correction overhead to be about 16:1 to achieve the first useful quantum applications. This contrasts with other approaches, for which we estimate the overhead to be in the range of 1,000:1 to 100,000:1.

We believe our architectural decisions will make our systems uniquely capable of achieving scale. We have published a roadmap for scaling to larger quantum computing systems, with concrete technological innovations designed to significantly shrink the physical size of the systems and their cost per qubit. For example, we recently announced that through our partnership with the U.S. Department of Energy’s Pacific Northwest National Laboratory (“PNNL”), we were able to shrink the barium source material down to a microscopic scale. We believe this is significant because it will allow us to reduce the size of core system components, an important step in the creation of quantum computers small enough to be networked together. However, meeting future milestones included in our roadmap is not guaranteed and is dependent on various technological advancements, which could take longer than expected to realize or turn out to be impossible to achieve. We believe that, with engineering advancements and firsts yet to be achieved, our quantum computers will become increasingly compact and transportable, opening up future applications of quantum computing at the edge.

Our Forward-Looking Roadmap

In December 2020, we publicly released a forward-looking technical roadmap for the next eight years. Our technical roadmap was designed to provide transparent guidance to our quantum computer users regarding when we expect certain quantum computing capabilities to become available. As part of this roadmap, we introduced the notion of “algorithmic qubits” as a metric to measure progress. The number of algorithmic qubits (#AQ) represents the total number of qubits that can be used to perform a quantum computational task that involves of order $\sim(\#AQ)^2$ entangling gate operations. This metric provides a simple and effective measure to estimate the computational power of each generation of quantum computers. At low #AQ, the size of the problem the quantum computer can tackle is limited by the error rate of the entangling gate operations, rather than by the number of physical qubits available in the computer. The aggressive push for improving the power of quantum

computers, including the early introduction of quantum error-correction, is intended to significantly compress the time required for reaching the point when we expect quantum computers may become commercially impactful at scale. We believe that many of the technological components needed to accomplish the performance goals of the roadmap, such as high-fidelity gate operations, photonic interconnects and quantum error-correction, have been realized in proof-of-concept demonstrations in trapped ion systems. Given our track record of engineering and technology development, we believe that, over time, we will be able to successfully translate these technology components into products, which may enable successful deployment of our quantum computers and deliver material commercial value to customers.

Our Modular Architecture is Designed to Scale with Smaller, Cheaper Systems for Each Generation

The scaling of classical computer technology, which unlocked continuously growing markets over many decades, was driven by exponential growth in computational power coupled with exponential reduction in the cost of computational power for each generation (Moore's law). The key economic driver permitting the expansion of digital computer applications to new segments of the market was this very phenomenon of capability doubling in each generation with costs rising only modestly. We believe the scaling of quantum computing may follow a similar trajectory: if the #AQ available in each generation scales dramatically, the per-AQ cost would need to be reduced exponentially to enable true scaling of quantum computers. Our systems have benefitted from years of architectural focus on scalability that addresses both #AQ and per-AQ cost and, as such, we believe that if we are able to successfully solve remaining scalability challenges, these systems may become increasingly powerful and accessible in tandem.

At the heart of our approach is the modular architecture that may enable such growth. We expect our future systems to be modular networks of many QPUs working together as a large quantum computer, similar to how classical data centers are designed, constructed and operated today. Our engineering effort is focused on reducing the size, weight, cost and power consumption of the QPUs that will be the center of each generation of the modular quantum computer, while increasing the number of QPUs manufactured each year. We intend to focus on achieving these engineering efforts over the next several years. If successful, we expect that we may be able to achieve compact, lightweight and reliable quantum computers, which can be deployed at the edge, similarly to how personal computers have enabled new applications for both government and commercial use.

Our Business Model

Quantum Computing and the Software-as-a-Service Model

As quantum hardware matures, we expect the quantum computing industry to increasingly focus on practical applications for real-world problems, known as quantum algorithms. Today, we believe that there are a large number of quantum algorithms widely thought to offer advantages over classical algorithms in that each of these algorithms can solve a problem more efficiently, or in a different manner, than a classical algorithm. Our business model is premised on the belief that businesses with access to quantum computers will likely have a competitive advantage in the future.

We envision providing QCaaS, complemented by access to quantum experts and algorithm development capabilities, to solve the most challenging issues facing corporations, governments and other large-scale entities today. We intend to manufacture, own and operate quantum computers, with compute units being offered to potential customers on a QCaaS basis.

We expect our target markets to experience two stages of quantum algorithm deployment: the development stage and the application stage. We expect our involvement in these two stages, to the extent they will take place, to be as follows:

- During the development stage, our experts will assist customers in developing an algorithm to solve their business challenges. Customers may be expected to pay for quantum compute usage, in addition

to an incremental amount for the consulting and development services provided in the creation of algorithms. We may choose to sell this computing time to customers in a variety of ways. In this stage, we expect revenue to be unevenly distributed, with individual customers potentially contributing to peaks in bookings.

- During the application stage, once an algorithm is fully developed for a market, we anticipate that customers would be charged to run the algorithm on our hardware. Given the mission critical nature of the use cases we anticipate quantum computing will attract, we believe a usage-based revenue model will result in a steady stream of revenue while providing the incremental ability to grow with customers as their algorithm complexity and inputs scale.

Our Customer Journey

In each new market that stands to benefit from quantum computing, we intend to guide our customers and partners through two stages: the development phase and the application phase.

Development Phase: This first stage focuses on quantum algorithm development and we expect it to involve deep partnerships between us and our customers to lay the groundwork for applying quantum solutions to the customer's industry. We also anticipate uneven revenue for this period given that the quantum computing market is still nascent. We expect the development phase for each market to be characterized by the following go-to-market channels:

- *Co-development of quantum applications with strategic partners.* We intend to form long-term partnerships with select industry-leading companies (aligned with our technology roadmap) to co-develop end-to-end solutions for the partner and to provide an early-adopter advantage to the partner in their industry. IonQ has announced co-development agreements with Hyundai Motor Company to pursue solutions for battery chemistry and with GE Research to apply quantum computing to risk management.
- *Preferred compute agreements with clients.* We expect our preferred offerings to give the customer's application engineers direct access to our cutting-edge quantum systems, as well as technical support to pursue their solution development.
- *Cloud access to quantum computing.* Our current and future cloud partnerships with AWS's Amazon Braket, Microsoft's Azure Quantum, Google's Cloud Marketplace and other cloud providers are or will be designed to make access to quantum computing hardware available to a broader community of quantum programmers.
- *Dedicated hardware.* We anticipate manufacturing and selling complete quantum systems for dedicated use by a single customer, to be hosted on premises by the customer or remotely by us.

Application Phase: This second phase is expected to commence if we are successful in demonstrating the commercial viability of quantum advantage in the industry and can therefore commence with developing commercial applications and applying that advantage broadly throughout the market with new customers.

- *Delivery of a full-scale quantum compute platform.* For customers who have worked alongside us in the development phase to curate deep in-house technical expertise in quantum computing capabilities at the time quantum advantage is achieved for the customer's application, our preferred compute agreements, cloud offerings, and dedicated hardware sales are expected to offer sufficient quantum computational capacity.
- *Packaged solution offerings.* When appropriate, we may develop full-stack quantum solutions that can be provided directly to customers, regardless of their in-house quantum expertise.
- *Accelerated high-impact applications development.* We intend to provide opportunities for accelerated applications development to customers seeking compressed development timelines to solve their biggest problems and drive efficiencies.

We expect the technical complexity of the solutions required for quantum algorithms to address each application area will impact the timing of that market's inflection point and transition from the development phase to the application phase. During the NISQ computing era, we expect quantum machine learning to be the first solution to transition into broadly available applications. Additional markets taking advantage of quantum material science research and optimization speed-ups may come online next if broad-scale quantum advantage becomes accessible. If our quantum computers achieve full-scale fault tolerance, a diverse array of industries, ranging from quantum chemistry to deeper optimization, may be able to be transitioned to the application phase.

Customers

QCaaS

We sell access to our quantum computing solutions via AWS's Amazon Braket, Microsoft's Azure Quantum, and Google's Cloud Marketplace, and directly to select customers via our own cloud service. Making systems available through the cloud in both cases enables wide distribution. Through our cloud service providers, potential customers across the world in industry, academia and government can access our quantum hardware with just a few clicks. These platforms serve an important purpose in the quantum ecosystem, allowing virtually anyone to try our systems without an upfront commitment or needing to integrate with our platform.

Direct Access Customers

By directly integrating with us, customers can reserve dedicated execution windows, receive concierge-level application development support, gain early access to next-generation hardware, or host their own quantum computer. Such access is currently limited to a select group of end-users.

We expect our standard offerings will include additional bundled value-add services in exchange for an annual commitment, such as usage-based access to our cloud platform, reserved system time, consultations with solution scientists, and other application and integration support.

Agreements with the University of Maryland and Duke University

Exclusive License Agreement

In July 2016, we entered into a license agreement with the University of Maryland and Duke University, which was subsequently amended in September 2017, October 2017, October 2018, February 2021, April 2021 and September 2021 (as amended, the "License Agreement"), under which it obtained a worldwide, royalty-free, sublicensable license under certain patents, know-how and other intellectual property to develop, manufacture and commercialize products for use in certain licensed fields, the scope of which would include the application of the licensed intellectual property in ion trap quantum computing. The License Agreement provides an exclusive license under the universities' interest in all patents (and non-exclusive for other types of intellectual property), subject to certain governmental rights and retained rights by the universities and other non-profit institutions to use and practice the licensed patents and technology for internal research and other non-profit purposes. We can add patents and other intellectual property to the License Agreement through the UMD Option Agreement and Duke Option Agreement (each as defined below).

We are obligated to use commercially reasonable efforts to commercialize the inventions covered by the licensed patent rights and achieve certain milestones, including the hiring of a Chief Executive Officer, obtaining equity financing by specified times and such other milestones that we may specify in a development plan provided by us to the universities. We have met all existing milestones as provided for in the License Agreement, have not included any additional milestones in any development plan provided to the universities, and no longer have any obligation to submit any future development plans to the universities. We are also responsible for the prosecution and maintenance of the licensed patents, at our expense and using commercially reasonable efforts. We have the sole right to enforce the licensed patents, at our expense.

We may terminate the License Agreement at any time for any reason with at least 90 days' written notice to the University of Maryland. The University of Maryland and Duke University may terminate the License Agreement if we enter into an insolvency-related event or in the event of our material breach of the agreement or other specified obligations therein, in each case, that remains uncured for 90 days after the date that it is provided with written notice of such breach by either university.

In consideration for the rights granted to us under the License Agreement, we issued the University of Maryland and Duke University shares of our common stock. Pursuant to the University of Maryland policy, Christopher Monroe, our Chief Scientist, may receive remuneration from the University of Maryland relating to any stock we have issued to the University of Maryland. Pursuant to Duke University's policy, Christopher Monroe and Jungsang Kim, our Chief Technology Officer and Director, may receive remuneration from Duke University relating to any stock we have issued to Duke University.

Option Agreement with the University of Maryland

In July 2016, we entered into an option agreement with the University of Maryland, which was subsequently amended in February 2021 (as amended, the "UMD Option Agreement"), under which we obtained the right to add the University of Maryland's interests in certain intellectual property to the License Agreement including if the intellectual property was developed by Christopher Monroe or by individuals under his supervision and such intellectual property relates to the field of ion trap quantum information processing devices. We have added patents and other intellectual property to the License Agreement pursuant to the UMD Option Agreement. The UMD Option Agreement provided that in the event of a sale or liquidation of us during the term of the agreement, the University of Maryland could receive additional consideration from such sale or liquidation to the extent that a holder of 0.5% of our common stock would receive more than the University of Maryland would otherwise receive based on its then current holdings of our common stock. This provision was not triggered as a result of our business combination and lapsed at the closing of the business combination in September 2021.

Option Agreement with Duke University

In July 2016, we entered into an option agreement with Duke University, which was subsequently amended in December 2020 (as amended, the "Duke Option Agreement"), under which it obtained the right to add Duke University's interests in certain patents or other intellectual property to the License Agreement, including if they were developed by Jungsang Kim, Christopher Monroe or Kenneth Brown, a professor at Duke University, or by individuals under their respective supervision and such patents or intellectual property relates to the field of quantum information processing devices. We have added patents and other intellectual property to the License Agreement through the Duke Option Agreement. Pursuant to the terms of the Duke Option Agreement, we issued Duke University shares of common stock, including shares of common stock issued pursuant to the amendment of the Duke Option Agreement. The Duke Option Agreement terminates in July 2026.

Lease with the University of Maryland

In March 2020, we entered into an amended and restated office lease with the University of Maryland for the lease of our corporate headquarters and our research and development and manufacturing facility. The lease expires on December 31, 2030. We may terminate the lease with not less than 120 days written notice beginning in year six. Any early termination will result in a termination fee ranging from \$2.5 million in year six to \$500,000 in year ten, with each year subject to a reduction of \$0.5 million. Annual base rent starts at \$684,472 and increases approximately 3.0% each subsequent year.

Competition

There are many other approaches to quantum computing that use qubit technology besides the trapped ion approach we are taking. In some cases, conflicting marketing messages from these competitors can lead to

confusion among our potential customer base. Large technology companies such as Google and IBM, and startup companies such as Rigetti Computing, are adopting a superconducting circuit technology approach, in which small amounts of electrical currents circulate in a loop of superconducting material (usually metal where the electrical resistance vanishes at low temperatures). The directionality of the current flow, in such an example, can represent the two quantum states of a qubit. An advantage of superconducting qubits is that the microfabrication technology developed for silicon devices can be leveraged to make the qubits on a chip; however, a disadvantage of superconducting qubits is that they need to be operated in a cryogenic environment at near absolute-zero temperatures, and it is difficult to scale the cryogenic technology. Compared to the trapped ion approach, the qubits generated via superconducting suffer from short coherence times, high error rates, limited connectivity, and higher estimated error-correction overhead (ranging from 1,000:1 to 100,000:1 to realize the error-corrected qubits from physical qubits).

There are companies pursuing photonic qubits, such as PsiQuantum and Xanadu, among others. PsiQuantum uses photons (i.e., individual particles of light) as qubits, whereas Xanadu uses a combination of photons and a collective state of many photons, known as continuous variable entangled states, as the qubits. Each company's approach leverages silicon photonics technology to fabricate highly integrated on-chip photonic devices to achieve scaling. The advantages to this approach are that photons are cheap to generate, they can remain coherent depending on the property of the photons used as the qubit, and they integrate well with recently-developed silicon photonics technology; however, the disadvantages of photonic qubit approaches include the lack of high-quality storage devices for the qubits (photons move at the speed of light) and weak gate interactions (photons do not interact with one another easily). Both of these problems lead to photon loss during computation. Additionally, this approach requires quantum error correcting protocols with high overhead (10,000:1 or more).

Several other companies use a trapped ion quantum computing approach similar to ours, including Quantinuum Ltd. and Alpine Quantum Technologies GmbH. These companies share the fundamental advantages of the atomic qubit enjoyed by our approach. The differences between our technology and that of these companies lies in our processor architecture, system design and implementation and our strategies to scale. Based on publicly available information, Quantinuum processors operate with the application circuits broken down to two qubits at a time, with a bus width of two, and the ion qubits are shuffled between each gate operation. Our processor core involves a wide-bus architecture, where the interaction among a few dozens of atomic ion qubits can be controlled using programmable laser pulses. This typically allows quantum logic gates between all possible pairs of qubits in the processor core without extraneous operations, which will enable us to operate some quantum gates that are not possible on other quantum architectures. We have also demonstrated the ability to shuttle multiple processor cores on the same chip, increasing the potential qubit capacity of a system. At scale, we believe these architectural features will confer benefits in the speed and efficiency of running algorithms. At a higher level, our scaling architecture will exploit optical interconnects among multiple QPUs in a way that allows full connectivity between any pair of qubits across the entire system. The modular scaling of multiple QPUs with photonic interconnects is unique in our architecture.

Lastly, there are alternative approaches to quantum computing being pursued by other private companies as well as the research departments at major universities or educational institutions. To our knowledge, none of these alternative approaches has produced a commercial-grade quantum computer.

Intellectual Property

We protect our intellectual property rights via a combination of patent, trademark and trade secret laws in the United States and other jurisdictions, as well as with contractual protections, to establish, maintain and enforce rights in its proprietary technologies. Unpatented research, development, know-how and engineering skills make an important contribution to our business. We pursue patent protection only when it is consistent with our overall strategy for safeguarding intellectual property.

In addition, we seek to protect our intellectual property rights through non-disclosure and invention assignment agreements with our employees and consultants and through non-disclosure agreements with business partners and other third parties. We have accumulated a broad patent portfolio, both owned and exclusively licensed, across the range of technological fronts that make up our systems and will continue to protect our innovative inventions in the United States and other countries. Our patent portfolio is deepest in the area of devices, methods and algorithms for controlling and manipulating trapped ions for quantum computing. Our trade secrets primarily cover the design, configuration, operation and testing of its trapped-ion quantum computers.

As of March 1, 2022, we own or license, on an exclusive basis, 34 issued U.S. patents and 99 U.S. pending or allowed patent applications, 74 foreign patent applications, 5 pending U.S. trademark applications, and 7 registered U.S. trademarks. Our issued patents expire between 2029 and 2040.

Human Capital Management

Our employees are critical to our success. As of December 31, 2021, we had a 97 person-strong team of quantum hardware and software developers, engineers, and general and administrative staff. Approximately 62% of our full-time employees are based in the greater Washington, D.C. metropolitan area. We also engage a small number of consultants and contractors to supplement our permanent workforce. A majority of our employees are engaged in research and development and related functions, and more than half of our research and development employees hold advanced engineering and scientific degrees, including many from the world's top universities.

To date, we have not experienced any work stoppages and maintain good working relationships with our employees. None of our employees are subject to a collective bargaining agreement or are represented by a labor union at this time.

Corporate Information

IonQ, formerly known as dMY Technology Group, Inc. III (“dMY”) was incorporated in the state of Delaware in September 2020 and formed as a special purpose acquisition company. Our wholly owned subsidiary, IonQ Quantum, Inc. (formerly known as IonQ, Inc., and referred to as “Legacy IonQ” herein), was incorporated in the state of Delaware in September 2015.

On March 7, 2021, Legacy IonQ entered into an Agreement and Plan of Merger (the “Merger Agreement”), with dMY and Ion Trap Acquisition Inc., a direct, wholly owned subsidiary of dMY (the “Merger Sub”). Pursuant to the Merger Agreement, on September 30, 2021, the Merger Sub was merged with and into Legacy IonQ with Legacy IonQ continuing as the surviving corporation following the Merger, becoming a wholly owned subsidiary of dMY and the separate corporate existence of the Merger Sub ceased. Commensurate with the closing of the business combination, dMY changed its name to IonQ, Inc. and Legacy IonQ changed its name to IonQ Quantum, Inc.

Our principal executive offices are located at 4505 Campus Drive, College Park, MD 20740, and our telephone number is (301) 298-7997. Our corporate website address is www.ionq.com. Information contained on or accessible through our website is not a part of this Annual Report, and the inclusion of our website address in this Annual Report is an inactive textual reference only.

Available Information

Our website address is www.ionq.com. We make available on our website, free of charge, our Annual Reports, our Quarterly Reports on Form 10-Q and our Current Reports on Form 8-K and any amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act, as soon as reasonably practicable after we electronically file such material with, or furnish it to, the Securities and Exchange

Commission (the “SEC”). The SEC maintains a website that contains reports, proxy and information statements and other information regarding our filings at www.sec.gov. The information found on our website is not incorporated by reference into this Annual Report or any other report we file with or furnish to the SEC.

Item 1A. Risk Factors.

Investing in our securities involves a high degree of risk. Before you make a decision to buy our securities, in addition to the risks and uncertainties described above under “Special Note Regarding Forward Looking Statements,” you should carefully consider the risks and uncertainties described below together with all of the other information contained in this Annual Report. If any of the events or developments described below were to occur, our business, prospects, operating results and financial condition could suffer materially, the trading price of our common stock could decline, and you could lose all or part of your investment. The risks and uncertainties described below are not the only ones we face. Additional risks and uncertainties not presently known to us or that we currently believe to be immaterial may also adversely affect our business.

Summary Risk Factors

Our business is subject to a number of risks of which you should be aware before making a decision to invest in our securities. These risks include, among others, the following:

- We are an early-stage company and have a limited operating history, which makes it difficult to forecast our future results of operations.
- We have a history of operating losses and expect to incur significant expenses and continuing losses for the foreseeable future.
- We may not be able to scale our business quickly enough to meet customer and market demand, which could result in lower profitability or cause us to fail to execute on our business strategies.
- Our estimates of market opportunity and forecasts of market growth may prove to be inaccurate.
- Even if the market in which we compete achieves the forecasted growth, our business could fail to grow at similar rates, if at all.
- Our management has limited experience in operating a public company.
- We have identified a material weakness in our internal control over financial reporting. If we are unable to remediate this material weakness, or if we identify additional material weaknesses in the future or otherwise fail to maintain an effective system of internal control over financial reporting, this may result in material misstatements of our financial statements or cause us to fail to meet our periodic reporting obligations or cause our access to the capital markets to be impaired.
- We may need additional capital to pursue our business objectives and respond to business opportunities, challenges or unforeseen circumstances, and we cannot be sure that additional financing will be available.
- We have not produced a scalable quantum computer and face significant barriers in our attempts to produce quantum computers. If we cannot successfully overcome those barriers, our business will be negatively impacted and could fail.
- Our 32-qubit system, which is an important milestone for our technical roadmap and commercialization, is not yet available for customers and may never be available.
- The quantum computing industry is competitive on a global scale and we may not be successful in competing in this industry or establishing and maintaining confidence in our long-term business prospects among current and future partners and customers.
- Our business is currently dependent upon our relationship with our cloud providers. There are no assurances that we will be able to commercialize quantum computers from our relationships with cloud providers.
- Even if we are successful in developing quantum computing systems and executing our strategy, competitors in the industry may achieve technological breakthroughs which render our quantum computing systems obsolete or inferior to other products.
- We may be unable to reduce the cost per qubit, which may prevent us from pricing our quantum systems competitively.
- The quantum computing industry is in its early stages and volatile, and if it does not develop, if it develops slower than we expect, if it develops in a manner that does not require use of our quantum computing solutions, if it encounters negative publicity or if our solution does not drive commercial engagement, the growth of our business will be harmed.
- If our computers fail to achieve a broad quantum advantage, our business, financial condition and future prospects may be harmed.

- We could suffer disruptions, outages, defects and other performance and quality problems with our quantum computing systems or with the public cloud and internet infrastructure on which we rely.
- We may face unknown supply chain issues that could delay the introduction of our product and negatively impact our business and operating results.
- If we cannot successfully execute on our strategy, including in response to changing customer needs and new technologies and other market requirements, or achieve our objectives in a timely manner, our business, financial condition and results of operations could be harmed.
- Our products may not achieve market success, but will still require significant costs to develop.
- We are highly dependent on our co-founders, and our ability to attract and retain senior management and other key employees, such as quantum physicists and other key technical employees, is critical to our success. If we fail to retain talented, highly-qualified senior management, engineers and other key employees or attract them when needed, such failure could negatively impact our business.
- Our future growth and success depend on our ability to sell effectively to large customers.
- We may not be able to accurately estimate the future supply and demand for our quantum computers, which could result in a variety of inefficiencies in our business and hinder our ability to generate revenue. If we fail to accurately predict our manufacturing requirements, we could incur additional costs or experience delays.
- Our systems depend on the use of a particular isotope of an atomic element that provides qubits for our ion trap technology. If we are unable to procure these isotopically enriched atomic samples, or are unable to do so on a timely and cost-effective basis, and in sufficient quantities, we may incur significant costs or delays which could negatively affect our operations and business.
- If our quantum computing systems are not compatible with some or all industry-standard software and hardware in the future, our business could be harmed.
- If we are unable to maintain our current strategic partnerships or we are unable to develop future collaborate partnerships, our future growth and development could be negatively impacted.
- Our business depends on our customer's abilities to find useful quantum algorithms and sufficient quantum resources for their business. If they are unable to do so due to the nature of their algorithmic challenge or other technical or personnel dilemmas, our growth may be negatively impacted.
- System security and data protection breaches, as well as cyber-attacks, could disrupt our operations, which may damage our reputation and adversely affect our business.
- Unfavorable conditions in our industry or the global economy, could limit our ability to grow our business and negatively affect our results of operations.
- Government actions and regulations, such as tariffs and trade protection measures, may limit our ability to obtain products from our suppliers.
- Our operating and financial results forecast relies in large part upon assumptions and analyses we developed. If these assumptions or analyses prove to be incorrect, our actual operating results may be materially different from our forecasted results.
- We have been, and may in the future be, adversely affected by the global COVID-19 pandemic, its various strains or future pandemics.
- We are subject to requirements relating to environmental and safety regulations and environmental remediation matters which could adversely affect our business, results of operation and reputation.
- Licensing of intellectual property is of critical importance to our business. For example, we license patents (some of which are foundational patents) and other intellectual property from the University of

Maryland and Duke University on an exclusive basis. If the license agreement with these universities terminates, or if any of the other agreements under which we acquired or licensed, or will acquire or license, material intellectual property rights is terminated, we could lose the ability to develop and operate our business.

- If we are unable to obtain and maintain patent protection for our products and technology, or if the scope of the patent protection obtained is not sufficiently broad or robust, our competitors could develop and commercialize products and technology similar or identical to ours, and our ability to successfully commercialize our products and technology may be adversely affected. Moreover, our trade secrets could be compromised, which could cause us to lose the competitive advantage resulting from these trade secrets.
- We may face patent infringement and other intellectual property claims that could be costly to defend, result in injunctions and significant damage awards or other costs (including indemnification of third parties or costly licensing arrangements (if licenses are available at all)) and limit our ability to use certain key technologies in the future or require development of non-infringing products, services, or technologies, which could result in a significant expenditure and otherwise harm our business.
- Some of our in-licensed intellectual property, including the intellectual property licensed from the University of Maryland and Duke University, has been conceived or developed through government-funded research and thus may be subject to federal regulations providing for certain rights for the U.S. government or imposing certain obligations on us, such as a license to the U.S. government under such intellectual property, “march-in” rights, certain reporting requirements and a preference for U.S.-based companies, and compliance with such regulations may limit our exclusive rights and our ability to contract with non-U.S. manufacturers.

Risks Related to Our Financial Condition and Status as an Early-Stage Company

We are an early-stage company and have a limited operating history, which makes it difficult to forecast our future results of operations.

We were founded in 2015 and first offered our Quantum Computer as a Service (“QCaaS”) and professional services related to training on our quantum computing systems in 2020 and 2019, respectively. As a result of our limited operating history, our ability to accurately forecast our future results of operations is limited and subject to a number of uncertainties, including our ability to plan for and model future growth. Our ability to generate revenues will largely be dependent on our ability to develop and produce quantum computers with increasing numbers of algorithmic qubits. We have commercialized a quantum computer with 20 algorithmic qubits. As a result, our scalable business model has not been formed and our technical roadmap may not be realized as quickly as hoped, or even at all. The development of our scalable business model will likely require the incurrence of a substantially higher level of costs than incurred to date, while our revenues will not substantially increase until more powerful, scalable computers are produced, which requires a number of technological advancements which may not occur on the currently anticipated timetable or at all. As a result, our historical results should not be considered indicative of our future performance. Further, in future periods, our growth could slow or decline for a number of reasons, including but not limited to slowing demand for our QCaaS, increased competition, changes to technology, inability to scale up our technology, a decrease in the growth of the overall market, or our failure, for any reason, to continue to take advantage of growth opportunities.

We have also encountered, and will continue to encounter, risks and uncertainties frequently experienced by growing companies in rapidly changing industries. If our assumptions regarding these risks and uncertainties and our future growth are incorrect or change, or if we do not address these risks successfully, our operating and financial results could differ materially from our expectations, and our business could suffer. Our success as a business ultimately relies upon fundamental research and development breakthroughs in the coming years and decade. There is no certainty these research and development milestones will be achieved as quickly as hoped, or even at all.

We have a history of operating losses and expect to incur significant expenses and continuing losses for the foreseeable future.

We incurred net losses of \$106.2 million and \$15.4 million for the years ended December 31, 2021 and December 31, 2020, respectively. As of December 31, 2021, we had an accumulated deficit of \$145.8 million. We believe that we will continue to incur operating and net losses each quarter until at least the time we begin significant production of our quantum computers, which is not expected to occur until 2025, at the earliest, and may occur later, or never. Even with significant production, such production may never become profitable.

We expect the rate at which we will incur losses to be significantly higher in future periods as we, among other things, continue to incur significant expenses in connection with the design, development and manufacturing of our quantum computers, and as we expand our research and development activities, invest in manufacturing capabilities, build up inventories of components for our quantum computers, increase our sales and marketing activities, develop our distribution infrastructure, and increase our general and administrative functions to support our growing operations and being a public company. We may find that these efforts are more expensive than we currently anticipate or that these efforts may not result in revenues, which would further increase our losses. If we are unable to achieve and/or sustain profitability, or if we are unable to achieve the growth that we expect from these investments, it could have a material effect on our business, financial condition or results of operations. Our business model is unproven and may never allow us to cover our costs.

We may not be able to scale our business quickly enough to meet customer and market demand, which could result in lower profitability or cause us to fail to execute on our business strategies.

In order to grow our business, we will need to continually evolve and scale our business and operations to meet customer and market demand. Quantum computing technology has never been sold at large-scale commercial levels. Evolving and scaling our business and operations places increased demands on our management as well as our financial and operational resources to:

- effectively manage organizational change;
- design scalable processes;
- accelerate and/or refocus research and development activities;
- expand manufacturing, supply chain and distribution capacity;
- increase sales and marketing efforts;
- broaden customer-support and services capabilities;
- maintain or increase operational efficiencies;
- scale support operations in a cost-effective manner;
- implement appropriate operational and financial systems; and
- maintain effective financial disclosure controls and procedures.

Commercial production of quantum computers may never occur. We have no experience in producing large quantities of our products and are currently constructing advanced generations of our products. As noted above, there are significant technological and logistical challenges associated with developing, producing, marketing, selling and distributing products in the advanced technology industry, including our products, and we may not be able to resolve all of the difficulties that may arise in a timely or cost-effective manner, or at all. We may not be able to cost-effectively manage production at a scale or quality consistent with customer demand in a timely or economical manner.

Our ability to scale is dependent also upon components we must source from the optical, electronics and semiconductor industries. Shortages or supply interruptions in any of these components will adversely impact our ability to deliver revenues.

The stability of ion traps may prove poorer than hoped, or more difficult to manufacture. It may also prove more difficult or even impossible to reliably entangle/connect ion traps together. Both of these factors would adversely impact scalability and costs of the ion trap system.

If commercial production of our quantum computers commences, our products may contain defects in design and manufacture that may cause them to not perform as expected or that may require repair, recalls and design changes. Our quantum computers are inherently complex and incorporate technology and components that have not been used for other applications and that may contain defects and errors, particularly when first introduced. We have a limited frame of reference from which to evaluate the long-term performance of our products. There can be no assurance that we will be able to detect and fix any defects in our quantum computers prior to the sale to potential consumers. If our products fail to perform as expected, customers may delay deliveries, terminate further orders or initiate product recalls, each of which could adversely affect our sales and brand and could adversely affect our business, prospects and results of operations.

If we cannot evolve and scale our business and operations effectively, we may not be able to execute our business strategies in a cost-effective manner and our business, financial condition, profitability and results of operations could be adversely affected.

Our estimates of market opportunity and forecasts of market growth may prove to be inaccurate.

Market opportunity estimates and growth forecasts, including those we have generated, are subject to significant uncertainty and are based on assumptions and estimates that may not prove to be accurate. The variables that go into the calculation of our market opportunity are subject to change over time, and there is no guarantee that any particular number or percentage of companies covered by our market opportunity estimates will purchase our products at all or generate any particular level of revenue for us. In addition, alternatives to quantum computing may present themselves and if they did, could substantially reduce the market for quantum computing services. Any expansion in our market depends on a number of factors, including the cost, performance, and perceived value associated with quantum computing solutions.

The methodology and assumptions used to estimate market opportunities may differ materially from the methodologies and assumptions previously used to estimate total addressable market. To estimate the size of our market opportunities and our growth rates, we have relied on market reports by leading research and consulting firms. These estimates of total addressable market and growth forecasts are subject to significant uncertainty, are based on assumptions and estimates that may not prove to be accurate and are based on data published by third parties that we have not independently verified. Advances in classical computing may prove more robust for longer than currently anticipated. This could adversely affect the timing of any quantum advantage being achieved, if at all.

Even if the market in which we compete achieves the forecasted growth, our business could fail to grow at similar rates, if at all.

Our success will depend upon our ability to expand, scale our operations, and increase our sales capability. Even if the market in which we compete meets the size estimates and growth forecasted, our business could fail to grow at similar rates, if at all.

Our growth is dependent upon our ability to successfully scale up manufacturing of our products in sufficient quantity and quality, in a timely or cost-effective manner, or at all. Our growth is also dependent upon our ability to successfully market and sell quantum computing technology. We do not have experience with the mass distribution and sale of quantum computing technology. Our growth and long-term success will depend upon the development of our sales and delivery capabilities.

Unforeseen issues associated with scaling up and constructing quantum computing technology at commercially viable levels, and selling our technology, could negatively impact our business, financial condition and results of operations.

Moreover, because of our unique technology, our customers will require particular support and service functions, some of which are not currently available, and may never be available. If we experience delays in adding such support capacity or servicing our customers efficiently, or experiences unforeseen issues with the reliability of our technology, it could overburden our servicing and support capabilities. Similarly, increasing the number of our products and services would require us to rapidly increase the availability of these services. Failure to adequately support and service our customers may inhibit our growth and ability to expand computing targets globally. There can be no assurance that our projections on which such targets are based will prove accurate or that the pace of growth or coverage of our customer infrastructure network will meet customer expectations. Failure to grow at rates similar to that of the quantum computing industry may adversely affect our operating results and ability to effectively compete within the industry.

We may not manage growth effectively.

If we fail to manage growth effectively, our business, results of operations and financial condition could be harmed. We anticipate that a period of significant expansion will be required to address potential growth. This expansion will place a significant strain on our management, operational and financial resources. Expansion will require significant cash investments and management resources and there is no guarantee that they will generate additional sales of our products or services, or that we will be able to avoid cost overruns or be able to hire additional personnel to support them. In addition, we will also need to ensure our compliance with regulatory requirements in various jurisdictions applicable to the sale, installation and servicing of our products. To manage the growth of our operations and personnel, we must establish appropriate and scalable operational and financial systems, procedures and controls and establish and maintain a qualified finance, administrative and operations staff. We may be unable to acquire the necessary capabilities and personnel required to manage growth or to identify, manage and exploit potential strategic relationships and market opportunities.

Our management has limited experience in operating a public company.

Our executive officers have limited experience in the management of a publicly traded company. Our management team may not successfully or effectively manage our transition to a public company that is subject to significant regulatory oversight and reporting obligations under federal securities laws. Their limited experience in dealing with the increasingly complex laws pertaining to public companies could be a significant disadvantage in that it is likely that an increasing amount of their time may be devoted to these activities, which will result in less time being devoted to our management and growth. We may not have adequate personnel with the appropriate level of knowledge, experience, and training in the accounting policies, practices or internal controls over financial reporting required of public companies in the United States. The development and implementation of the standards and controls necessary for us to achieve the level of accounting standards required of a public company in the United States may require costs greater than expected. It is possible that we will be required to expand our employee base and hire additional employees to support our operations as a public company, which will increase our operating costs in future periods.

We have identified a material weakness in our internal control over financial reporting. If we are unable to remediate this material weakness, or if we identify additional material weaknesses in the future or otherwise fail to maintain an effective system of internal control over financial reporting, this may result in material misstatements of our financial statements or cause us to fail to meet our periodic reporting obligations or cause our access to the capital markets to be impaired.

In connection with the preparation of our financial statements as of and for the year ended December 31, 2021, we identified a material weakness in our internal control over financial reporting specifically related to our financial statement close process.

Specifically,

- Although we recently added accounting and financial reporting personnel with requisite knowledge and experience in the application of U.S. GAAP and SEC rules, the Company is still in process of

formalizing its processes and procedures, establishing clear authorities and approvals and segregating duties to facilitate accurate and timely financial reporting.

- Our financial accounting system has limited functionality and does not facilitate effective information technology general controls relevant to financial reporting. Additionally, elements of our close process are managed and processed outside the accounting system, increasing the risk of error.

This material weakness could result in a misstatement of account balances or disclosures that would result in a material misstatement to the annual or interim consolidated financial statements that would not be prevented or detected.

In light of the material weakness identified, we are implementing a remediation plan which includes measures designed to improve our internal control over financial reporting to remediate this material weakness. These measures include adding resources (both internal and external) as well as improving the control environment around financial systems and processes. In 2021, the Company completed the following remedial actions:

- Hired additional full-time accounting personnel with appropriate levels of experience, and augmented skills gaps with external experts;
- Established and implemented policies surrounding the approval of transactions, related to, but not limited to, account reconciliations and journal entries; and
- Selected and began implementing a financial accounting system that can support effective information technology general controls as well as the anticipated growth of the business.

Our management believes that these actions, and additional actions to be taken under our remediation plan, are sufficient to remediate the material weakness identified and strengthen our internal control over financial reporting. The actions we are taking are subject to ongoing senior management review, as well as Audit Committee oversight.

The material weakness will not be considered remediated until our remediation plan has been fully implemented, the applicable controls operate for a sufficient period of time, and we have concluded, through testing, that the newly implemented and enhanced controls are operating effectively. At this time, we cannot predict the success of such efforts or the outcome of our assessment of the remediation efforts. We can give no assurance that our efforts will remediate this material weakness in our internal control over financial reporting, or that additional material weaknesses will not be identified in the future. Our failure to implement and maintain effective internal control over financial reporting could result in errors in our consolidated financial statements that could result in a restatement of our financial statements, and could cause us to fail to meet our reporting obligations, any of which could diminish investor confidence in us and cause a decline in the price of our common stock.

We are required to disclose changes made in our internal controls and procedures on a quarterly basis and our management is required to assess the effectiveness of controls annually. Our independent registered public accounting firm is not required to formally attest to the effectiveness of our internal control over financial reporting until after we are no longer an “emerging growth company,” as defined in the JOBS Act. At such time, our independent registered public accounting firm may issue a report that is adverse in the event it is not satisfied with the level at which our internal control over financial reporting is documented, designed or operating.

We may need additional capital to pursue our business objectives and respond to business opportunities, challenges or unforeseen circumstances, and we cannot be sure that additional financing will be available.

Our business and our future plans for expansion are capital-intensive and the specific timing of cash inflows and outflows may fluctuate substantially from period to period. Our operating plan may change because of factors currently unknown, and we may need to seek additional funds sooner than planned, through public or private equity or debt financings or other sources, such as strategic collaborations. Such financings may result in dilution to our stockholders, issuance of securities with priority as to liquidation and dividend and other rights more favorable than common stock, imposition of debt covenants and repayment obligations or other restrictions that may adversely affect our business. In addition, we may seek additional capital due to favorable market conditions or strategic considerations even if we believe that we have sufficient funds for current or future operating plans. There can be no assurance that financing will be available to us on favorable terms, or at all. The inability to obtain financing when needed may make it more difficult for us to operate our business or implement our growth plans.

Our ability to use net operating loss carryforwards and other tax attributes may be limited.

We have incurred losses during our history, do not expect to become profitable in the near future and may never achieve profitability. To the extent that we continue to generate taxable losses, unused losses will carry forward to offset future taxable income, if any, until such unused losses expire, if at all. As of December 31, 2021, we had U.S. federal and state net operating loss carryforwards of approximately \$14.1 million.

Our net operating loss carryforwards are subject to review and possible adjustment by the IRS, and state tax authorities. Under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended (the “Code”), our federal net operating loss carryforwards and other tax attributes may become subject to an annual limitation in the event of certain cumulative changes in the ownership of our stock. An “ownership change” pursuant to Section 382 of the Code generally occurs if one or more stockholders or groups of stockholders who own at least 5% of a company’s stock increase their ownership by more than 50 percentage points over their lowest ownership percentage within a rolling three-year period. Our ability to utilize our net operating loss carryforwards and other tax attributes to offset future taxable income or tax liabilities may be limited as a result of ownership changes, including changes in connection with our business combination with dMY Technology Group, Inc. III (“dMY”) or other transactions. Similar rules may apply under state tax laws. We have not yet determined the amount of the cumulative change in our ownership resulting from our business combination with dMY or other transactions, or any resulting limitations on our ability to utilize our net operating loss carryforwards and other tax attributes. If we earn taxable income, such limitations could result in increased future income tax liability and our future cash flows could be adversely affected. We have recorded a full valuation allowance related to our net operating loss carryforwards and other deferred tax assets due to the uncertainty of the ultimate realization of the future benefits of those assets.

Risks Related to Our Business and Industry

We have not produced a scalable quantum computer and face significant barriers in our attempts to produce quantum computers. If we cannot successfully overcome those barriers, our business will be negatively impacted and could fail.

Producing quantum computers is a difficult undertaking. There are significant engineering challenges that we must overcome to build our quantum computers. We are still in the development stage and face significant challenges in completing development of our quantum computers and in producing quantum computers in commercial volumes. Some of the development challenges that could prevent the introduction of our quantum computers include, but are not limited to, failure to find scalable ways to flexibly manipulate qubits, failure to transition quantum systems to leverage low-cost, commodity optical technology, and failure to realize multicore quantum computer technology.

Additional development challenges we face include:

- gate fidelity, error correction and miniaturization may not commercialize from the lab and scale as hoped or at all;
- it could prove more challenging and take materially longer than expected to operate parallel gates within a single ion trap and maintain gate fidelity;
- the photonic interconnect between ion traps could prove more challenging and take longer to perfect than currently expected. This would limit our ability to scale beyond a single ion trap of approximately 22 logical qubits;
- it could take longer to tune the qubits in a single ion trap, as well as preserve the stability of the qubits within a trap as we seek to maximize the total number of qubits within one trap;
- the gate speed in our technology could prove more difficult to improve than expected; and
- the scaling of fidelity with qubit number could prove poorer than expected, limiting our ability to achieve larger quantum volume.

In addition, we will need to develop the manufacturing process necessary to make these quantum computers in high volume. We have not yet validated a manufacturing process or acquired the tools or processes necessary to produce high volumes of our quantum computers that meet all commercial requirements. If we are not able to overcome these manufacturing hurdles in building our quantum computers, our business is likely to fail.

Even if we complete development and achieve volume production of our quantum computers, if the cost, performance characteristics or other specifications of the quantum computer fall short of our projections, our business, financial condition and results of operations would be adversely affected.

Our 32-qubit system, which is an important milestone for our technical roadmap and commercialization, is not yet available for customers and may never be available.

We are developing our next-generation 32-qubit quantum computer system, which has not yet been made available to customers. We expect this system to have 22 algorithmic qubits, i.e., qubits that are usable to run quantum algorithms, but the number of algorithmic qubits available in this system has not been finalized and may be fewer than planned. The availability of this generation of quantum computer system for customer use or independent verification by a third party may be materially delayed, or even never occur. Additionally, the future success of our technical roadmap will depend upon our ability to approximately double the number of qubits in each subsequent generation of our quantum computer. Accordingly, our technical roadmap may be delayed or may never be achieved, either of which would have a material impact on our business, financial condition or results of operations.

The quantum computing industry is competitive on a global scale and we may not be successful in competing in this industry or establishing and maintaining confidence in our long-term business prospects among current and future partners and customers.

The markets in which we operate are rapidly evolving and highly competitive. As these markets continue to mature and new technologies and competitors enter such markets, we expect competition to intensify. Our current competitors include:

- large, well-established tech companies that generally compete in all of our markets, including Honeywell, Google, Microsoft, Amazon, Intel and IBM;
- countries such as China, Russia, Canada, Australia and the United Kingdom, and those in the European Union and we believe additional countries in the future;

- less-established public and private companies with competing technology, including companies located outside the United States; and
- new or emerging entrants seeking to develop competing technologies.

We compete based on various factors, including technology, performance, multi-cloud availability, brand recognition and reputation, customer support and differentiated capabilities, including ease of administration and use, scalability and reliability, data governance and security. Many of our competitors have substantially greater brand recognition, customer relationships, and financial, technical and other resources, including an experienced sales force and sophisticated supply chain management. They may be able to respond more effectively than us to new or changing opportunities, technologies, standards, customer requirements and buying practices. In addition, many countries are focused on developing quantum computing solutions either in the private or public sector and may subsidize quantum computers which may make it difficult for us to compete. Many of these competitors do not face the same challenges we do in growing our business. In addition, other competitors might be able to compete with us by bundling their other products in a way that does not allow us to offer a competitive solution.

Additionally, we must be able to achieve our objectives in a timely manner or quantum computing may lose ground to competitors, including competing technologies. Because there are a large number of market participants, including certain sovereign nations, focused on developing quantum computing technology, we must dedicate significant resources to achieving any technical objectives on the timelines established by our management team. Any failure to achieve objectives in a timely manner could adversely affect our business, operating results and financial condition.

For all of these reasons, competition may negatively impact our ability to maintain and grow consumption of our platform or put downward pressure on our prices and gross margins, any of which could materially harm our reputation, business, results of operations, and financial condition.

Our business is currently dependent upon our relationship with our cloud providers. There are no assurances that we will be able to commercialize quantum computers from our relationships with cloud providers.

Cloud computing partnerships could be terminated, or not scale as anticipated, or even at all. We currently offer our QCaaS on public clouds provided by Amazon Web Services' ("AWS"), Microsoft's Azure Quantum ("Azure"), and the Google Cloud Marketplace. The companies that own these public clouds have internal quantum computing efforts that are competitive to our technology. There is risk that one or more of these public cloud providers could use their respective control of their public clouds to embed innovations or privileged interoperating capabilities in competing products, bundle competing products, provide us with unfavorable pricing, leverage their public cloud customer relationships to exclude us from opportunities, and treat us and our customers differently with respect to terms and conditions or regulatory requirements than they would treat their similarly situated customers. Further, they have the resources to acquire or partner with existing and emerging providers of competing technology and thereby accelerate adoption of those competing technologies. All of the foregoing could make it difficult or impossible for us to provide products and services that compete favorably with those of the public cloud providers.

Further, if our contractual and other business relationships with our public cloud providers are terminated, either by the counterparty or by us, suspended or suffer a material change to which we are unable to adapt, such as the elimination of services or features on which we depend, we would be unable to provide our QCaaS at the same scale and would experience significant delays and incur additional expense in transitioning customers to a different public cloud provider.

Any material change in our contractual and other business relationships with our public cloud providers could result in reduced use of our systems, increased expenses, including service credit obligations, and harm to our brand and reputation, any of which could have a material adverse effect on our business, financial condition and results of operations.

Even if we are successful in developing quantum computing systems and executing our strategy, competitors in the industry may achieve technological breakthroughs which render our quantum computing systems obsolete or inferior to other products.

Our continued growth and success depend on our ability to innovate and develop quantum computing technology in a timely manner and effectively market these products. Without timely innovation and development, our quantum computing solutions could be rendered obsolete or less competitive by changing customer preferences or because of the introduction of a competitor's newer technologies. We believe that many competing technologies will require a technological breakthrough in one or more problems related to science, fundamental physics or manufacturing. While it is uncertain whether such technological breakthroughs will occur in the next several years, that does not preclude the possibility that such technological breakthroughs could eventually occur. Any technological breakthroughs which render our technology obsolete or inferior to other products could have a material effect on our business, financial condition or results of operations.

We may be unable to reduce the cost per qubit, which may prevent us from pricing our quantum systems competitively.

Our projections are dependent on the cost per qubit decreasing over the next several years as our quantum computers advance. These cost projections are based on economies of scale due to demand for our computer systems, technological innovation and negotiations with third-party parts suppliers. If these cost savings do not materialize, the cost per qubit may be higher than projected, making our quantum computing solution less competitive than those produced by our competitors, which could have a material effect on our business, financial condition or results of operations.

The quantum computing industry is in its early stages and volatile, and if it does not develop, if it develops slower than we expect, if it develops in a manner that does not require use of our quantum computing solutions, if it encounters negative publicity or if our solution does not drive commercial engagement, the growth of our business will be harmed.

The nascent market for quantum computers is still rapidly evolving, characterized by rapidly changing technologies, competitive pricing and competitive factors, evolving government regulation and industry standards, and changing customer demands and behaviors. If the market for quantum computers in general does not develop as expected, or develops more slowly than expected, our business, prospects, financial condition and operating results could be harmed.

In addition, our growth and future demand for our products is highly dependent upon the adoption by developers and customers of quantum computers, as well as on our ability to demonstrate the value of quantum computing to our customers. Delays in future generations of our quantum computers or technical failures at other quantum computing companies could limit market acceptance of our solution. Negative publicity concerning our solution or the quantum computing industry as a whole could limit market acceptance of our solution. We believe quantum computing will solve many large-scale problems. However, such problems may never be solvable by quantum computing technology. If our clients and partners do not perceive the benefits of our solution, or if our solution does not drive member engagement, then our market may not develop at all, or it may develop slower than we expect. If any of these events occur, it could have a material adverse effect on our business, financial condition or results of operations. If progress towards quantum advantage ever slows relative to expectations, it could adversely impact revenues and customer confidence to continue to pay for testing, access and "quantum readiness." This would harm or even eliminate revenues in the period before quantum advantage.

If our computers fail to achieve a broad quantum advantage, our business, financial condition and future prospects may be harmed.

Quantum advantage refers to the moment when a quantum computer can compute faster than traditional computers, while quantum supremacy is achieved once quantum computers are powerful enough to complete

calculations that traditional supercomputers cannot perform at all. Broad quantum advantage is when quantum advantage is seen in many applications and developers prefer quantum computers to a traditional computer. No current quantum computers, including our quantum hardware, have reached a broad quantum advantage, and they may never reach such advantage. Achieving a broad quantum advantage will be critical to the success of any quantum computing company, including us. However, achieving quantum advantage would not necessarily lead to commercial viability of the technology that accomplished such advantage, nor would it mean that such system could outperform classical computers in tasks other than the one used to determine a quantum advantage. Quantum computing technology, including broad quantum advantage, may take decades to be realized, if ever. If we cannot develop quantum computers that have quantum advantage, customers may not continue to purchase our products and services. If other companies' quantum computers reach a broad quantum advantage prior to the time ours reaches such capabilities, it could lead to a loss of customers. If any of these events occur, it could have a material adverse effect on our business, financial condition or results of operations.

We could suffer disruptions, outages, defects and other performance and quality problems with our quantum computing systems or with the public cloud and internet infrastructure on which they rely.

Our business depends on our quantum computing systems to be available. We have experienced, and may in the future further experience, disruptions, outages, defects and other performance and quality problems with our systems. We have also experienced, and may in the future further experience, disruptions, outages, defects and other performance and quality problems with the public cloud and internet infrastructure on which our systems rely. These problems can be caused by a variety of factors, including failed introductions of new functionality, vulnerabilities and defects in proprietary and open source software, hardware components, human error or misconduct, capacity constraints, design limitations or denial of service attacks or other security-related incidents. We do not have a contractual right with our public cloud providers that compensates us for any losses due to availability interruptions in the public cloud.

Any disruptions, outages, defects and other performance and quality problems with our quantum computing system or with the public cloud and internet infrastructure on which it relies, could result in reduced use of our systems, increased expenses, including service credit obligations, and harm to our brand and reputation, any of which could have a material adverse effect on our business, financial condition and results of operations.

We may face unknown supply chain issues that could delay the introduction of our product and negatively impact our business and operating results.

We are reliant on third-party suppliers for components necessary to develop and manufacture our quantum computing solutions. As our business grows, we must continue to scale and adapt our supply chain or it could have an adverse impact on our business. Any of the following factors (and others) could have an adverse impact on the availability of these components necessary to our business:

- our inability to enter into agreements with suppliers on commercially reasonable terms, or at all;
- difficulties of suppliers ramping up their supply of materials to meet our requirements;
- a significant increase in the price of one or more components, including due to industry consolidation occurring within one or more component supplier markets or as a result of decreased production capacity at manufacturers;
- any reductions or interruption in supply, including disruptions on our global supply chain as a result of the COVID-19 pandemic, which we have experienced, and may in the future experience;
- any supply chain disruptions due to Russia's recent incursion in the Ukraine and any indirect effects thereof which could further complicate existing supply chain constraints;
- financial problems of either manufacturers or component suppliers;

- significantly increased freight charges, or raw material costs and other expenses associated with our business;
- other factors beyond our control or which we do not presently anticipate, could also affect our suppliers' ability to deliver components to us on a timely basis;
- a failure to develop our supply chain management capabilities and recruit and retain qualified professionals;
- a failure to adequately authorize procurement of inventory by our contract manufacturers; or
- a failure to appropriately cancel, reschedule, or adjust our requirements based on our business needs.

If any of the aforementioned factors were to materialize, it could cause us to halt production of our quantum computing solutions and/or entail higher manufacturing costs, any of which could materially adversely affect our business, operating results, and financial condition and could materially damage customer relationships.

If we cannot successfully execute on our strategy, including in response to changing customer needs and new technologies and other market requirements, or achieve our objectives in a timely manner, our business, financial condition and results of operations could be harmed.

The quantum computing market is characterized by rapid technological change, changing user requirements, uncertain product lifecycles and evolving industry standards. We believe that the pace of innovation will continue to accelerate as technology changes and different approaches to quantum computing mature on a broad range of factors, including system architecture, error correction, performance and scale, ease of programming, user experience, markets addressed, types of data processed, and data governance and regulatory compliance. Our future success depends on our ability to continue to innovate and increase customer adoption of our quantum computer. If we are unable to enhance our quantum computing system to keep pace with these rapidly evolving customer requirements, or if new technologies emerge that are able to deliver competitive products at lower prices, more efficiently, with better functionality, more conveniently, or more securely than our platform, our business, financial condition and results of operations could be adversely affected.

Our products may not achieve market success, but will still require significant costs to develop.

We believe that we must continue to dedicate significant resources to our research and development efforts before knowing whether there will be market acceptance of our quantum computing technologies. Furthermore, the technology for our products is new, and the performance of these products is uncertain. Our quantum computing technologies could fail to attain sufficient market acceptance, if at all, for many reasons, including:

- pricing and the perceived value of our systems relative to its cost;
- delays in releasing quantum computers with sufficient performance and scale to the market;
- failure to produce products of consistent quality that offer functionality comparable or superior to existing or new products;
- ability to produce products fit for their intended purpose;
- failures to accurately predict market or customer demands;
- defects, errors or failures in the design or performance of our quantum computing system;
- negative publicity about the performance or effectiveness of our system;
- strategic reaction of companies that market competitive products; and
- the introduction or anticipated introduction of competing technology.

To the extent we are unable to effectively develop and market a quantum computing system to address these challenges and attain market acceptance, our business, operating results and financial condition may be adversely affected.

We are highly dependent on our co-founders, and our ability to attract and retain senior management and other key employees, such as quantum physicists and other key technical employees, is critical to our success. If we fail to retain talented, highly-qualified senior management, engineers and other key employees or attract them when needed, such failure could negatively impact our business.

Our future success is highly dependent on our ability to attract and retain our executive officers, key employees and other qualified personnel, including our co-founders, Jungsang Kim, our Chief Technology Officer, and Christopher Monroe, our Chief Scientist. As we build our brand and become more well known, there is increased risk that competitors or other companies may seek to hire our personnel. The loss of the services provided by these individuals will adversely impact the achievement of our business strategy. These individuals could leave our employment at any time, as they are “at will” employees. A loss of the co-founders, a member of senior management, or an engineer or other key employee particularly to a competitor, could also place us at a competitive disadvantage. Effective succession planning is also important to our long-term success. Failure to ensure effective transfer of knowledge and smooth transitions involving key employees could hinder our strategic planning and execution.

Our future success also depends on our continuing ability to attract, develop, motivate and retain highly qualified and skilled employees. The market for highly skilled workers and leaders in the quantum computing industry is extremely competitive. In particular, hiring qualified personnel specializing in supply chain management, engineering and sales, as well as other technical staff and research and development personnel is critical to our business and the development of our quantum computing systems. Some of these professionals are hard to find and we may encounter significant competition in our efforts to hire them. Many of the other companies with which we compete for qualified personnel have greater financial and other resources than we do. The effective operation of our supply chain, including the acquisition of critical components and materials, the development of our quantum computing technologies, the commercialization of our quantum computing technologies and the effective operation of our managerial and operating systems all depend upon our ability to attract, train and retain qualified personnel in the aforementioned specialties. Additionally, changes in immigration and work permit laws and regulations or the administration or interpretation of such laws or regulations could impair our ability to attract and retain highly qualified employees. If we cannot attract, train and retain qualified personnel, including our co-founders, in this competitive environment, we may experience delays in the development of our quantum computing technologies and be otherwise unable to develop and grow our business as projected, or even at all.

Our future growth and success depend on our ability to sell effectively to large customers.

Our potential customers tend to be large enterprises. Therefore, our future success will depend on our ability to effectively sell our products to such large customers. Sales to these end-customers involve risks that may not be present (or that are present to a lesser extent) with sales to smaller customers. These risks include, but are not limited to, (i) increased purchasing power and leverage held by large customers in negotiating contractual arrangements with us and (ii) longer sales cycles and the associated risk that substantial time and resources may be spent on a potential end-customer that elects not to purchase our solutions.

Large organizations often undertake a significant evaluation process that results in a lengthy sales cycle. In addition, product purchases by large organizations are frequently subject to budget constraints, multiple approvals and unanticipated administrative, processing and other delays. Finally, large organizations typically have longer implementation cycles, require greater product functionality and scalability, require a broader range of services, demand that vendors take on a larger share of risks, require acceptance provisions that can lead to a delay in revenue recognition and expect greater payment flexibility. All of these factors can add further risk to business conducted with these potential customers.

We may not be able to accurately estimate the future supply and demand for our quantum computers, which could result in a variety of inefficiencies in our business and hinder our ability to generate revenue. If we fail to accurately predict our manufacturing requirements, we could incur additional costs or experience delays.

It is difficult to predict our future revenues and appropriately budget for our expenses, and we may have limited insight into trends that may emerge and affect our business. We anticipate being required to provide forecasts of our demand to our current and future suppliers prior to the scheduled delivery of products to potential customers. Currently, there is no historical basis for making judgments on the demand for our quantum computers or our ability to develop, manufacture, and deliver quantum computers, or our profitability, if any, in the future. If we overestimate our requirements, our suppliers may have excess inventory, which indirectly would increase our costs. If we underestimate our requirements, our suppliers may have inadequate inventory, which could interrupt manufacturing of our products and result in delays in shipments and revenues. In addition, lead times for materials and components that our suppliers order may vary significantly and depend on factors such as the specific supplier, contract terms and demand for each component at a given time. If we fail to order sufficient quantities of product components in a timely manner, the delivery of quantum computers and related compute time to our potential customers could be delayed, which would harm our business, financial condition and operating results.

Our systems depend on the use of a particular isotope of an atomic element that provides qubits for our ion trap technology. If we are unable to procure these isotopically enriched atomic samples, or are unable to do so on a timely and cost-effective basis, and in sufficient quantities, we may incur significant costs or delays which could negatively affect our operations and business.

There are limited suppliers to sources of isotopically enriched materials which may be necessary for the production of our ion trap technology. We currently purchase such materials through the National Isotope Development Center managed by the U.S. Department of Energy Isotope Program. We do not have any supplier agreements with the U.S. Department of Energy, and purchase the materials through a standard ordering process. While we are currently looking to engage additional suppliers, there is no guarantee we will be able to establish or maintain relationships with such additional suppliers on terms satisfactory to us. Reliance on any single supplier increases the risks associated with being unable to obtain the necessary atomic samples because the supplier may have laboratory constraints, can be subject to unanticipated shutdowns and/or may be affected by natural disasters and other catastrophic events. Some of these factors may be completely out of our and our suppliers' control. Failure to acquire sufficient quantities of the necessary isotopically enriched atomic samples in a timely or cost-effective manner could materially harm our business.

If our quantum computing systems are not compatible with some or all industry-standard software and hardware in the future, our business could be harmed.

Programming for quantum computing requires unique tools, software, hardware, and development environments. We have focused our efforts on creating quantum computing hardware, the operating system for such hardware and a suite of low-level software programs that optimize execution of quantum algorithms on our hardware. Further up the software stack, we rely on third parties to create higher level quantum programming languages, software development kits (SDKs), and application libraries. Such third-party software and programming is essential to operating our quantum computing products and services. Our quantum computing solutions are designed today to be compatible with most major quantum software development kits, including Qiskit, Cirq, Q# QDK, and OpenQASM, all of which are open source. If a proprietary (not open source) software toolset became the standard for quantum application development in the future by a competitor, usage of our hardware might be limited as a result which would have a negative impact on us. Similarly, if a piece of hardware or other quantum tool became a necessary component for quantum computing (for instance, quantum networking) and we cannot integrate with it (as we have thus far), the result might have a negative impact on us and our anticipated growth.

If our customers are unable to achieve compatibility between other software and hardware and our hardware, it could impact our relationships with such customers or with customers, generally, if the incompatibility is more widespread. In addition, the mere announcement of an incompatibility problem relating to our products with higher level software tools could cause us to suffer reputational harm and/or lead to a loss of customers. Any adverse impacts from the incompatibility of our quantum computing solutions could adversely affect our business, operating results and financial condition.

If we are unable to maintain our current strategic partnerships or we are unable to develop future collaborate partnerships, our future growth and development could be negatively impacted.

We have entered into, and may enter into, strategic partnerships to develop and commercialize our current and future research and development programs with other companies to accomplish one or more of the following:

- obtain expertise in relevant markets;
- obtain sales and marketing services or support;
- obtain equipment and facilities;
- develop relationships with potential future customers; and
- generate revenue.

We may not be successful in establishing or maintaining suitable partnerships, and we may not be able to negotiate collaboration agreements having terms satisfactory to us, or at all. Failure to make or maintain these arrangements or a delay or failure in a collaborative partner's performance under any such arrangements could harm our business and financial condition.

Our business depends on our customers' abilities to implement useful quantum algorithms and sufficient quantum resources for their business. If they are unable to do so due to the nature of their algorithmic challenge or other technical or personnel dilemmas, our growth may be negatively impacted.

We have entered into, and may enter into, partnerships and other contractual arrangements with customers to develop, test and run quantum algorithms specific to their business. The success of these contracts and partnerships is dependent on our customer's ability to implement useful and scalable algorithms for their portfolio. These arrangements are also dependent on the availability of time and resources to develop and optimize these algorithms. The development and optimization of these algorithms is reliant on employing sufficient talent familiar with quantum computing, a unique skill that requires special training and education. If the market fails to train a sufficient number of engineers, researchers and other key quantum personnel, our customers may not find sufficient talent to partner with us to solve these problems. To the extent our customers are unable to effectively develop or utilize resources to advance algorithmic-use cases, our business, operating results and financial condition may be adversely impacted.

System security and data protection breaches, as well as cyber-attacks, could disrupt our operations, which may damage our reputation and adversely affect our business.

Cyber-attacks, denial-of-service attacks, ransomware attacks, business email compromises, computer malware, viruses, and social engineering (including phishing) are prevalent in the technology industry and our customers' industries. In addition, we may experience attacks, unavailable systems, unauthorized access or disclosure due to employee theft or misuse, denial-of-service attacks, sophisticated nation-state and nation-state supported actors, and advanced persistent threat intrusions. The techniques may be used to sabotage or to obtain unauthorized access to our platform, systems, networks, or physical facilities where our quantum computers are stored, and may be unable to implement adequate preventative measures or stop security breaches while they are occurring. U.S. law enforcement agencies have indicated to us that quantum computing technology is of particular interest to certain malicious cyber threat actors.

Our platform is built to be accessed through third-party public cloud providers such as AWS, Azure and the Google Cloud Marketplace. These providers may also experience breaches and attacks to their products which may impact our systems. Data security breaches may also result from non- technical means, such as actions by an employee with access to our systems. While we and our third-party cloud providers have implemented security measures designed to protect against security breaches, these measures could fail or may be insufficient, resulting in the unauthorized disclosure, modification, misuse, destruction, or loss of sensitive or confidential information.

Actual or perceived breaches of our security measures or the accidental loss, inadvertent disclosure or unapproved dissemination of proprietary information or sensitive or confidential data about us, our partners, our customers or third parties could expose the company and the parties affected to a risk of loss or misuse of this information, resulting in litigation and potential liability, paying damages, regulatory inquiries or actions, damage to the our brand and reputation or other harm to the our business. Our efforts to prevent and overcome these challenges could increase our expenses and may not be successful. If we fail to detect or remediate a security breach in a timely manner, or a breach otherwise affects our customers, or if we suffer a cyber- attack that impacts our ability to operate our platform, we may suffer material damage to our reputation, business, financial condition and results of operations.

Unfavorable conditions in our industry or the global economy, could limit our ability to grow our business and negatively affect our results of operations.

Our results of operations may vary based on the impact of changes in our industry or the global economy on the company or our customers and potential customers. Negative conditions in the general economy both in the United States and abroad, including conditions resulting from changes in gross domestic product growth, financial and credit market fluctuations, international trade relations, pandemics (such as the COVID-19 pandemic), political turmoil, natural disasters or other catastrophic events, warfare, terrorist attacks on the United States or elsewhere, and geopolitical tensions, such as Russia's recent incursion into Ukraine, could cause a decrease in business investments, including the progress on development of quantum technologies, and negatively affect the growth of our business.

In addition, in challenging economic times, our current or potential future customers may experience cash flow problems and as a result may modify, delay or cancel plans to purchase our products and services. Additionally, if our customers are not successful in generating sufficient revenue or are unable to secure financing, they may not be able to pay, or may delay payment of, accounts receivable due to us. Moreover, our key suppliers may reduce their output or become insolvent, thereby adversely impacting our ability to manufacture our products. Furthermore, uncertain economic conditions may make it more difficult for us to raise funds through borrowings or private or public sales of debt or equity securities. We cannot predict the timing, strength or duration of any economic slowdown, instability or recovery, generally or within any particular industry.

Government actions and regulations, such as tariffs and trade protection measures, may limit our ability to obtain products from our suppliers.

Political challenges between the United States and countries in which our suppliers are located, including China, and changes to trade policies, including tariff rates and customs duties, trade relations between the United States and China and other macroeconomic issues could adversely impact our business. Specifically, United States-China trade relations remain uncertain. The United States administration has announced tariffs on certain products imported into the United States with China as the country of origin, and China has imposed tariffs in response to the actions of the United States. There is also a possibility of future tariffs, trade protection measures or other restrictions imposed on our products or on our customers by the United States, China or other countries that could have a material adverse effect on our business. Our technology may be deemed a matter of national security and as such our customer base may be tightly restricted. We may accept government grants that place restrictions on our ability to operate.

Our operating and financial results forecast relies in large part upon assumptions and analyses we have developed. If these assumptions or analyses prove to be incorrect, our actual operating results may be materially different from our forecasted results.

Our projected financial and operating information reflect current estimates of future performance, which may never occur. Whether actual operating and financial results and business developments will be consistent with our expectations and assumptions as reflected in our forecasts depends on a number of factors, many of which are outside our control, including, but not limited to:

- success and timing of development activity;
- customer acceptance of our quantum computing systems;
- breakthroughs in classical computing or other computing technologies that could eliminate the advantages of quantum computing systems rendering them less practical to customers;
- competition, including from established and future competitors;
- whether we can obtain sufficient capital to sustain and grow our business;
- our ability to manage our growth;
- our ability to retain existing key management, integrate recent hires and attract, retain and motivate qualified personnel; and
- the overall strength and stability of domestic and international economies.

Unfavorable changes in any of these or other factors, most of which are beyond our control, could materially and adversely affect our business, financial condition and results of operations.

Acquisitions, divestitures, strategic investments and strategic partnerships could disrupt our business and harm our financial condition and operating results.

We may pursue growth opportunities by acquiring complementary businesses, solutions or technologies through strategic transactions, investments or partnerships. The identification of suitable acquisition, strategic investment or strategic partnership candidates can be costly and time consuming and can distract our management team from our current operations. If such strategic transactions require us to seek additional debt or equity financing, we may not be able to obtain such financing on terms favorable to us or at all, and such transactions may adversely affect our liquidity and capital structure. Any strategic transaction might not strengthen our competitive position, may increase some of our risks, and may be viewed negatively by our customers, partners or investors. Even if we successfully complete a strategic transaction, we may not be able to effectively integrate the acquired business, technology, systems, control environment, solutions, personnel or operations into our business. We may experience unexpected changes in how we are required to account for strategic transactions pursuant to U.S. GAAP and may not achieve the anticipated benefits of any strategic transaction. We may incur unexpected costs, claims or liabilities that we incur during the strategic transaction or that we assume from the acquired company, or we may discover adverse conditions post acquisition for which we have limited or no recourse.

We have been, and may in the future be, adversely affected by the global COVID-19 pandemic, its various strains or future pandemics.

We face various risks related to epidemics, pandemics, and other outbreaks, including the COVID-19 pandemic, including newly discovered strains of the virus. In response to the COVID-19 pandemic, governments have implemented significant measures, including, but not limited to, business closures, quarantines, travel restrictions, shelter-in-place, stay-at-home and other social distancing directives, intended to control the spread of the virus. Companies have also taken precautions, such as requiring employees to work remotely, imposing travel

restrictions and temporarily closing businesses. To the extent that these restrictions remain in place, additional prevention and mitigation measures are implemented in the future, or there is uncertainty about the effectiveness of these or any other measures or the likelihood of achieving widespread global vaccination rates as part of the broadscale efforts to contain or treat COVID-19 or future pandemics, there is likely to be an adverse impact on our potential customers, our employees and global economic conditions, and consumer confidence and spending, which could materially and adversely affect our operations and demand for our products.

The spread of COVID-19 has and may continue to impact our suppliers by disrupting the manufacturing, delivery and the overall supply chain of parts required to manufacture our quantum computers. In addition, various aspects of our business cannot be conducted remotely, such as the assembly of our quantum computers. These measures by government authorities may remain in place for a significant period of time and they are likely to continue to adversely affect our future manufacturing plans, sales and marketing activities, business and results of operations. We may take further actions as may be required by government authorities or that we determine are in the best interests of our employees, suppliers, vendors and business partners.

Due to the fluid nature of the COVID-19 pandemic and uncertainties regarding the related economic impact are likely to result in sustained market turmoil, which could also negatively impact the company's business, financial condition and cash flows. The extent of COVID-19's effect on our operational and financial performance will depend on future developments, including the duration, spread and intensity of the pandemic, all of which are uncertain and difficult to predict considering the rapidly evolving landscape. As a result, it is not currently possible to ascertain the overall impact of COVID-19 on our business. However, if the pandemic continues to persist as a severe worldwide health crisis, the disease could negatively impact our business, financial condition results of operations and cash flows, and may also have the effect of heightening many of the other risks described in this "Risk Factors" section.

Even after the COVID-19 pandemic has subsided, we may continue to experience an adverse impact to our business as a result of COVID-19's global economic impact, including any recession that has occurred or may occur in the future and the uncertainty of the timing of the broader economic recovery to pre-pandemic levels.

Risks Related to Litigation and Government Regulation

State, federal and foreign laws and regulations related to privacy, data use and security could adversely affect us.

We are subject to state and federal laws and regulations related to privacy, data use and security. In addition, in recent years, there has been a heightened legislative and regulatory focus on data security, including requiring consumer notification in the event of a data breach. Legislation has been introduced in Congress and there have been several Congressional hearings addressing these issues. From time to time, Congress has considered, and may do so again, legislation establishing requirements for data security and response to data breaches that, if implemented, could affect us by increasing our costs of doing business. In addition, several states have enacted privacy or security breach legislation requiring varying levels of consumer notification in the event of a security breach. For example, the California Consumer Privacy Act ("CCPA"), which enhances consumer protection and privacy rights by granting consumers resident in California new rights with respect to the collection of their personal data and imposing new operational requirements on businesses, went into effect in January 2020. The CCPA includes a statutory damages framework and private rights of action against businesses that fail to comply with certain CCPA terms or implement reasonable security procedures and practices to prevent data breaches. Several other states are considering similar legislation. Foreign governments are raising similar privacy and data security concerns. In particular, the European Union enacted a General Data Protection Regulation ("GDPR") in May 2018 which imposes strict requirements on how we and third parties with whom we contract collect, share, export or otherwise process personal information, and provide for significant penalties for noncompliance. China, Russia, Japan and other countries in Latin America and Asia are also strengthening their privacy laws and the enforcement of privacy and data security requirements. Complying with such laws and regulations may be time-consuming and require additional resources, and could therefore harm our business, financial condition and results of operations.

We are subject to U.S. and foreign anti-corruption, anti-bribery and similar laws, and non-compliance with such laws can subject us to criminal or civil liability and harm our business.

We are subject to the U.S. Foreign Corrupt Practices Act of 1977, as amended, the U.S. domestic bribery statute contained in 18 U.S.C. § 201, the U.S. Travel Act, and other anti-bribery, and anti-corruption laws in countries in which we conduct activities. Anti-corruption and anti-bribery laws have been enforced aggressively in recent years and are interpreted broadly to generally prohibit companies, their employees, and their third-party intermediaries from authorizing, promising, offering, providing, soliciting, or accepting, directly or indirectly, improper payments or benefits to or from any person whether in the public or private sector. We may engage with partners and third-party intermediaries to market our services and to obtain necessary permits, licenses, and other regulatory approvals. In addition, we or our third-party intermediaries may have direct or indirect interactions with officials and employees of government agencies or state-owned or affiliated entities. We can be held liable for the corrupt or other illegal activities of these third-party intermediaries, and of our employees, representatives, contractors, partners, and agents, even if we do not explicitly authorize such activities. We cannot provide any assurance that all of our employees and agents will not take actions in violation of our policies and applicable law, for which we may be ultimately held responsible.

Detecting, investigating, and resolving actual or alleged violations of anti-corruption laws can require a significant diversion of time, resources, and attention from senior management. In addition, noncompliance with anti-corruption or anti-bribery laws could subject us to whistleblower complaints, investigations, sanctions, settlements, prosecution, enforcement actions, fines, damages, other civil or criminal penalties, injunctions, suspension or debarment from contracting with certain persons, reputational harm, adverse media coverage, and other collateral consequences.

We are subject to governmental export and import controls that could impair our ability to compete in international markets due to licensing requirements and subject us to liability if we are not in compliance with applicable laws.

Our products and technologies are subject to U.S. export control and import laws and regulations, including the U.S. Export Administration Regulations, U.S. Customs regulations, and various economic and trade sanctions regulations administered by the U.S. Treasury Department's Office of Foreign Assets Controls. U.S. export control and economic sanctions laws include restrictions or prohibitions on the sale or supply of certain products, technologies, and services to U.S. Government embargoed or sanctioned countries, governments, persons and entities. In addition, certain products and technology may be subject to export licensing or approval requirements. Exports of our products and technology must be made in compliance with export control and sanctions laws and regulations. If we fail to comply with these laws and regulations, we and certain of our employees could be subject to substantial civil or criminal penalties, including the possible loss of export or import privileges; fines, which may be imposed on us and responsible employees or managers; and, in extreme cases, the incarceration of responsible employees or managers.

In addition, changes in our products or technologies or changes in applicable export or import laws and regulations may create delays in the introduction and sale of our products and technologies in international markets or, in some cases, prevent the export or import of our products and technologies to certain countries, governments or persons altogether. Any change in export or import laws and regulations, shift in the enforcement or scope of existing laws and regulations, or change in the countries, governments, persons or technologies targeted by such laws and regulations, could also result in decreased use of our products and technologies, or in our decreased ability to export or sell our products and technologies to existing or potential customers. Any decreased use of our products and technologies or limitation on our ability to export or sell our products and technologies would likely adversely affect our business, financial condition and results of operations.

We expect to incur significant costs in complying with these regulations. Regulations related to quantum computing are currently evolving and we may face additional risks associated with changes to these regulations.

Our business is exposed to risks associated with litigation, investigations and regulatory proceedings.

We may in the future face legal, administrative and regulatory proceedings, claims, demands and/or investigations involving stockholder, consumer, competition and/or other issues relating to our business. Litigation and regulatory proceedings are inherently uncertain, and adverse rulings could occur, including monetary damages, or an injunction stopping us from engaging in certain business practices, or requiring other remedies, such as compulsory licensing of patents. For example, on January 12, 2021, dMY Technology Group, Inc. II, dMY Sponsor II, LLC, dMY and dMY Sponsor III, LLC (“Sponsor”) accepted service of a lawsuit where we are named as counterclaim defendants in an underlying action by and between GTY Technology Holdings, Inc. (“GTY”), dMY Technology Group, Inc. and dMY Sponsor, LLC, dMY Sponsor II, LLC, dMY Technology Group Inc. II, dMY and Sponsor (collectively, “dMY Defendants”) and Carter Glatt (“Glatt”) and Captains Neck Holdings LLC (“Captains Neck”), an entity of which Mr. Glatt is a member. The underlying lawsuit, filed by dMY Technology Group, Inc. and dMY Sponsor, LLC, seeks a declaratory judgment that Glatt and Captains Neck are not entitled to membership units of dMY Sponsor LLC, which was formed by Harry L. You, the co-founder and former President and Chief Financial Officer of GTY when Glatt was still working at GTY. The underlying lawsuit contains claims arising from Glatt’s termination of employment from GTY, including theft and misappropriation of confidential GTY information, breach of contract, breach of the duties of loyalty and fiduciary duty and conversion. Glatt has responded to the underlying lawsuit by adding members of the Sponsor and officers of dMY as additional counterclaim defendants (collectively with the dMY Defendants, Glatt and Captains Neck, the “Counterclaim Defendants”) and adding Dune Acquisition Holdings LLC, a newly formed special purpose acquisition company, as a counterclaimant and asserting claims for breach of contract, fraudulent misrepresentation, negligent misrepresentation, tortious interference with business relations, quantum meruit and unjust enrichment. The Counterclaim Defendants have denied the claims against them and have a motion to dismiss the suit.

An unfavorable outcome or settlement in a legal, administrative and regulatory proceeding may result in a material adverse impact on our business, results of operations, financial position and overall trends. In addition, regardless of the outcome, litigation can be costly, time-consuming, and disruptive to our operations. Any claims or litigation, even if fully indemnified or insured, could damage our reputation and make it more difficult to compete effectively or to obtain adequate insurance in the future. In addition, the laws and regulations our business is subject to are complex and change frequently. We may be required to incur significant expense to comply with changes in, or remedy violations of, these laws and regulations. Furthermore, while we maintain insurance for certain potential liabilities, such insurance does not cover all types and amounts of potential liabilities and is subject to various exclusions as well as caps on amounts recoverable. Even if we believe a claim is covered by insurance, insurers may dispute our entitlement to recovery for a variety of potential reasons, which may affect the timing and, if the insurers prevail, the amount of our recovery.

We may become subject to product liability claims, which could harm our financial condition and liquidity if we are not able to successfully defend or insure against such claims.

We may become subject to product liability claims, even those without merit, which could harm our business prospects, operating results, and financial condition. We may face inherent risk of exposure to claims in the event our quantum computers do not perform as expected or malfunction. A successful product liability claim against us could require us to pay a substantial monetary award. Moreover, a product liability claim could generate substantial negative publicity about our quantum computers and business and inhibit or prevent commercialization of other future quantum computers, which would have material adverse effects on our brand, business, prospects and operating results. Any insurance coverage might not be sufficient to cover all potential product liability claims. Any lawsuit seeking significant monetary damages either in excess of our coverage, or outside of our coverage, may have a material adverse effect on our reputation, business and financial condition. We may not be able to secure additional product liability insurance coverage on commercially acceptable terms or at reasonable costs when needed, particularly if we do face liability for our products and are forced to make a claim under our policy.

We are subject to requirements relating to environmental and safety regulations and environmental remediation matters which could adversely affect our business, results of operation and reputation.

We are subject to numerous federal, state and local environmental laws and regulations governing, among other things, solid and hazardous waste storage, treatment and disposal, and remediation of releases of hazardous materials. There are significant capital, operating and other costs associated with compliance with these environmental laws and regulations. Environmental laws and regulations may become more stringent in the future, which could increase costs of compliance or require us to manufacture with alternative technologies and materials.

Federal, state and local authorities also regulate a variety of matters, including, but not limited to, health, safety and permitting in addition to the environmental matters discussed above. New legislation and regulations may require us to make material changes to our operations, resulting in significant increases to the cost of production.

Our manufacturing process will have hazards such as but not limited to hazardous materials, machines with moving parts, and high voltage and/or high current electrical systems typical of large manufacturing equipment and related safety incidents. There may be safety incidents that damage machinery or product, slow or stop production, or harm employees. Consequences may include litigation, regulation, fines, increased insurance premiums, mandates to temporarily halt production, workers' compensation claims, or other actions that impact the company brand, finances, or ability to operate.

Risks Related to our Intellectual Property

Licensing of intellectual property is of critical importance to our business. For example, we license patents (some of which are foundational patents) and other intellectual property from the University of Maryland and Duke University on an exclusive basis. If the license agreement with these universities terminates, or if any of the other agreements under which we acquired or licensed, or will acquire or license, material intellectual property rights is terminated, we could lose the ability to develop and operate our business.

We are heavily reliant upon licenses to certain patent rights and other intellectual property from third parties that are important or necessary to the development of our products. In particular, our quantum computing technology is dependent on our license agreement with University of Maryland and Duke University (the "Universities"). Significant intellectual property developed by our co-founders, Jungsang Kim, our Chief Technology Officer, and Christopher Monroe, our Chief Scientist, has been and is required to be assigned to the Universities as a result of Dr. Kim and Dr. Monroe's employment by the Universities, and certain such intellectual property is licensed pursuant to the license agreement with the Universities. Pursuant to the license agreement with the Universities, we were granted an exclusive, worldwide, royalty-free, sublicenseable license for certain patents, know-how (on a non-exclusive basis) and other intellectual property to develop, manufacture and commercialize products for use in certain licensed fields, the scope of which includes the application of the licensed intellectual property in ion trap quantum computing.

Our existing license agreement with the Universities imposes, and we expect that any future license agreements will impose, upon us various commercial and development obligations. If we fail to comply with our obligations under these agreements, or we are subject to an insolvency-related event, the licensor may have the right to terminate these agreements, in which event we would not be able to develop, market or otherwise commercialize products covered by these agreements, including if any of the foregoing were to occur with respect to our license agreement with the Universities. Our business could significantly suffer, for example, if any current or future licenses terminate, if the licensors fail to abide by the terms of the license, if the licensed patents or other rights are found to be invalid or unenforceable, or if we are unable to enter into necessary licenses on acceptable terms.

Licensing of intellectual property is of critical importance to our business and involves complex legal, business and scientific issues, and certain provisions in intellectual property license agreements may be

susceptible to multiple interpretations. Disputes may arise between us and our licensors regarding intellectual property subject to a license agreement, including:

- the scope of rights granted under the license agreement and other interpretation-related issues;
- whether and the extent to which our technology and processes infringe on intellectual property of the licensor that is not subject to the licensing agreement;
- our right to sublicense patent and other rights to third parties;
- our diligence obligations with respect to the use of the licensed technology in relation to our development and commercialization of our product and technology, and what activities satisfy those diligence obligations;
- the ownership of inventions and know-how resulting from the joint creation or use of intellectual property by our licensors and the company;
- our right to transfer or assign the license; and
- the effects of termination.

The resolution of any contract interpretation disagreement that may arise could narrow what we believe to be the scope of our rights to the relevant intellectual property or technology, or increase what we believe to be our financial or other obligations under the relevant agreement, either of which could harm our business, financial condition and results of operations. Moreover, if disputes over intellectual property that we have licensed prevent or impair our ability to maintain our current licensing arrangements on acceptable terms, we may be unable to successfully develop and commercialize our products or technology.

While we would expect to exercise all rights and remedies available to us, including seeking to cure any breach by us, and otherwise seek to preserve our rights under the license agreement, we may not be able to do so in a timely manner, at an acceptable cost or at all.

If we are unable to obtain and maintain patent protection for our products and technology, or if the scope of the patent protection obtained is not sufficiently broad or robust, our competitors could develop and commercialize products and technology similar or identical to ours, and our ability to successfully commercialize our products and technology may be adversely affected. Moreover, our trade secrets could be compromised, which could cause us to lose the competitive advantage resulting from these trade secrets.

Our success depends, in significant part, on our ability to obtain, maintain, enforce and defend patents and other intellectual property rights, including trade secrets, with respect to our products and technology and to operate our business without infringing, misappropriating, or otherwise violating the intellectual property rights of others. We may not be able to prevent unauthorized use of our intellectual property. We rely upon a combination of the intellectual property protections afforded by patent, copyright, trademark and trade secret laws in the United States and other jurisdictions, as well as license agreements and other contractual protections, to establish, maintain and enforce rights in our proprietary technologies. In addition, we seek to protect our intellectual property rights through nondisclosure and invention assignment agreements with our employees and consultants, and through non-disclosure agreements with business partners and other third parties. Our trade secrets may also be compromised which could cause us to lose the competitive advantage from such trade secrets. Despite our efforts to protect our proprietary rights, third parties may attempt to copy or otherwise obtain and use our intellectual property. Monitoring unauthorized use of our intellectual property is difficult and costly, and the steps we have taken or will take to prevent misappropriation may not be sufficient. Any enforcement efforts we undertake, including litigation, could be time-consuming and expensive and could divert management's attention, which could harm our business, results of operations and financial condition. In addition, existing intellectual property laws and contractual remedies may afford less protection than needed to safeguard our intellectual property portfolio.

Patent, copyright, trademark and trade secret laws vary significantly throughout the world. A number of foreign countries do not protect intellectual property rights to the same extent as do the laws of the United States. Therefore, our intellectual property rights may not be as strong or as easily enforced outside of the United States and efforts to protect against the unauthorized use of our intellectual property rights, technology and other proprietary rights may be more expensive and difficult outside of the United States. Failure to adequately protect our intellectual property rights could result in our competitors using our intellectual property to offer products, potentially resulting in the loss of some of our competitive advantage and a decrease in our revenue which, would adversely affect our business, financial condition and operating results.

Our patent applications may not result in issued patents or our patent rights may be contested, circumvented, invalidated or limited in scope, any of which could have a material adverse effect on our ability to prevent others from interfering with our commercialization of our products.

Our patent applications may not result in issued patents, which may have a material adverse effect on our ability to prevent others from commercially exploiting products similar to ours. The status of patents involves complex legal and factual questions and the breadth of claims allowed is uncertain. As a result, we cannot be certain that the patent applications that we file will result in patents being issued, or that our patents and any patents that may be issued to us will afford protection against competitors with similar technology. Numerous patents and pending patent applications owned by others exist in the fields in which we have developed and are developing our technology. In addition to those who may have patents or patent applications directed to relevant technology with an effective filing date earlier than any of our existing patents or pending patent applications, any of our existing or pending patents may also be challenged by others on the basis that they are otherwise invalid or unenforceable. Furthermore, patent applications filed in foreign countries are subject to laws, rules and procedures that differ from those of the United States, and thus we cannot be certain that foreign patent applications related to issued U.S. patents will be issued.

Even if our patent applications succeed and we are issued patents in accordance with them, it is still uncertain whether these patents will be contested, circumvented, invalidated or limited in scope in the future. The rights granted under any issued patents may not provide us with meaningful protection or competitive advantages, and some foreign countries provide significantly less effective patent enforcement than in the United States. In addition, the claims under any patents that issue from our patent applications may not be broad enough to prevent others from developing technologies that are similar or that achieve results similar to ours. The intellectual property rights of others could also bar us from licensing and exploiting any patents that issue from our pending applications. In addition, patents issued to us may be infringed upon or designed around by others and others may obtain patents that it needs to license or design around, either of which would increase costs and may adversely affect our business, prospects, financial condition and operating results.

We may face patent infringement and other intellectual property claims that could be costly to defend, result in injunctions and significant damage awards or other costs (including indemnification of third parties or costly licensing arrangements (if licenses are available at all)) and limit our ability to use certain key technologies in the future or require development of non-infringing products, services, or technologies, which could result in a significant expenditure and otherwise harm our business.

We may become subject to intellectual property disputes. Our success depends, in part, on our ability to develop and commercialize our products, services and technologies without infringing, misappropriating or otherwise violating the intellectual property rights of third parties. However, we may not be aware that our products, services or technologies are infringing, misappropriating or otherwise violating third-party intellectual property rights and such third parties may bring claims alleging such infringement, misappropriation or violation. For example, there may be issued patents of which we are unaware, held by third parties that, if found to be valid and enforceable, could be alleged to be infringed by our current or future products, services or technologies. There also may be pending patent applications of which we are not aware that may result in issued patents, which could be alleged to be infringed by our current or future products, services or technologies. Because patent

applications can take years to issue and are often afforded confidentiality for some period of time there may currently be pending applications, unknown to us, that later result in issued patents that could cover our current or future products, services or technologies. Lawsuits can be time-consuming and expensive to resolve, and they divert management's time and attention. Numerous patents and pending patent applications owned by others exist in the fields in which we have developed and are developing our technology. Companies that have developed and are developing technology are often required to defend against litigation claims based on allegations of infringement, misappropriation or other violations of intellectual property rights. Our products, services or technologies may not be able to withstand any third-party claims against their use. In addition, many companies have the capability to dedicate substantially greater resources to enforce their intellectual property rights and to defend claims that may be brought against them. In a patent infringement claim against us, we may assert, as a defense, that we do not infringe the relevant patent claims, that the patent is invalid or both. The strength of our defenses will depend on the patents asserted, the interpretation of these patents, and our ability to invalidate the asserted patents. However, we could be unsuccessful in advancing non-infringement and/or invalidity arguments in our defense. In the United States, issued patents enjoy a presumption of validity, and the party challenging the validity of a patent claim must present clear and convincing evidence of invalidity, which is a high burden of proof. Conversely, the patent owner need only prove infringement by a preponderance of the evidence, which is a lower burden of proof. Our patent portfolio may not be large enough to deter patent infringement claims, and our competitors and others may now and in the future have significantly larger and more mature patent portfolios. Any litigation may also involve patent holding companies or other adverse patent owners that have no relevant solution revenue, and therefore, our patent portfolio may provide little or no deterrence as we would not be able to assert our patents against such entities or individuals. If a third party is able to obtain an injunction preventing us from accessing such third-party intellectual property rights, or if we cannot license or develop alternative technology for any infringing aspect of our business, we may be forced to limit or stop sales of our products, services or technologies or cease business activities related to such intellectual property.

Although we carry general liability insurance, our insurance may not cover potential claims of this type or may not be adequate to indemnify us for all liability that may be imposed. We cannot predict the outcome of lawsuits and cannot ensure that the results of any such actions will not have an adverse effect on our business, financial condition or results of operations. Any intellectual property litigation to which we might become a party, or for which we are required to provide indemnification, regardless of the merit of the claim or our defenses, may require us to do one or more of the following:

- cease selling or using solutions or services that incorporate the intellectual property rights that allegedly infringe, misappropriate or violate the intellectual property of a third party;
- make substantial payments for legal fees, settlement payments or other costs or damages;
- obtain a license, which may not be available on reasonable terms or at all, to sell or use the relevant technology;
- redesign the allegedly infringing solutions to avoid infringement, misappropriation or violation, which could be costly, time-consuming or impossible; or
- indemnify organizations using our platform or third-party service providers.

Even if the claims do not result in litigation or are resolved in our favor, these claims, and the time and resources necessary to resolve them, could divert the resources of our management and harm our business and operating results. Moreover, there could be public announcements of the results of hearings, motions or other interim proceedings or developments and if securities analysts or investors perceive these results to be negative, it could have a substantial adverse effect on the price of our common stock. The occurrence of infringement claims may grow as the market for our products, services and technologies grows. Accordingly, our exposure to damages resulting from infringement claims could increase and this could further exhaust our financial and management resources.

Some of our in-licensed intellectual property, including the intellectual property licensed from the Universities, has been conceived or developed through government-funded research and thus may be subject to federal regulations providing for certain rights for the U.S. government or imposing certain obligations on us, such as a license to the U.S. government under such intellectual property, “march-in” rights, certain reporting requirements and a preference for U.S.-based companies, and compliance with such regulations may limit our exclusive rights and our ability to contract with non-U.S. manufacturers.

Certain intellectual property rights that have been in-licensed pursuant to the license agreement with the Universities have been generated through the use of U.S. government funding and are therefore subject to certain federal regulations. As a result, the U.S. government may have certain rights to intellectual property embodied in our current or future product candidates pursuant to the Bayh-Dole Act of 1980, or the Patent and Trademark Law Amendment. These U.S. government rights include a non-exclusive, non-transferable, irrevocable worldwide license to use inventions for any governmental purpose. In addition, the U.S. government has the right, under certain limited circumstances, to require the licensor to grant exclusive, partially exclusive or non-exclusive licenses to any of these inventions to a third party if it determines that: (1) adequate steps have not been taken to commercialize the invention, (2) government action is necessary to meet public health or safety needs or (3) government action is necessary to meet requirements for public use under federal regulations (also referred to as “march-in rights”). The U.S. government also has the right to take title to these inventions if the licensor fails to disclose the invention to the government or fails to file an application to register the intellectual property within specified time limits. Intellectual property generated under a government funded program is also subject to certain reporting requirements, compliance with which may require us to expend substantial resources. In addition, the U.S. government requires that any products embodying any of these inventions or produced through the use of any of these inventions be manufactured substantially in the U.S., and the license agreement with the Universities requires that we comply with this requirement. This preference for U.S. industry may be waived by the federal agency that provided the funding if the owner or assignee of the intellectual property can show that reasonable but unsuccessful efforts have been made to grant licenses on similar terms to potential licensees that would be likely to manufacture the products substantially in the United States or that under the circumstances domestic manufacture is not commercially feasible. To the extent any of our owned or licensed future intellectual property is also generated through the use of U.S. government funding, the provisions of the Bayh-Dole Act may similarly apply.

Risks Related to an Investment in our Securities and Other General Matters

There may not be an active trading market for our common stock or public warrants, which may make it difficult to sell such securities.

It is possible that an active trading market will not develop or, if developed, that any market will not be sustained. This would make it difficult for you to sell shares of our common stock or public warrants at an attractive price or at all.

The market price of shares of our common stock or public warrants may be volatile, which could cause the value of your investment to decline.

Even if an active trading market develops, the market price of our common stock or public warrants may be highly volatile and could be subject to wide fluctuations. Securities markets worldwide experience significant price and volume fluctuations. The securities markets have experienced significant volatility as a result of the COVID-19 pandemic and Russia’s recent incursion into Ukraine, among other factors. Market volatility, as well as general economic, market or political conditions, could reduce the market price of shares of our common stock regardless of our operating performance. Our operating results could be below the expectations of public market analysts and investors due to a number of potential factors, including:

- variations in quarterly operating results or dividends, if any, to stockholders;
- additions or departures of key management personnel;
- publication of research reports about our industry;

- litigation and government investigations;
- changes or proposed changes in laws or regulations or differing interpretations or enforcement of laws or regulations affecting our business;
- adverse market reaction to any indebtedness incurred or securities issued in the future;
- changes in market valuations of similar companies;
- adverse publicity or speculation in the press or investment community;
- announcements by competitors of significant contracts, acquisitions, dispositions, strategic partnerships, joint ventures, or capital commitments; and
- the impact of the COVID-19 pandemic on our management, employees, partners, customers, and operating results.

In response, the market price of shares of our common stock or public warrants could decrease significantly. You may be unable to resell your shares of our common stock at or above your purchase price. Following periods of volatility in the overall market and the market price of a company's securities, securities class action litigation has often been instituted against such company. Such litigation, if instituted against us, could result in substantial costs and a diversion of management's attention and resources.

Unstable market and economic conditions may have serious adverse consequences on our business, financial condition and share price.

The global economy, including credit and financial markets, has experienced extreme volatility and disruptions, including severely diminished liquidity and credit availability, declines in consumer confidence, declines in economic growth, increases in unemployment rates, increases in inflation rates, higher interest rates and uncertainty about economic stability. For example, the COVID-19 pandemic resulted in widespread unemployment, economic slowdown and extreme volatility in the capital markets. Similarly, Russia's recent incursion of Ukraine has created extreme volatility in the global capital markets and is expected to have further global economic consequences, including disruptions of the global supply chain and energy markets. Any such volatility and disruptions may have adverse consequences on us or the third parties on whom we rely. If the equity and credit markets deteriorate, including as a result of political unrest or war, it may make any necessary debt or equity financing more difficult to obtain in a timely manner or on favorable terms, more costly or more dilutive. Increased inflation rates can adversely affect us by increasing our costs, including labor and employee benefit costs. In addition, higher inflation could also increase our customers' operating costs, which could result in reduced budgets for our customers and potentially less demand for our products and services. Any significant increases in inflation and related increase in interest rates could have a material adverse effect on our business, results of operations and financial condition.

Our ability to timely raise capital in the future may be limited, or may be unavailable on acceptable terms, if at all. The failure to raise capital when needed could harm our business, operating results and financial condition. Debt or equity issued to raise additional capital may reduce the value of our common stock.

We cannot be certain when or if the operations of our business will generate sufficient cash to fund our ongoing operations or the growth of our business. We intend to make investments to support our current business and may require additional funds to respond to business challenges, including the need to develop or enhance our technology, improve our operating infrastructure or acquire complementary businesses and technologies. Additional financing may not be available on favorable terms, if at all. If adequate funds are not available on acceptable terms, we may be unable to invest in future growth opportunities, which could harm our business, operating results and financial condition. If we incur debt, the debt holders could have rights senior to holders of our common stock to make claims on our assets. The terms of any debt could restrict our operations, including our ability to pay dividends on our common stock. If we issue additional equity securities, stockholders will

experience dilution, and the new equity securities could have rights senior to those of our common stock. Because the decision to issue securities in the future offering will depend on numerous considerations, including factors beyond our control, we cannot predict or estimate the amount, timing or nature of any future issuances of debt or equity securities. As a result, stockholders will bear the risk of future issuances of debt or equity securities reducing the value of their common stock and diluting their interest.

A small number of stockholders will continue to have substantial control over us, which may limit other stockholders' ability to influence corporate matters and delay or prevent a third party from acquiring control over us.

Our directors and executive officers of, and beneficial owners of 5% or more of our voting securities and their respective affiliates beneficially own, in the aggregate, approximately 39.3% of our outstanding common stock. This significant concentration of ownership may have a negative impact on the trading price for our common stock because investors often perceive disadvantages in owning stock in companies with controlling stockholders. In addition, these stockholders will be able to exercise influence over all matters requiring stockholder approval, including the election of directors and approval of corporate transactions, such as a merger or other sale of us or our assets. This concentration of ownership could limit stockholders' ability to influence corporate matters and may have the effect of delaying or preventing a change in control, including a merger, consolidation or other business combination, or discouraging a potential acquirer from making a tender offer or otherwise attempting to obtain control, even if that change in control would benefit the other stockholders.

There can be no assurance that we will be able to comply with the continued listing standards of the New York Stock Exchange ("NYSE").

If we fail to satisfy the continued listing requirements of NYSE, such as the corporate governance requirements or the minimum share price requirement, NYSE may take steps to delist our securities. Such a delisting would likely have a negative effect on the price of the securities and would impair your ability to sell or purchase the securities when you wish to do so. In the event of a delisting, we can provide no assurance that any action taken by us to restore compliance with listing requirements would allow our securities to become listed again, stabilize the market price or improve the liquidity of our securities, prevent our securities from dropping below the NYSE minimum share price requirement or prevent future non-compliance with NYSE's listing requirements. Additionally, if our securities are not listed on, or become delisted from, NYSE for any reason, and are quoted on the OTC Bulletin Board, an inter-dealer automated quotation system for equity securities that is not a national securities exchange, the liquidity and price of our securities may be more limited than if we were quoted or listed on NYSE or another national securities exchange. You may be unable to sell your securities unless a market can be established or sustained.

If we are unable to implement and maintain effective internal control over financial reporting in the future, investors may lose confidence in the accuracy and completeness of financial reports, and the market price of our common stock may decline.

We are required to maintain internal controls over financial reporting and to report any material weaknesses in such internal controls. The process of designing, implementing, and testing the internal control over financial reporting required to comply with this obligation is time-consuming, costly, and complicated. If we are unable to remediate any existing material weaknesses or if we identify additional material weaknesses in our internal control over financial reporting, if we are unable to comply with the requirements of Section 404 of Sarbanes-Oxley in a timely manner, or if we are unable to assert that our internal control over financial reporting is effective, we will be unable to certify that our internal control over financial reporting is effective. We cannot assure you that there will not be additional material weaknesses or significant deficiencies in our internal control over financial reporting in the future. Any failure to maintain internal control over financial reporting could severely inhibit our ability to accurately report our financial condition or results of operations. If we are unable to conclude that our internal control over financial reporting is effective, investors may lose confidence in the

accuracy and completeness of our financial reports and the market price of our common stock could decline. We could become subject to investigations by the NYSE, the SEC or other regulatory authorities, which could require additional financial and management resources.

If our operating and financial performance in any given period does not meet the guidance provided to the public or the expectations of investment analysts, the market price of our common stock may decline.

We may, but are not obligated to, provide public guidance on our expected operating and financial results for future periods. Any such guidance will consist of forward-looking statements, subject to the risks and uncertainties described in this filing and in our other public filings and public statements. The ability to provide this public guidance, and the ability to accurately forecast our results of operations, may be impacted by the COVID-19 pandemic. Our actual results may not always be in line with or exceed any guidance we have provided, especially in times of economic uncertainty, such as the current global economic uncertainty being experienced as a result of the COVID-19 pandemic. If, in the future, our operating or financial results for a particular period do not meet any guidance provided or the expectations of investment analysts, or if we reduce our guidance for future periods, the market price of our common stock may decline as well. Even if we do issue public guidance, there can be no assurance that we will continue to do so in the future.

Our quarterly operating results may fluctuate significantly and could fall below the expectations of securities analysts and investors due several factors, some of which are beyond our control, resulting in a decline in our stock price.

Our quarterly operating results may fluctuate significantly because of several factors, including:

- labor availability and costs for hourly and management personnel;
- profitability of our products, especially in new markets;
- changes in interest rates;
- impairment of long-lived assets;
- macroeconomic conditions, both nationally and locally;
- size and scope of our revenue arrangements with our customers;
- negative publicity relating to products we serve;
- changes in consumer preferences and competitive conditions;
- expansion to new markets; and
- fluctuations in commodity prices.

We will incur significant increased expenses and administrative burdens as a public company, which could negatively impact our business, financial condition and results of operations.

We face increased legal, accounting, administrative and other costs and expenses as a public company that we did not incur as a private company. Sarbanes-Oxley, including the requirements of Section 404, as well as rules and regulations subsequently implemented by the SEC, the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 and the rules and regulations promulgated and to be promulgated thereunder, the PCAOB and the securities exchanges, impose additional reporting and other obligations on public companies. Compliance with public company requirements will increase costs and make certain activities more time-consuming. A number of those requirements require us to carry out activities we have not done previously. For example, we have created new board committees and adopted new internal controls and disclosure controls and procedures.

If any issues in complying with SEC reporting requirements are identified (for example, if we identify an additional material weakness or significant deficiency or fail to remediate any existing material weaknesses in the internal control over financial reporting), we could incur additional costs rectifying those issues, and the existence of those issues could harm our reputation or investor perceptions of us. Further, the costs to maintain our director and officer liability insurance may continue to rise to unprecedented levels. Risks associated with our status as a public company may make it more difficult to attract and retain qualified persons to serve on our board of directors or as executive officers. The additional reporting and other obligations imposed by these rules and regulations will increase legal and financial compliance costs and the costs of related legal, accounting and administrative activities. These increased costs will require us to divert a significant amount of money that could otherwise be used to expand our business and achieve strategic objectives. Advocacy efforts by stockholders and third parties may also prompt additional changes in governance and reporting requirements, which could further increase costs.

We qualify as an emerging growth company as well as a smaller reporting company. The reduced public company reporting requirements applicable to emerging growth companies may make our common stock less attractive to investors.

We qualify as an emerging growth company under SEC rules. As an emerging growth company, we are permitted and plan to rely on exemptions from certain disclosure requirements that are applicable to other public companies that are not emerging growth companies. These provisions include: (1) presenting only two years of audited financial statements; (2) presenting only two years of related selected financial data and “Management’s Discussion and Analysis of Financial Condition and Results of Operations” disclosure; (3) an exemption from compliance with the auditor attestation requirement in the assessment of internal control over financial reporting pursuant to Section 404 of Sarbanes-Oxley; (4) not being required to comply with any requirement that may be adopted by the PCAOB regarding mandatory audit firm rotation or a supplement to the auditor’s report providing additional information about the audit and the financial statements; (5) reduced disclosure obligations regarding executive compensation arrangements in periodic reports, registration statements, and proxy statements; and (6) exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved. As a result, the information we provide will be different than the information that is available with respect to other public companies that are not emerging growth companies. If some investors find our common stock less attractive as a result, there may be a less active trading market for our common stock, and the market price of our common stock may be more volatile. We will remain an emerging growth company until the earliest of: (1) December 31, 2025; (2) the last day of the fiscal year in which we have gross revenue exceeding \$1.07 billion; (3) the date on which we have issued more than \$1.0 billion in non-convertible debt securities during the prior three year period; and (4) the last day of the year in which we are deemed to be a large accelerated filer, which means the market value of our common stock held by non-affiliates exceeds \$700 million as of the prior June 30th.

Additionally, we qualify as a “smaller reporting company” as defined in Item 10(f)(1) of Regulation S-K. Smaller reporting companies may take advantage of certain reduced disclosure obligations, including, among other things, providing only two years of audited financial statements. We will remain a smaller reporting company until the last day of the fiscal year in which (i) the market value of common stock held by non-affiliates exceeds \$250 million as of the end of that year’s second fiscal quarter, or (ii) our annual revenues exceeded \$100 million during such completed fiscal year and the market value of common stock held by non-affiliates equals or exceeds \$700 million as of the end of that year’s second fiscal quarter. To the extent we take advantage of such reduced disclosure obligations, we may also make comparison of our financial statements with other public companies difficult or impossible.

A significant portion of our total outstanding shares of common stock are restricted from immediate resale but may be sold into the market in the near future. This could cause the market price of common stock to drop significantly, even if our business is doing well.

Shares of our common stock that are currently restricted from immediate resale may be sold into the market in the near future. These sales, or the perception in the market that the holders of a large number of shares intend to sell shares, could reduce the market price of common stock. We are unable to predict the effect that sales may have on the prevailing market price of our common stock or our public warrants.

To the extent our warrants, additional shares of common stock will be issued, which will result in dilution to the holders of common stock and increase the number of shares eligible for resale in the public market. Sales, or the potential sales, of substantial numbers of shares in the public market by the securityholders, subject to certain restrictions on transfer until the termination of applicable lock-up periods, could increase the volatility of the market price of common stock or adversely affect the market price of our common stock.

We may issue additional shares of common stock or other equity securities without your approval, which would dilute your ownership interests and may depress the market price of our common stock.

We have warrants outstanding to purchase an aggregate of 13,534,220 shares of common stock. Pursuant to our employee benefit plans, we may issue an aggregate of up to 31,589,000 shares of common stock, which amount may be subject to increase from time to time. We may also issue additional shares of common stock or other equity securities of equal or senior rank in the future in connection with, among other things, future acquisitions or repayment of outstanding indebtedness, without stockholder approval, in a number of circumstances.

The issuance of additional shares or other equity securities of equal or senior rank would have the following effects:

- existing stockholders' proportionate ownership interest in us will decrease;
- the amount of cash available per share, including for payment of dividends, if any, may decrease;
- the relative voting strength of each previously outstanding common stock may be diminished; and
- the market price of our common stock may decline.

There is no guarantee that the public warrants will be in the money, and they may expire worthless.

The exercise price for our public warrants is \$11.50 per share of common stock. There is no guarantee that the public warrants will be in the money prior to their expiration, and as such, the public warrants may expire worthless.

We may amend the terms of the public warrants in a manner that may be adverse to holders with the approval by the holders of at least 50% of the then-outstanding public warrants. As a result, the exercise price of your public warrants could be increased, the exercise period could be shortened and the number of shares of our common stock purchasable upon exercise of a public warrant could be decreased, all without your approval.

Our public warrants are issued in registered form under the Warrant Agreement between the warrant agent and us. The Warrant Agreement provides that the terms of the public warrants may be amended without the consent of any holder to cure any ambiguity or correct any defective provision, but requires the approval by the holders of at least 50% of the then-outstanding public warrants to make any change that adversely affects the interests of the registered holders of public warrants. Accordingly, we may amend the terms of the public warrants in a manner adverse to a holder if holders of at least 50% of the then-outstanding public warrants approve of such amendment. Although our ability to amend the terms of the public warrants with the consent of

at least 50% of the then- outstanding public warrants is unlimited, examples of such amendments could be amendments to, among other things, increase the exercise price of the warrants, convert the public warrants into cash or stock (at a ratio different than initially provided), shorten the exercise period or decrease the number of shares of our common stock purchasable upon exercise of a public warrant.

We may redeem unexpired public warrants prior to their exercise at a time that is disadvantageous to warrant holders, thereby making such warrants worthless.

We have the ability to redeem outstanding public warrants prior to their expiration, at a price of \$0.01 per warrant, provided that the last reported sales price of our common stock equals or exceeds \$18.00 per share (as adjusted for stock splits, stock dividends, reorganizations, recapitalizations and the like) for any 20 trading days within a 30-trading day period ending on the third trading day prior to the date on which we give proper notice of such redemption and provided certain other conditions are met. If and when the public warrants become redeemable by us, we may exercise our redemption right even if we are unable to register or qualify the underlying securities for sale under all applicable state securities laws. Redemption of the outstanding public warrants could force you (a) to exercise your public warrants and pay the exercise price therefor at a time when it may be disadvantageous for you to do so, (b) to sell your public warrants at the then-current market price when you might otherwise wish to hold your public warrants or (c) to accept the nominal redemption price which, at the time the outstanding public warrants are called for redemption, is likely to be substantially less than the market value of your public warrants.

In addition, we may redeem your public warrants after they become exercisable for a number of shares of common stock determined based on the redemption date and the fair market value of our common stock. Any such redemption may have similar consequences to a cash redemption described above. In addition, such redemption may occur at a time when the public warrants are “out-of-the-money,” in which case, you would lose any potential embedded value from a subsequent increase in the value of our common stock had your public warrants remained outstanding.

We have no current plans to pay cash dividends on our common stock; as a result, stockholders may not receive any return on investment unless they sell their common stock for a price greater than the purchase price.

We have no current plans to pay dividends on our common stock. Any future determination to pay dividends will be made at the discretion of our board of directors, subject to applicable laws. It will depend on a number of factors, including our financial condition, results of operations, capital requirements, contractual, legal, tax and regulatory restrictions, general business conditions, and other factors that the board of directors may deem relevant. In addition, the ability to pay cash dividends may be restricted by the terms of debt financing arrangements, as any future debt financing arrangement likely will contain terms restricting or limiting the amount of dividends that may be declared or paid on our common stock. As a result, stockholders may not receive any return on an investment in our common stock unless they sell their shares for a price greater than that which they paid for them.

Provisions in our organizational documents and certain rules imposed by regulatory authorities may delay or prevent an acquisition by a third party that could otherwise be in the interests of stockholders.

Our second amended and restated certificate of incorporation (“Certificate of Incorporation”) and amended and restated bylaws (“Bylaws”) contain several provisions that may make it more difficult or expensive for a third party to acquire control of us without the approval of the board of directors. These provisions, which may delay, prevent or deter a merger, acquisition, tender offer, proxy contest, or other transaction that stockholders may consider favorable, include the following:

- a classified board;
- advance notice for nominations of directors by stockholders and for stockholders to include matters to be considered at our annual meetings;

- certain limitations on convening special stockholder meetings;
- limiting the persons who may call special meetings of stockholders;
- limiting the ability of stockholders to act by written consent;
- restrictions on business combinations with interested stockholder;
- in certain cases, the approval of holders representing at least 66 2/3% of the total voting power of the shares entitled to vote generally in the election of directors will be required for stockholders to adopt, amend or repeal the Bylaws, or amend or repeal certain provisions of the Certificate of Incorporation;
- no cumulative voting;
- the required approval of holders representing at least 66 2/3% of the total voting power of the shares entitled to vote at an election of the directors to remove directors; and
- the ability of the board of directors to designate the terms of and issue new series of preferred stock without stockholder approval, which could be used, among other things, to institute a rights plan that would have the effect of significantly diluting the stock ownership of a potential hostile acquirer, likely preventing acquisitions.

These provisions of our Certificate of Incorporation and Bylaws could discourage potential takeover attempts and reduce the price that investors might be willing to pay for shares of our common stock in the future, which could reduce the market price of our common stock.

The provision of our Certificate of Incorporation requiring exclusive venue in the Court of Chancery in the State of Delaware and the federal district courts of the United States for certain types of lawsuits may have the effect of discouraging lawsuits against directors and officers.

Our Certificate of Incorporation provides that, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware shall be the sole and exclusive forum for:

- any derivative action or proceeding brought on behalf of us;
- any action asserting a claim of breach of fiduciary duty owed by any director, officer, agent or other employee or stockholder to us or our stockholders;
- any action asserting a claim arising pursuant to any provision of the Delaware General Corporation Law (the “DGCL”), the Certificate of Incorporation or Bylaws or as to which the DGCL confers jurisdiction on the Court of Chancery of the State of Delaware;
- any claim or cause of action seeking to interpret, apply, enforce or determine the validity of the Certificate of Incorporation or the Bylaws; or
- any action asserting a claim governed by the internal affairs doctrine, in each case subject to such Court of Chancery having personal jurisdiction over the indispensable parties named as defendants therein. It further provides that, unless we consent in writing to the selection of an alternative forum, the federal district courts of the United States shall, to the fullest extent permitted by law, be the sole and exclusive forum for the resolutions of any complaint asserting a cause of action arising under the Securities Act. The exclusive forum clauses described above shall not apply to suits brought to enforce a duty or liability created by the Securities Exchange Act of 1934, or any other claim for which the federal courts have exclusive jurisdiction. Although these provisions are expected to benefit us by providing increased consistency in the application of applicable law in the types of lawsuits to which they apply, the provisions may have the effect of discouraging lawsuits against directors and officers. The enforceability of similar choice of forum provisions in other companies’ certificates of incorporation have been challenged in legal proceedings and there is uncertainty as to whether a court would enforce such provisions. In addition, investors cannot waive compliance with the federal securities laws and the

rules and regulations thereunder. It is possible that, in connection with any applicable action brought against us, a court could find the choice of forum provisions contained in our Certificate of Incorporation to be inapplicable or unenforceable in such action. If so, we may incur additional costs associated with resolving such action in other jurisdictions, which could harm our business, financial condition or results of operations.

These provisions of our Certificate of Incorporation and Bylaws could discourage lawsuits against directors and officers, which could reduce the market price of our common stock.

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties.

Our only current facility is our corporate headquarters, located in College Park, Maryland, where we lease approximately 32,000 square feet of space from the University of Maryland under an agreement that expires in 2030. Most of the facility is used for research and development and manufacturing. We believe this facility is adequate to meet our current ongoing needs. However, in order to accommodate anticipated growth and to recruit and retain top talent around the globe, we anticipate seeking additional facilities in various locations. We anticipate that we will be able to obtain additional space as needed under commercially reasonable terms.

Item 3. Legal Proceedings.

From time to time, we may become involved in various legal proceedings arising in the ordinary course of our business. Refer to Note 9, Commitments and Contingencies, included in Part II, Item 8 of this Annual Report for a description of current legal proceedings.

Item 4. Mine Safety Disclosures.

None.

PART II

Item 5. Market for Registrant’s Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities.

Market Information

Prior to the closing of our business combination, dMY common stock, units and warrants were listed on the NYSE under the symbols DMYI,” “DMYI-UN” and “DMYI-WT,” respectively. On September 30, 2021, our common stock and public warrants began trading on the NYSE under the symbols “IONQ” and “IONQ WS,” respectively. We no longer have any outstanding units.

Holder

As of March 15, 2022, there were approximately 181 stockholders of record. The actual number of stockholders is greater than this number of record holders, and includes stockholders who are beneficial owners, but whose shares are held in street name by brokers and other nominees. This number of holders of record also does not include stockholders whose shares may be held in trust by other entities.

Dividend Policy

We have never declared or paid any cash dividends on our capital stock and do not anticipate paying any cash dividends in the foreseeable future. Payment of cash dividends, if any, in the future will be at the discretion of our board of directors and will depend on then-existing conditions, including our financial condition, operating results, contractual restrictions, capital requirements, business prospects and other factors our board of directors may deem relevant.

Recent Sales of Unregistered Equity Securities

None.

Use of Proceeds from the IPO

On November 17, 2020, dMY consummated its initial public offering of 30,000,000 units, consisting of shares of common stock and warrants to purchase shares of common stock, generating total gross proceeds of \$300.0 million. After deducting payments to existing stockholders of \$9.5 million in connection with their exercise of redemption rights prior to the closing of the business combination and expenses related to the business combination, the remainder of the trust account is now held on our balance sheet to fund our operations and continued growth.

Purchases of Equity Securities by the Issuer and Affiliated Purchasers

None.

Item 6. [Reserved].

Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations.

This Annual Report contains statements that may constitute “forward-looking statements” within the meaning of Section 27A of the Securities Act of 1933, as amended (the “Securities Act”), and Section 21E of the Securities Exchange Act of 1934, as amended (the “Exchange Act”), that involve substantial risks and uncertainties. All statements contained in this Annual Report other than statements of historical fact, including statements regarding our future results of operations and financial position, our business strategy and plans, and our objectives for future operations, are forward-looking statements. The words “believes,” “expects,” “intends,” “estimates,” “projects,” “anticipates,” “will,” “plan,” “may,” “should,” or similar language are intended to identify forward-looking statements.

It is routine for our internal projections and expectations to change throughout the year, and any forward-looking statements based upon these projections or expectations may change prior to the end of the next quarter or year. Readers of this Annual Report are cautioned not to place undue reliance on any such forward-looking statements. As a result of a number of known and unknown risks and uncertainties, our actual results or performance may be materially different from those expressed or implied by these forward-looking statements. Risks and uncertainties are identified under “Risk Factors” in Item 1A herein and in our other filings with the Securities and exchange Commission (the “SEC”). All forward-looking statements included herein are made only as of the date hereof. Unless otherwise required by law, we do not undertake, and specifically disclaim, any obligation to update any forward-looking statement, whether as a result of new information, future events, or otherwise after the date of such statement.

You should read the following discussion and analysis of our financial condition and results of operations together with our audited consolidated financial statements and related notes included elsewhere in this Annual Report. Unless the context otherwise requires, the terms “IonQ,” “Legacy IonQ” “we,” “us,” “our” and similar terms refer to IonQ Quantum, Inc. prior to the consummation of the business combination and IonQ, Inc. and its wholly owned subsidiary, IonQ Quantum, Inc., after the consummation of the business combination. References to “dMY” refer to the predecessor company prior to the consummation of the business combination.

Overview

We are developing quantum computers designed to solve the world’s most complex problems, and transform business, society, and the planet for the better. We believe that our proprietary technology, our architecture, and the technology exclusively available to us through license agreements will offer us advantages both in terms of research and development, as well as the commercial value of our intended product offerings. We sell access to a quantum computer with 20 qubits, and we are in the process of researching and developing technologies for quantum computers with increasing computational capabilities. We currently make access to our quantum computers available via three major cloud platforms, Amazon Web Services’ (“AWS”) Amazon Braket, Microsoft’s Azure Quantum, and Google’s Cloud Marketplace, and to select customers via our own cloud service.

We are still in the early stages of generating revenue with our 20-qubit quantum computer. We have incurred significant operating losses since our inception. Our net losses were \$106.2 million for the year ended December 31, 2021. As of December 31, 2021, we had an accumulated deficit of \$145.8 million. We expect to continue to incur losses for the foreseeable future as we prioritize reaching the technical milestones necessary to achieve increasingly higher number of stable qubits and higher levels of fidelity than that which presently exists—prerequisites for quantum computing to reach broad quantum advantage.

The Merger Agreement and Public Company Costs

On March 7, 2021, Legacy IonQ, dMY and Ion Trap Acquisition Inc. (the “Merger Sub”) entered into an Agreement and Plan of Merger (the “Merger Agreement”). Pursuant to the Merger Agreement, at the closing, the

Merger Sub was merged with and into Legacy IonQ, with Legacy IonQ continuing as the surviving corporation following the merger, being a wholly owned subsidiary of dMY and the separate corporate existence of the Merger Sub ceased. Commensurate with the business combination, dMY changed its name to IonQ, Inc. and Legacy IonQ changed its name to IonQ Quantum, Inc. IonQ became the successor registrant with the SEC, meaning that Legacy IonQ's financial statements for previous periods will be disclosed in the registrant's future periodic reports filed with the SEC.

While the legal acquirer in the Merger Agreement is dMY, for financial accounting and reporting purposes under accounting principles generally accepted in the United States of America ("U.S. GAAP"), Legacy IonQ is the accounting acquirer and the merger is accounted for as a "reverse recapitalization" (i.e., a capital transaction involving the issuance of stock by dMY for the stock of Legacy IonQ). A reverse recapitalization does not result in a new basis of accounting, and the financial statements of the Company represent the continuation of the financial statements of Legacy IonQ in many respects. Under this method of accounting, dMY is treated as the "acquired" company for financial reporting purposes.

Upon the closing of the merger and the concurrent private placement of 34,500,000 shares of common stock (the "PIPE"), the most significant change in our financial position and results of operations was an increase in cash (as compared to our balance sheet as of December 31, 2020) of approximately \$363 million, which included \$345 million in gross proceeds from the PIPE. Total direct and incremental transaction costs of dMY and Legacy IonQ were approximately \$52 million, substantially all of which were offset to additional-paid-in-capital as costs related to the reverse recapitalization.

As a result of the merger, Legacy IonQ is the successor to an SEC registrant and is listed on the New York Stock Exchange ("NYSE"), which will require IonQ to hire additional personnel and implement procedures and processes to address public company regulatory requirements and customary practices. As a public company, we have incurred and expect to continue to incur, expenses for, among other things, directors' and officers' liability insurance, director fees and additional internal and external accounting, legal and administrative resources, including increased audit and legal fees.

Impact of COVID-19 on Our Business

In March 2020, the COVID-19 outbreak was declared a pandemic by the World Health Organization. There are many uncertainties regarding the ongoing pandemic, and we are closely monitoring its impact on all aspects of our business, including how it impacts our employees, suppliers, vendors, and business partners. The pandemic has resulted in government authorities implementing numerous measures to try to contain the virus, such as travel bans and restrictions, quarantines, stay-at-home or shelter-in-place orders, and business shutdowns. These measures may adversely impact our employees and operations and the operations of suppliers and business partners. In addition, various aspects of our business cannot be conducted remotely. These measures by government authorities may continue to remain in place for a significant period of time and could adversely affect our development plans, sales and marketing activities, and business operations.

The evolution of the virus is unpredictable at this point and any resurgence may slow down our ability to develop our quantum computing program. The ongoing COVID-19 pandemic could limit the ability of suppliers and business partners to perform, including third-party suppliers' ability to provide components and materials. We may also experience an increase in the cost of raw materials. The full impact of the COVID-19 pandemic continues to evolve. As such, the full magnitude of the pandemic's effect on our financial condition, liquidity and future results of operations is uncertain. Management continues to actively monitor our financial condition, liquidity, operations, suppliers, industry, and workforce.

Key Components of Results of Operations

Revenue

We have generated limited revenues since our inception. We derive revenue from providing access to quantum computing as a service ("QCaaS") and professional services related to co-developing algorithms on our

quantum computing systems. In arrangements with the cloud service providers, the cloud service provider is considered the customer and we do not have any contractual relationships with the cloud service providers' end users.

We have determined that our QCaaS contracts represent a combined, stand-ready performance obligation to provide access to our quantum computing systems together with related maintenance and support. The transaction price for our contracts generally includes a variable fee based on usage of our quantum computing systems and may include a fixed fee for a minimum volume of usage to be made available over a defined period of access. Fixed fee arrangements may also include a variable component whereby customers pay an amount for usage over contractual minimums contained in the contracts. For contracts with a fixed transaction price, the fixed fee is recognized as QCaaS subscription-based revenues on a straight-line basis over the access period. For contracts without fixed fees, variable usage fees are billed and recognized during the period of such usage.

We are currently focused on marketing our QCaaS and have entered into, and are continuing to enter into new contracts with customers.

Operating Costs and Expenses

Cost of revenue

Cost of revenue primarily consists of expenses related to delivering our services, including personnel-related expenses, allocated facility and other costs for customer facing functions, and costs associated with maintaining the cloud on which the QCaaS resides beginning in the period that QCaaS revenue generating activities began. Personnel-related expenses include salaries, benefits, and stock-based compensation. Cost of revenue excludes depreciation and amortization related to our quantum computing systems and related software.

Research and development

Research and development expenses consist of personnel-related expenses, including salaries, benefits and stock-based compensation, and allocated facility and other costs for our research and development functions. Unlike a standard computer, design and development efforts continue throughout the useful life of our quantum computing systems to ensure proper calibration and optimal functionality. Research and development expenses also include purchased hardware and software costs related to quantum computing systems constructed for research purposes that are not probable of providing future economic benefit and have no alternate future use as well as costs associated with third-party research and development arrangements.

Sales and marketing

Sales and marketing and marketing expenses consist of personnel-related expenses, including salaries, benefits and stock-based compensation, costs for direct advertising, marketing and promotional expenditures and allocated facility and other costs for our sales and marketing functions. We expect to continue to make the necessary sales and marketing investments to enable us to increase our market penetration and expand our customer base.

General and administrative

General and administrative expenses consist of personnel-related expenses, including salaries, benefits and stock-based compensation, and allocated facility and other costs for our corporate, executive, finance, and other administrative functions. General and administrative expenses also include expenses for outside professional services, including legal, auditing and accounting services, recruitment expenses, information technology, travel expenses and certain non-income taxes, insurance, and other administrative expenses.

We expect our general and administrative expenses to increase for the foreseeable future as we scale headcount with the growth of our business, and as a result of operating as a public company, including

compliance with the rules and regulations of the SEC, NYSE, legal, audit, additional insurance expenses, investor relations activities, and other administrative and professional services. As a result, we expect that our general and administrative expenses will increase in absolute dollars but may fluctuate as a percentage of total revenue over time.

Depreciation and amortization

Depreciation and amortization expense results from depreciation and amortization of our property and equipment and intangible assets that is recognized over their estimated lives.

Nonoperating Costs and Expenses

Change in fair value of warrant liabilities

The change in fair value of warrant liabilities consists of mark-to-market fair value adjustments recorded associated with the public and private placement warrants assumed as part of the business combination.

Offering costs associated with warrants

Offering costs associated with warrants consist of transaction costs that have been allocated to the public and private warrants and were expensed upon consummation of the business combination on September 30, 2021 based on the relative fair value of the equity issued and the liability-classified warrants.

Other income (expense), net

Other income (expense), net consists of income earned on our money market funds and other available for sale investments offset by certain other expenses.

Results of Operations

The following table sets forth our statements of operations for the periods indicated:

	Year Ended December 31,	
	2021	2020
	(in thousands)	
Revenue	\$ 2,099	\$ —
Costs and expenses:		
Cost of revenue (excluding depreciation and amortization) ⁽¹⁾	1,040	143
Research and development ⁽¹⁾	20,228	10,157
Sales and marketing ⁽¹⁾	3,233	486
General and administrative ⁽¹⁾	13,737	3,547
Depreciation and amortization	2,548	1,400
Total operating costs and expenses	<u>40,786</u>	<u>15,733</u>
Loss from operations	(38,687)	(15,733)
Change in fair value of warrant liabilities	(63,332)	—
Offering costs associated with warrants	(4,259)	—
Other income (expense), net	92	309
Loss before benefit for income taxes	(106,186)	(15,424)
Benefit for income taxes	—	—
Net loss	<u>\$(106,186)</u>	<u>\$(15,424)</u>

- (1) Cost of revenue, research and development, sales and marketing, and general and administrative expenses for the periods include stock-based compensation expense as follows:

	<u>Year Ended December 31,</u>	
	<u>2021</u>	<u>2020</u>
	(in thousands)	
Cost of revenue	\$ 62	\$—
Research and development	2,841	716
Sales and marketing	67	—
General and administrative	4,778	508

Comparison of the Year Ended December 31, 2021 and 2020

Revenue

	<u>Year Ended December 31,</u>		<u>\$ Change</u>	<u>% Change</u>
	<u>2021</u>	<u>2020</u>		
	(in thousands)			
Revenue	\$2,099	\$—	\$2,099	100%

Revenue increased by \$2.1 million, or 100%, to \$2.1 million for the year ended December 31, 2021 from zero for the year ended December 31, 2020. The increase was primarily driven by four revenue contracts under which we provided services during the year ended December 31, 2021. While we generated revenue in 2020, we executed an arrangement with a customer for the issuance of a warrant to purchase shares of Legacy IonQ Series B-1 convertible redeemable preferred stock. The warrant was evaluated and considered to represent consideration provided to a customer and as such, the recognition of the warrant expense is recorded as a reduction in revenue as revenue is earned under the contract. The increase in revenue in 2021 was also partially due to the contract asset related to the warrant being fully amortized during the year. See Note 11—Warrant Transaction Agreement to our consolidated financial statements for additional information.

Cost of revenue

	<u>Year Ended December 31,</u>		<u>\$ Change</u>	<u>% Change</u>
	<u>2021</u>	<u>2020</u>		
	(in thousands)			
Cost of revenue (excluding depreciation and amortization)	\$1,040	\$143	\$897	627%

Cost of revenue increased by \$0.9 million, or 627%, to \$1.0 million for the year ended December 31, 2021 from \$0.1 million for the year ended December 31, 2020. The increase was driven by the increase in costs to service active contracts for the year ended December 31, 2021.

Research and development

	<u>Year Ended December 31,</u>		<u>\$ Change</u>	<u>% Change</u>
	<u>2021</u>	<u>2020</u>		
	(in thousands)			
Research and development	\$20,228	\$10,157	\$10,071	99%

Research and development expense increased by \$10.1 million, or 99%, to \$20.2 million for the year ended December 31, 2021 from \$10.2 million for the year ended December 31, 2020. The increase was primarily driven

by a \$4.9 million increase in payroll-related expenses, including stock-based compensation of \$2.1 million, as a result of increased headcount, a \$1.3 million increase due to amortization of the Duke and UMD research and development arrangements, a \$1.3 million increase in materials, supplies and equipment costs, and a \$2.6 million increase in miscellaneous other research and development expenses.

Sales and marketing

	<u>Year Ended December 31,</u>		<u>\$ Change</u>	<u>% Change</u>
	<u>2021</u>	<u>2020</u>		
	<u>(in thousands)</u>			
Sales and marketing	\$3,233	\$486	\$2,747	565%

Sales and marketing expense increased by \$2.7 million, or 565%, to \$3.2 million for the year ended December 31, 2021 from \$0.5 million for the year ended December 31, 2020. The increase was primarily due to increased costs to promote service offerings and other marketing initiatives of approximately \$2.0 million and an increase of \$0.8 million of payroll-related expenses as a result of increased headcount.

General and administrative

	<u>Year Ended December 31,</u>		<u>\$ Change</u>	<u>% Change</u>
	<u>2021</u>	<u>2020</u>		
	<u>(in thousands)</u>			
General and administrative	\$13,737	\$3,547	\$10,190	287 %

General and administrative expenses increased by \$10.2 million, or 287%, to \$13.7 million for the year ended December 31, 2021 from \$3.5 million for the year ended December 31, 2020. The increase was primarily driven by an increase of \$6.3 million in payroll-related expenses, including an increase in stock-based compensation of \$4.3 million, due to increased headcount to support the growth of our business, an increase of \$1.2 million in legal fees, an increase of \$1.1 million in directors and officers insurance costs as a result of becoming a public company, an increase of \$0.8 million in auditing and accounting fees, and an increase of \$0.7 million in rent and utilities costs due to expansion of headquarters office space in the fourth quarter of 2020.

Depreciation and amortization

	<u>Year Ended December 31,</u>		<u>\$ Change</u>	<u>% Change</u>
	<u>2021</u>	<u>2020</u>		
	<u>(in thousands)</u>			
Depreciation and amortization	\$2,548	\$1,400	\$1,148	82%

Depreciation and amortization expenses increased by \$1.1 million, or 82%, to \$2.5 million for the year ended December 31, 2021 from \$1.4 million for the year ended December 31, 2020. The increase was primarily driven by an increase of \$0.5 million due to amortization of capitalized internally developed software, an increase of \$0.6 million in depreciation expense associated with capitalized quantum computing system costs and capitalized research and development equipment.

Change in fair value of warrant liabilities

	Year Ended December 31,		\$ Change	% Change
	2021	2020		
	(in thousands)			
Change in fair value of warrant liabilities	\$63,332	\$—	\$63,332	100 %

The change in fair value of warrant liabilities increased \$63.3 million as a result of mark-to-market expense adjustments recorded for the public and private placement warrants assumed as part of the business combination.

Offering costs associated with warrants

	Year Ended December 31,		\$ Change	% Change
	2021	2020		
	(in thousands)			
Offering costs associated with warrants	\$4,259	\$—	\$4,259	100%

In connection with the business combination, \$4.3 million of transaction costs were allocated and expensed related to the liability-classified public and private warrants.

Other income (expense), net

	Year Ended December 31,		\$ Change	% Change
	2021	2020		
	(in thousands)			
Other income (expense), net	\$92	\$309	\$(217)	(70)%

Other income (expense), net decreased by \$0.2 million, or 70%, for the year ended December 31, 2021, from \$0.3 million for the year ended December 31, 2020. The decrease was due to a \$0.2 million decrease in short-term dividend income.

Liquidity and Capital Resources

As of December 31, 2021, we had cash and cash equivalents of \$399 million and available-for-sale securities of \$203.5 million, with \$123.4 million classified as short-term investments and \$80.1 million classified as long-term investments. We believe that our cash, cash equivalents and investments as of December 31, 2021 will be sufficient to meet our working capital and capital expenditure needs for the next 12 months. We believe we will meet longer term expected future cash requirements and obligations through a combination of cash flows from operating activities and available funds from our cash, cash equivalents and investment balances. However, this determination is based upon internal projections and is subject to changes in market and business conditions. We have incurred losses since our inception and as of December 31, 2021, we had an accumulated deficit of \$145.8 million. During the year ended December 31, 2021, we incurred net losses of \$106.2 million. We expect to incur additional losses and higher operating expenses for the foreseeable future.

Future Funding Requirements

We expect our principal sources of liquidity will continue to be our cash and investments and any additional capital we may obtain through additional equity or debt financings. Our future capital requirements will depend on many factors, including investments in growth and technology. We may in the future enter into arrangements to acquire or invest in complementary businesses, services, and technologies which may require us to seek additional equity or debt financing.

Upon the closing of the business combination, we received approximately \$636.0 million of gross proceeds. The proceeds are invested in money market funds, commercial paper, corporate and municipal notes and bonds, and other U.S. government and agency securities as disclosed in Note 3—Cash Equivalents and Investments in our consolidated financial statements. The investments will be used to fund the strategic operations of the Company.

Our primary uses of cash are to fund our operations as we continue to grow our business. We require a significant amount of cash for expenditures as we invest in ongoing research and development, and commercialization of our products. Until such time as we can generate significant revenue from sales of our QCaaS, if ever, we expect to finance our cash needs through our cash, cash equivalents and investments as well as equity or debt financings or other capital sources, including potential collaborations and other similar arrangements. However, we may be unable to raise additional funds or enter into such other arrangements when needed on favorable terms or at all. To the extent that we raise additional capital through the sale of equity or convertible debt securities, the ownership interest of our stockholders will be or could be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect the rights of our stockholders. Debt financing and equity financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures, or declaring dividends. If we raise funds through collaborations, or other similar arrangements with third parties, we may have to relinquish valuable rights to our quantum computing technology on terms that may not be favorable to us and/or may reduce the value of our common stock. If we are unable to raise additional funds through equity or debt financings when needed, we may be required to delay, limit, reduce or terminate our quantum computing development efforts. Our future capital requirements and the adequacy of available funds will depend on many factors, including those set forth in the section titled “*Risk Factors*.”

Other than operating expenses, including our continued investment in our quantum computers, cash requirements for fiscal 2022 are expected to consist primarily of capital expenditures for corporate facilities.

The following table summarizes current and long-term material cash requirements as of December 31, 2021, which we expect to fund primarily with cash and cash equivalents (*in millions*):

	Material Cash Requirements				
	Total	Less than 1 Year	1 - 3 Years	3 - 5 Years	More than 5 Years
Operating lease obligations ⁽¹⁾	\$6,984	\$644	\$1,421	\$1,568	\$3,351
Total	<u>\$6,984</u>	<u>\$644</u>	<u>\$1,421</u>	<u>\$1,568</u>	<u>\$3,351</u>

(1) Amounts include direct lease obligations, excluding any taxes, insurance and other related expenses.

Cash flows

The following table summarizes our cash flows for the period indicated:

	Year Ended December 31,	
	2021	2020
	(in thousands)	
Net cash used in operating activities	\$ (26,537)	\$(12,007)
Net cash used in investing activities	(213,785)	(11,676)
Net cash provided by financing activities	603,227	276

Cash flows from operating activities

Our cash flows from operating activities are significantly affected by the growth of our business primarily related to research and development, sales and marketing, and general and administrative activities. Our

operating cash flows are also affected by our working capital needs to support growth in personnel-related expenditures and fluctuations in accounts payable and other current assets and liabilities.

Net cash used in operating activities during year ended December 31, 2021 was \$26.5 million, resulting primarily from a net loss of \$106.2 million, adjusted for non-cash charges of \$63.3 million in mark-to-market fair value adjustments associated with our warrant liabilities, \$7.7 million in stock-based compensation, \$4.3 million in offering costs associated with warrants, \$2.5 million in depreciation and amortization, and \$1.3 million in costs associated with research and development arrangements. The increase in net cash used in operations from the prior year was primarily related to noncash expenses as well as our increased research and development activities and hiring of personnel to support the growth of our business and being a public company.

Net cash used in operating activities during the year ended December 31, 2020 was \$12.0 million, resulting primarily from a net loss of \$15.4 million, adjusted for non-cash charges of \$1.4 million in depreciation and amortization and \$1.2 million in stock-based compensation. The increase in net cash used in operations from the prior year was primarily related to our increased research and development activities and hiring of personnel.

Cash flows from investing activities

Net cash used in investing activities during the year ended December 31, 2021 was \$213.8 million primarily resulting from purchases of available-for-sale securities of \$203.8 million, additions of \$7.8 million to property and equipment primarily related to the development of our quantum computing systems, \$1.6 million of capitalized internal software development costs, and \$0.6 million of intangible asset acquisition costs.

Net cash used in investing activities during the year ended December 31, 2020 was \$11.7 million primarily resulting from additions of \$10.0 million to property and equipment primarily related to the development of our quantum computing systems, \$1.1 million of capitalized internal software development costs, and \$0.5 million of intangible assets acquisition costs.

Cash flows from financing activities

Net cash provided by financing activities during the year ended December 31, 2021 was \$603.2 million primarily reflecting proceeds received from the business combination, including the PIPE investment, as well as cash received from the exercise of warrants and exercise of stock options.

Net cash provided by financing activities during the year ended December 31, 2020 was \$0.3 million primarily reflecting proceeds from stock options exercised.

Critical Accounting Estimates

This discussion and analysis of financial condition and results of operations is based upon the Company's consolidated financial statements, which have been prepared in accordance with U.S. GAAP. The preparation of these financial statements requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities. We also make estimates and assumptions on revenue generated and reported expenses incurred during the reporting periods. Our estimates are based on our historical experience and on various other factors that we believe are reasonable under the circumstances. The results of these estimates form the basis for making judgments about the carrying value of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates. Our critical accounting policies are described in greater detail in Note 2 to our audited consolidated financial statements included in this Annual Report.

Critical accounting estimates are defined as those reflective of significant judgments, estimates and uncertainties, which may result in materially different results under different assumptions and conditions. We have listed below our critical accounting estimates that we believe to have the greatest potential impact on our

consolidated financial statements. Historically, our assumptions, judgments and estimates relative to our critical accounting estimates have not differed materially from actual results.

Revenue recognition

We derive revenue from our QCaaS arrangements as well as from professional services related to co-developing and running algorithms on our quantum computing systems.

We have applied judgement in determining that our QCaaS contracts represent a combined, stand-ready performance obligation to provide access to our quantum computing systems together with related maintenance and support. For arrangements with multiple performance obligations, judgement is used to determine whether multiple services in the contract should be accounted for separately or as a group. Judgement is also applied when determining the relative standalone selling price of each performance obligation as this is used to allocate the transaction price to each performance obligation within the contract. In addition, we apply judgment in evaluating any consideration payable to the customer and whether it is in exchange for distinct goods or services or should be reflected as a reduction of revenue.

For arrangements where we enter into multiple contracts with a single counterparty at or near the same time, we use judgement in determining whether the contracts should be combined and whether we should account for them as a single contract. We account for them as a single contract when one or more of the following criteria are met: (i) the contracts are negotiated as a package with a single commercial objective; (ii) consideration to be paid in one contract depends on the price or performance of the other contract; and (iii) goods or services promised are a single performance obligation.

Contracts with customers are evaluated at the time of execution and may vary in terms. The amount of revenue recognized in a period may vary with respect to the allocation of arrangement consideration to performance obligations with different revenue recognition patterns and changes to existing contract terms.

Quantum computing systems

Quantum computing systems are included within property and equipment, net on the consolidated balance sheet. Prior to 2019, we built certain quantum computing systems solely for research and development purposes and these quantum computing systems were deemed to have no alternative future use. In 2019, we began to commercialize our quantum computing systems via the offering of QCaaS and quantum computing systems built thereafter were determined to provide a probable future economic benefit. As a result, hardware and labor costs associated with the building of such quantum computing systems were capitalized in the period the costs were incurred. Costs to maintain quantum computing systems are expensed as incurred.

Judgement is used to determine when hardware and labor costs incurred for our quantum computing systems should be capitalized as a result of our assessment of whether the system will provide a probable future economic benefit and whether or not the costs represent activities necessary to build the systems, maintain the systems or to perform certain research and development functions. Judgement is also used to determine when the systems are placed into service and the estimated useful life of the associated systems.

Changes in these estimates can have a significant impact on the assessment of capitalized costs which could result in material changes to reported property and equipment, net. The amount of depreciation expense associated with the quantum computing systems may also vary based on the estimated useful life.

Capitalized internally developed software

Capitalized internally developed software, which is included in intangible assets, net, on the consolidated balance sheet, consists of costs to purchase and develop internal-use software, which we use to provide services to our customers.

Judgement is used to determine when costs to develop internal-use software for a specific project should be capitalized and whether or not the costs represent activities necessary to enhance the functionality of the software or maintain the performance of the software, and whether it is considered probable that the software will be used to perform the function intended. Judgement is also used to determine when the software is available for use as well as the estimated useful life of the software.

The assumptions used to capitalize internally developed software costs consider when the preliminary project stage is completed, whether the software will perform the function intended, and whether the development activities enhance the functionality of the software or maintain the performance of the software. Changes in these estimates can have a significant impact on the assessment of capitalized costs which could result in material changes to reported intangible assets, net. The amortization of capitalized internally developed software may also be impacted by the estimated useful life associated with these intangible assets.

Impairment of long-lived assets

Long-lived assets, such as our quantum computing systems and capitalized internally developed software are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable.

As of December 31, 2021, we did not have an impairment of any long-lived assets. In determining whether a potential impairment exists, judgement is used in determining the level at which the assessment is made. We have determined that the company consists of one entity-wide asset group for purposes of assessing whether a triggering event has occurred that would indicate the long-lived asset group's carrying value is not recoverable. Impairment calculations, if necessary, contain uncertainties because they require management to make assumptions and to apply judgment to estimate future cash flows and asset fair values. Key assumptions used in estimating future cash flows and asset fair values include projected revenue growth and operating expenses, as well as forecasting asset useful lives and selecting an appropriate discount rate with respect to any terminal value cash flows.

Triggering events occur when there are indicators that the carrying value of a long-lived asset may not be recoverable. These indicators may include internal and external economic factors, including significant decrease in market price of our capital stock, adverse market conditions, and an adverse change in the manner of which the asset is used. The assumptions used to assess impairment consider historical trends, macroeconomic conditions, and projections consistent with our operating strategy including the pace of technological change or specific technological challenges in building our quantum computing systems. Changes in these estimates can have a significant impact on the assessment of fair value which could result in material impairment losses.

Warrant liabilities

Our private placement warrant liabilities are financial instruments that were initially recorded at fair value on the issuance date and were re-valued upon exercise or at each reporting date. All private placement warrants were exercised as of December 31, 2021.

Estimates were used to determine the fair value of the private placement warrants, specifically, when assumed as part of the business combination and then again upon exercise during the year. The fair value of the private placement warrants was determined using the Black-Scholes valuation model. Inherent in the valuation were assumptions related to expected stock-price volatility, expected term, risk-free interest rate and dividend yield. We estimated the volatility of the private placement warrants based on implied volatility from our publicly traded warrants and from historical volatility of select peer company's common stock that matches the expected remaining life of the private placement warrants. The risk-free interest rate was based on the U.S. Treasury zero-coupon yield curve on the measurement date for a maturity similar to the expected remaining life of the private placement warrants. The expected life of the private placement warrants was assumed to be equivalent to their remaining contractual term. The dividend rate was based on the historical rate, which we anticipated remaining at zero.

The assumed expected stock-price volatility, expected term, risk-free interest rate, and dividend yield have a significant impact on the amounts recorded as mark-to-market adjustments for the private placement warrants. We believe the estimates applied were based on reasonable assumptions, but which were inherently uncertain. As a result, actual results may differ from the assumptions and judgments used to determine the fair value of the private placement warrants.

Equity valuations and Stock-based compensation

Prior to the business combination, the fair value of our equity instruments and the associated stock-based compensation charges for stock options granted was determined based upon information available at the time of grant. Given the absence of a public trading market for our capital stock at the time of grant for awards granted prior to the business combination, and in accordance with the American Institute of Certified Public Accountants Practice Aid, *Valuation of Privately Held Company Equity Securities Issued as Compensation*, our management exercised reasonable judgment and considered numerous objective and subjective factors to determine the best estimate of the fair value of our equity instruments at each grant date.

As there was no public market for Legacy IonQ's equity prior to the business combination, valuations of equity instruments required the application of significant estimates, assumptions, and judgments. These valuations impact various amounts reported in our consolidated financial statements, including the amounts recorded for stock-based compensation. The following factors impact the significant estimates, assumptions and judgments that drive the determination of the fair values of the Legacy IonQ preferred and common stock that comprised Legacy IonQ's capital structure prior to the business combination:

- contemporaneous valuations performed at periodic intervals by independent, third-party specialists;
- our actual operating and financial performance;
- our current business conditions and projections;
- our progress on research and development efforts;
- our stage of development;
- the prices, preferences, and privileges of shares of Legacy IonQ convertible preferred stock relative to shares of common stock;
- likelihood of achieving a liquidity event for the underlying equity instruments, such as a business combination, given prevailing market conditions;
- lack of marketability of Legacy IonQ common stock; and
- macroeconomic conditions.

We use the Black-Scholes option-pricing model to determine the estimated fair value for stock options. No stock options have been granted subsequent to the business combination.

The Black-Scholes option-pricing model requires the use of subjective assumptions, which determine the fair value of our stock options, including the fair value of our common stock, the option's expected term, the price volatility of the underlying common stock, risk-free interest rates, and the expected dividend yield of the common stock. The assumptions used to determine the fair value of the stock options represent management's best estimates. These estimates involve inherent uncertainties and the application of management's judgment.

If any assumptions used in the Black-Scholes option-pricing model change significantly, stock option compensation expense for future awards may differ materially compared with the expense for awards granted previously. We believe the estimates applied to be based on reasonable assumptions, but which are inherently uncertain.

Emerging Growth Company Status and Smaller Reporting Company Status

Section 102(b)(1) of the JOBS Act exempts emerging growth companies from being required to comply with new or revised financial accounting standards until private companies are required to comply with the new or revised financial accounting standards. The JOBS Act provides that a company can choose not to take advantage of the extended transition period and comply with the requirements that apply to non-emerging growth companies, and any such election to not take advantage of the extended transition period is irrevocable. During the extended transition period, it may be difficult or impossible to compare our financial results with the financial results of another public company that complies with public company effective dates for accounting standard updates because of the potential differences in accounting standards used.

We will remain an emerging growth company under the JOBS Act until the earliest of (a) December 31, 2025, (b) the last date of our fiscal year in which we have total annual gross revenue of at least \$1.07 billion, (c) the date on which we are deemed to be a “large accelerated filer” under the rules of the SEC with at least \$700.0 million of outstanding securities held by non-affiliates or (d) the date on which we have issued more than \$1.0 billion in non-convertible debt securities during the previous three years.

We are also a smaller reporting company as defined in the Exchange Act. We may continue to be a smaller reporting company even after we are no longer an emerging growth company. We may take advantage of certain of the scaled disclosures available to smaller reporting companies and will be able to take advantage of these scaled disclosures for so long as (i) our voting and non-voting common stock held by nonaffiliates is less than \$250.0 million measured on the last business day of our second fiscal quarter or (ii) our annual revenue is less than \$100.0 million during the most recently completed fiscal year and our voting and non-voting common stock held by non-affiliates is less than \$700.0 million measured on the last business day of our second fiscal quarter.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk.

Interest Rate Risk

We had cash and cash equivalents of \$399.0 million and total investments of \$203.5 million as of December 31, 2021. We hold our cash and cash equivalents for working capital purposes. Our cash and cash equivalents are held in cash deposits and money market funds. Our investments are held in commercial paper, corporate notes and bonds, municipal bonds, and U.S. government and agency securities. The primary objective of our investment activities is to preserve principal while at the same time maximizing yields without significantly increased risk. To achieve this object, we invest in highly liquid securities depending on our strategic cash needs. Due to the nature of these instruments, we believe that we do not have any material exposure to changes in the fair value due to changes in interest rates. Declines in interest rates, however, would reduce our future interest income. Further, in the event of a change of such magnitude, we would consider taking actions to further mitigate our exposure to the change. However, due to the uncertainty of the specific actions that would be taken and their possible effects, the sensitivity analysis assumes no changes in our investment portfolio.

Concentration of Credit Risk

We deposit our cash, cash equivalents and investments with financial institutions, and, at times, such balances may exceed federally insured limits. Management believes the financial institutions that hold our cash, cash equivalents and investments are financially sound and, accordingly, minimal credit risk exists with respect to such balances.

Item 8. Financial Statements and Supplementary Data.

The financial statements, together with the report of our independent registered public accounting firm, required by this item are set forth beginning on page F-1 of this Annual Report.

Item 9. Changes in and Disagreements With Accountants on Accounting and Financial Disclosure.

None.

Item 9A. Controls and Procedures.

Evaluation of Disclosure Controls and Procedures

We maintain “disclosure controls and procedures,” as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended, or the Exchange Act, that are designed to ensure that information required to be disclosed in the reports that we file or submit under the Exchange Act is (1) recorded, processed, summarized and reported, within the time periods specified in the SEC’s rules and forms and (2) accumulated and communicated to our management, including our principal executive officer and principal financial officer, to allow timely decisions regarding required disclosure. Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures.

Our management, with the participation of our Chief Executive Officer and Chief Financial Officer, evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act), as of the end of the period covered by this Annual Report. Based on such evaluation, our Chief Executive Officer and Chief Financial Officer have concluded that as of December 31, 2021, our disclosure controls and procedures were not effective at a reasonable assurance level as a result of the material weakness that existed in our internal control over financial reporting as described below, and which continues to exist.

Management’s Annual Report on Internal Control Over Financial Reporting

This Annual Report does not include a report of management’s assessment regarding internal control over financial reporting as allowed by the SEC for reverse acquisitions between an issuer and a private operating company when it is not possible to conduct an assessment of the private operating company’s internal control over financial reporting in the period between the consummation date of the reverse acquisition and the date of management’s assessment of internal control over financial reporting (see Section 215.02 of the SEC Division of Corporation Finance’s Regulation S-K Compliance & Disclosure Interpretations). As discussed elsewhere in this Annual Report, we completed a business combination on September 30, 2021 pursuant to which we acquired Legacy IonQ. Prior to the business combination, we were a special purpose acquisition company formed for the purpose of effecting a merger, capital stock exchange, asset acquisition, stock purchase, recapitalization, reorganization or similar business combination with one or more businesses. As a result, previously existing internal controls are no longer applicable or comprehensive enough as of the assessment date, as our operations prior to the business combination were insignificant compared to those of the consolidated entity post-business combination. As a result, management was unable, without incurring unreasonable effort or expense, to complete an assessment of our internal control over financial reporting as of December 31, 2021.

Material Weakness in Internal Control Over Financial Reporting

In connection with the preparation of our financial statements as of and for the fiscal year ended December 31, 2021, we identified a material weakness in our internal control over financial reporting specifically related to our financial statement close process. Specifically,

- Although we recently added accounting and financial reporting personnel with requisite knowledge and experience in the application of U.S. GAAP and SEC rules, the Company is still in process of formalizing its processes and procedures, establishing clear authorities and approvals and segregating duties to facilitate accurate and timely financial reporting.

- Our financial accounting system has limited functionality and does not facilitate effective information technology general controls relevant to financial reporting. Additionally, elements of our close process are managed and processed outside the accounting system, increasing the risk of error.

This material weakness could result in a misstatement of account balances or disclosures that would result in a material misstatement to the annual or interim consolidated financial statements that would not be prevented or detected.

Remediation Efforts to Address the Material Weakness

In light of the material weakness identified, we are implementing a remediation plan which includes measures designed to improve our internal control over financial reporting to remediate this material weakness. These measures include adding resources (both internal and external) as well as improving the control environment around financial systems and processes. In 2021, the Company completed the following remedial actions:

- Hired additional full-time accounting personnel with appropriate levels of experience, and augmented skills gaps with external experts;
- Established and implemented policies surrounding the approval of transactions, related to, but not limited to, account reconciliations and journal entries; and
- Selected and began implementing a financial accounting system that can support effective information technology general controls as well as the anticipated growth of the business.

Our management believes that these actions, and additional actions to be taken under our remediation plan, are sufficient to remediate the material weakness identified and strengthen our internal control over financial reporting. The actions we are taking are subject to ongoing senior management review, as well as Audit Committee oversight. The material weakness will not be considered remediated until our remediation plan has been fully implemented, the applicable controls operate for a sufficient period of time, and we have concluded, through testing, that the newly implemented and enhanced controls are operating effectively.

Attestation Report of the Registered Public Accounting Firm

This Annual Report does not include an attestation report of our registered public accounting firm due to an exemption for “emerging growth companies.”

Changes in Internal Control over Financial Reporting

Except as described above under Remediation Plan, there were no changes in our internal control over financial reporting identified in connection with the evaluation required by Rule 13a-15(d) and 15d-15(d) of the Exchange Act that occurred during the period covered by this Annual Report on Form 10-K that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information.

None.

Item 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspections.

Not applicable.

PART III

Item 10. Directors, Executive Officers and Corporate Governance.

INFORMATION ABOUT OUR DIRECTORS AND EXECUTIVE OFFICERS

The brief biographies below include information, as of March 15, 2022, regarding the specific and particular experience, qualifications, attributes and skills for each member of our board of directors.

<u>Name</u>	<u>Age</u>	<u>Term Expires</u>	<u>Position</u>
Peter Chapman	61	2024	President & Chief Executive Officer and Director
Jungsang Kim	52	2024	Chief Technology Officer and Director
Craig Barratt	59	2024	Chairman of the Board
Blake Byers	37	2022	Director
Ronald Bernal	66	2023	Director
Niccolo de Masi	41	2022	Director
Inder M. Singh	63	2022	Director
Harry You	62	2023	Director

Peter Chapman has served as a member of our board of directors and president and chief executive officer since the closing of the business combination in September 2021. Mr. Chapman previously served as Legacy IonQ's president and chief executive officer and a member of its board of directors since May 2019. From September 2014 to May 2019, Mr. Chapman served as a director of engineering for Amazon Prime at Amazon.com, Inc. prior to joining IonQ. Before that, Mr. Chapman was the president at Media Arc, Inc. We believe Mr. Chapman is well qualified to serve as a member of our board of directors because of his prior leadership and officer positions at technology and software companies.

Jungsang Kim has served as a member of our board of directors and chief strategy officer since the closing of the business combination in September 2021. Dr. Kim is the co-founder of Legacy IonQ and served as its chief strategy officer and a member of its board of directors since September 2015. Dr. Kim assumed the role of chief technology officer in 2020. Dr. Kim has served as assistant/associate/full professor in the Department of Electrical and Computer Engineering, Department of Physics and Department of Computer Science at Duke University since June 2004. From 2006 to 2020, Dr. Kim was also the founder and president and chief executive officer of Applied Quantum Technologies, Inc. Dr. Kim received a B.S. in physics from Seoul National University and a Ph.D. in physics from Stanford University. We believe Dr. Kim is well qualified to serve as a member of our board of directors because of his extensive research in electrical and computer engineering and quantum mechanics.

Craig Barratt has served as a member of our board of directors and chairman of the board since the closing of the business combination in September 2021. Dr. Barratt served as a member of Legacy IonQ's board of directors since January 2021. Until May 2020, Dr. Barratt served as senior vice president and general manager of the Connectivity Group of Intel Corporation, a semiconductor company, since its acquisition of Barefoot Networks, Inc., a computer networking company, in July 2019, where he previously served as president and chief executive officer since April 2017. From June 2013 to January 2017, Dr. Barratt held several different roles at Google, including senior vice president, access and energy and advisor. Dr. Barratt previously served as president of Qualcomm Atheros, the networking and connectivity subsidiary of Qualcomm Inc., and as president, chief executive officer and a director of Atheros Communications, Inc., a fabless semiconductor company, until its acquisition by Qualcomm. Dr. Barratt has also served as a member of the board of directors of Intuitive Surgical, Inc., a robotic-assisted surgery company, since April 2011 and as chairman of the board of directors since April 2020. Dr. Barratt received a B.E. in electrical engineering and a B.S. in pure mathematics and physics from the

University of Sydney, Australia as well as an M.S. and Ph.D. in electrical engineering from Stanford University. We believe Dr. Barratt is qualified to serve as a member of our board of directors because of his senior leadership roles at industry leading companies in the technology sector.

Ronald Bernal has served as a member of our board of directors since the closing of the business combination in September 2021. Mr. Bernal served as a member of Legacy IonQ's board of directors since February 2017. Mr. Bernal has served as a venture partner at New Enterprise Associates since February 2010. From May 2006 to February 2010, Mr. Bernal was a partner at Sequel Venture Partners prior to joining New Enterprise Associates. Prior to that, Mr. Bernal was a partner at Sutter Hill Ventures and was vice president of operations and chief development officer at Cisco Systems, Inc. Mr. Bernal currently serves on the board of directors of Cohere Technologies, Inc., and Tigera Inc. Mr. Bernal received a B.S. in electrical engineering from DeVry Institute of Technology. We believe Mr. Bernal is qualified to serve as a member of our board of directors because of his integral involvement in the technology industry, generally, and management roles at global venture capital firms.

Blake Byers has served as a member of our board of directors since the closing of the business combination in September 2021. Dr. Byers served as a member of Legacy IonQ's board of directors since February 2017. In March 2021, Dr. Byers founded Byers Capital, a venture capital investment firm. Prior to founding Byers Capital, Dr. Byers was a general partner at GV (formerly Google Ventures), a venture capital investment firm, from April 2010 to March 2021. Dr. Byers has served as a member of the board of directors of Magenta Therapeutics since April 2017, and is currently Chairman of the board of directors of Pact Pharma, Inc. and previously served as their president from February 2018 to October 2018. Dr. Byers also serves on the board of directors of several private companies, including Spotlight Therapeutics. Prior to joining GV, Dr. Byers helped start two companies, led research projects on biomedical engineering at Stanford University and was an angel investor. Dr. Byers received a Ph.D. and M.S. in bioengineering from Stanford University and holds a B.S. in biomedical engineering and a B.S. in economics from Duke University. We believe Dr. Byers is qualified to serve as a member of our board of directors because of his substantial involvement with venture capital investment firms and prior board positions at various biotechnology companies.

Niccolo de Masi has served as a member of our board of directors since the closing of the business combination in September 2021, and was the chief executive officer and board member of our predecessor, dMY Technology Group, Inc. III, since inception. Since June and December 2020, respectively, Mr. de Masi has also served as the chief executive officer and director of dMY Technology Group, Inc. II and dMY Technology Group, Inc. IV. He has also been the co-chairman of the board of directors of AdMY Technology Group, Inc. since January 2021. From January 2020 to December 2020, Mr. de Masi served as Chief Executive Officer of dMY Technology Group, Inc. and has served as director of Rush Street Interactive, Inc. since December 2020, following its business combination with dMY Technology Group, Inc. Since January 2010, Mr. de Masi has been a member of the board of directors of Glu Mobile Inc., a publicly traded mobile gaming company. Since December 2014, he has served as chairman and he served as interim chairman from July 2014 to December 2014. From January 2010 to November 2016, he served as its president and chief executive officer. From February 2019 to March 2020, Mr. de Masi was the chief innovation officer at Resideo Technologies, Inc., a publicly traded securities solutions company. From October 2018 to January 2020, he served as a member of its board of directors and from February 2019 until January 2020 he served as its president of products and solutions. From November 2016 until October 2018, Mr. de Masi previously served as the president of Essential Products, Inc. Mr. de Masi served on the board of directors of Xura, Inc. and its audit committee from November 2015 until August 2016. Mr. de Masi was also previously the chief executive officer and Director of Hands-On Mobile and Monsternob Ltd. Since November 2015, Mr. de Masi has served on the Leadership Council of the UCLA Grand Challenge. Mr. de Masi received a B.A. and an MSci. in physics from Cambridge University. We believe Mr. de Masi is qualified to serve as a member of our board of directors because of his breadth of experience as both an officer and board member at a variety of publicly traded technology companies.

Inder M. Singh has served as a member of our board of directors since December 2021. Since April 2019, Mr. Singh has served as Executive Vice President and Chief Financial Officer of Arm Limited, a British

semiconductor and software design company, where he leads the global finance organization as well as corporate IT operations, procurement and enterprise security teams. From November 2016 to April 2019, Mr. Singh served as Senior Vice President and Chief Financial Officer, and from March 2016 to November 2016, as Chief Strategy and Marketing Officer, of Unisys Corp., a publicly listed company. Prior to that, Mr. Singh was a Managing Director at SunTrust Bank’s equities unit, and a Senior Vice President in finance at Comcast Corporation. Mr. Singh is currently a member of the board of directors of Affinity Federal Credit Union, a U.S. financial services firm. Mr. Singh has also advised startups as a member of Columbia University’s Entrepreneurship Advisory Board, and participates as a project advisor for the U.S. Department of Homeland Security on national security and critical infrastructure issues. Mr. Singh received an M.B.A. in finance from New York University and holds M.S. and a B.S. degrees in engineering from Columbia University. We believe Mr. Singh is qualified to serve as a member of our board of directors because of his finance and corporate management roles within various organizations and his general involvement in the technology and infrastructure industry.

Harry You has served as a member of our board of directors since the closing of the business combination in September 2021, and was the chief financial officer and chairman of the board of directors of our predecessor, dMY Technology Group, Inc. III, since inception. Since April 2021, Mr. You has served on the board of directors of Genius Sports Ltd., a publicly traded sports data and technology company, after its acquisition of dMY Technology Group II, where Mr. You had served as a director since June 2020. Since March 2021, Mr. You has served on the board of directors of Coupang, Inc, a south Korean publicly traded e-commerce company. Since December 2020, Mr. You has also served as the chairman of dMY Technology Group, Inc. IV. From January 2020 to December 2020, Mr. You served as chairman of the board of directors of dMY Technology Group, Inc. and has served as director of Rush Street Interactive, Inc. since December 2020, following its business combination with dMY Technology Group, Inc. Since January 2019, Mr. You has served as a member of the board of directors of Broadcom Inc., a publicly traded semiconductor and software company. In September 2016, Mr. You founded GTY Technology Holdings, Inc. (“GTY”), a publicly traded technology company. From September 2016 until February 2019, Mr. You served as its president, chief financial officer and director when GTY consummated its initial business combination. From February 2019 to May 2019, he served as its president and from February 2019 through August 2019 he served as its chief financial officer. Since May 2019, he has served as its vice chairman of the board of directors. From May 7, 2019 to May 20, 2019, Mr. You also served as GTY’s president. From February 2008 to September 2016, Mr. You served as the executive vice president of EMC Corporation (formerly NYSE: EMC) in the office of the chairman. Mr. You was chief executive officer at BearingPoint (formerly KPMG Consulting, Inc.) as well as chief financial officer of Oracle and Accenture. Mr. You also previously spent 14 years on Wall Street, including serving as a managing director in the Investment Banking Division of Morgan Stanley, where he headed the Computer and Business Services Group. From 2004 to October 2016, Mr. You served as a director of Korn/Ferry International. From 2004 to 2005, he served as a director of Oracle Japan. Since August 2016, Mr. You has been a trustee of the U.S. Olympic Committee Foundation. Mr. You received a B.A. in economics from Harvard College and an M.A. in economics from Yale University. We believe Mr. You is qualified to serve as a member of our board of directors because of his extensive and varied experience as both a senior executive and board member at a variety of publicly traded technology and software companies.

Executive Officers

The following table sets forth information regarding our executive officers who are not listed above a members of our board of directors as of March 15, 2022, other than with respect to Ms. Babinski whose employment with us commenced on March 28, 2022:

<u>Name</u>	<u>Age*</u>	<u>Position</u>
Executive Officers		
Christopher Monroe	56	Chief Scientist
Thomas Kramer	51	Chief Financial Officer
Laurie Babinski	40	General Counsel and Secretary

Christopher Monroe has served as our chief scientist since the closing of the business combination in September 2021. Dr. Monroe is the co-founder of Legacy IonQ and served as its chief scientist since September 2016. From August 2018 until May 2019, Dr. Monroe served as IonQ's chief executive officer. Dr. Monroe has served as a Professor of Electrical Computer Engineering and Physics at Duke University since January 2021. Dr. Monroe held various positions at the University of Maryland, including from January 2021 to present as a College Park Professor, from 2015 to December 2020 as a Distinguished University Professor of Physics, from September 2018 to December 2020 as a Professor of Electrical and Computer Engineering, and from September 2007 to December 2020 as a Bice Zorn Professor of Physics. From 2014 to December 2020, Dr. Monroe was a Fellow at the Center for Quantum Information and Computer Science and from 2007 to December 2020, Dr. Monroe was a Fellow at the Joint Quantum Institute. Dr. Monroe also held various academic and research positions at the University of Michigan, Ann Arbor, University of Colorado, Boulder, and the National Institute of Standards and Technology. Dr. Monroe serves on advisory boards at several academic institutions, including the Max Planck Institute of Quantum Optics (since 2018), the CalTech Institute for Quantum Information (since 2018), the Center for Quantum Technology, National University of Singapore (since 2018). Dr. Monroe received an S.B. in physics from Massachusetts Institute of Technology and a Ph.D. in physics from the University of Colorado, Boulder.

Thomas Kramer has served as our chief financial officer since the closing of the business combination in September 2021, and as our secretary from September 2021 to March 2022. Mr. Kramer served as Legacy IonQ's chief financial officer since February 2021. From February 2017 to February 2021, Mr. Kramer served as managing director of Remarque Advisory. From November 2011 to October 2016, Mr. Kramer also served as chief financial officer of Opower, Inc., a cloud-based enterprise software company in the utilities space. From 2000 to 2011, Mr. Kramer served as chief financial officer of Cvent, Inc., a cloud-based enterprise software company in the event-management space. From 1998 to 2000, Mr. Kramer served as a consultant at the Boston Consulting Group. Mr. Kramer holds an M.B.A. from Harvard Business School and an M.S. in economics from the Norwegian School of Economics.

Laurie Babinski has served as our general counsel and secretary since March 2022. From December 2019 to March 2022, Ms. Babinski served as deputy general counsel at Credit Karma, LLC, a multinational personal finance company, where she also served in various roles from August 2015 to December 2019, including as the lead of numerous legal functions such as product, marketing, regulatory, privacy, litigation, employment and government relations in the United States, Canada and the United Kingdom. Prior to that, Ms. Babinski worked at the law firm Baker Hostetler LLP practicing in the Media, Technology and Intellectual Property group. Ms. Babinski received a J.D. from Northwestern University Pritzker School of Law and holds a B.A. in Journalism and Spanish from Pepperdine University.

Family Relationships

There are no family relationships among any of our directors or executive officers.

CORPORATE GOVERNANCE

Audit Committee

The audit committee consists of Messrs. Blake Byers, Niccolo de Masi, Inder Singh and Harry You, each of whom our board of directors has determined satisfies the independence requirements under NYSE listing standards and Rule 10A-3(b)(1) of the Exchange Act. The chair of the audit committee is Mr. You. Our board has determined that Mr. You is an "audit committee financial expert" within the meaning of SEC regulations. Each member of the audit committee can read and understand fundamental financial statements in accordance with applicable requirements. In arriving at these determinations, our board has examined each audit committee member's scope of experience and the nature of their employment.

The primary purpose of the audit committee is to discharge the responsibilities of the board of directors with respect to the corporate accounting and financial reporting processes, systems of internal control and financial statement audits, and to oversee the independent registered public accounting firm. Specific responsibilities of the audit committee include:

- helping the board of directors oversee corporate accounting and financial reporting processes;
- managing the selection, engagement, qualifications, independence and performance of a qualified firm to serve as the independent registered public accounting firm to audit the financial statements;
- discussing the scope and results of the audit with the independent registered public accounting firm, and reviewing, with management and the independent accountants, the interim and year-end operating results;
- developing procedures for employees to submit concerns anonymously about questionable accounting or audit matters;
- reviewing related person transactions;
- obtaining and reviewing a report by the independent registered public accounting firm at least annually that describes internal quality control procedures, any material issues with such procedures and any steps taken to deal with such issues when required by applicable law; and
- approving or, as permitted, pre-approving, audit and permissible non-audit services to be performed by the independent registered public accounting firm.

Code of Business Conduct and Ethics

We have adopted a Code of Business Conduct and Ethics, or the Code of Conduct, applicable to all of our employees, executive officers and directors. The Code of Conduct is available at the investors section of our website at www.ionq.com. Any amendments to the Code of Conduct, or any waivers of its requirements, are expected to be disclosed on our website to the extent required by applicable rules and exchange requirements. The reference to our website address does not constitute incorporation by reference of the information contained at or available through our website, and you should not consider it to be a part of this Annual Report.

Delinquent Section 16(a) Reports

Section 16(a) of the Exchange Act requires our directors, certain officers, including our executive officers, and persons who own more than 10% of our common stock to report to the SEC their initial ownership of our common stock and any subsequent changes in that ownership. The SEC has established specific due dates for these reports and we are required to disclose in in this Annual Report any late filings or failures to file.

Based solely on our review of such reports filed electronically with the SEC and written representations from reporting persons that no other reports were required during the fiscal year ended December 31, 2021, we believe that all of our directors and officers complied with all Section 16(a) filing requirements applicable to them.

Item 11. Executive Compensation.

Executive Compensation

Summary Compensation Table

The following table sets forth information for each of the last two completed fiscal years regarding compensation awarded to or earned by our Chief Executive Officer, our former Chief Executive Officer and the two other most highly compensated executive officers (the “named executive officers”) during the fiscal years indicated:

Name and Principal Position	Year	Salary (\$)	Option Awards (\$) ⁽¹⁾	All Other Compensation (\$) ⁽²⁾	Total (\$)
Peter Chapman	2021	350,000	—	14,500	364,500
<i>President and Chief Executive Officer</i>	2020	350,000	—	14,250	364,250
Jungsang Kim	2021	280,000	2,973,049	—	3,253,049
<i>Chief Technology Officer</i>	2020	213,533	1,177,277	—	1,390,810
Thomas Kramer ⁽³⁾	2021	175,769	17,067,337	8,788	17,251,894
<i>Chief Financial Officer</i>					
Niccolo de Masi ⁽⁴⁾	2021	11,000 ⁽⁵⁾	—	—	11,000
<i>Former Chief Executive Officer</i>					

- (1) The amounts in this column reflect the aggregate grant date fair value of the shares underlying option awards granted in the applicable year, computed in accordance with Financial Accounting Standards Board (“FASB”) Accounting Standards Codification (“ASC”) Topic 718 for stock-based compensation transactions. The assumptions we used in valuing these awards are described in Note 13 to our consolidated financial statements included elsewhere in this Annual Report. These amounts do not reflect the actual economic value that will be realized by the named executive officer upon the vesting of the stock options, the exercise of the stock options, or the sale of the common stock underlying such stock options.
- (2) Amounts in this column represent 401(k) matching contribution for Mr. Chapman and Mr. Kramer.
- (3) Mr. Kramer began employment with us on February 15, 2021.
- (4) Mr. de Masi resigned as the chief executive officer upon closing of the business combination.
- (5) Amount represents annual fees paid to Mr. de Masi for his service on our board of directors.

Outstanding Equity Awards as of December 31, 2021

The following table presents information regarding outstanding option and stock awards held by the named executive officers as of December 31, 2021. All awards were granted pursuant to the 2015 Plan.

Name	Option Awards ⁽⁵⁾					Stock Awards ⁽⁵⁾		
	Grant Date	Vesting Commencement Date	Number of securities underlying unexercised options (#) exercisable	Number of securities underlying unexercised options (#) unexercisable	Option exercise price (\$)	Option expiration date	Number of shares or units of stock that have not vested (#)	Market value of shares of units of stock that have not vested (\$)
Peter Chapman	5/17/2019	5/17/2019	4,183,402	3,913,503 ⁽¹⁾	\$0.13	5/16/2029	—	—
Jungsang Kim	11/3/2020	12/31/2020	222,677	951,374 ⁽²⁾	\$0.69	11/2/2030	—	—
	3/4/2021	4/30/2021	60,714	344,131 ⁽²⁾	\$2.39	3/3/2031	—	—
Thomas Kramer	2/19/2021	2/15/2021	—	2,251,538 ⁽¹⁾	\$2.39	2/18/2031	225,158 ⁽³⁾	3,760,139 ⁽⁴⁾
Niccolo de Masi	—	—	—	—	—	—	—	—

- (1) 10% of the shares of common stock underlying the option vested on the six month anniversary of the vesting commencement date and 1/54th of the remaining shares shall vest on the last day of each month thereafter, subject to the holder remaining in continuous service with the Company on each vesting date.

- (2) The shares of common stock underlying the option vested or shall vest 1/54th on the last day of each month commencing on the Vesting Commencement Date, subject to the holder remaining in Continuous Service with the Company on each vesting date.
- (3) Consists of shares of restricted stock issued pursuant to the early exercise of Mr. Kramer's option award granted in February 2021 and that remain subject to our repurchase right in accordance with the vesting schedule of the option.
- (4) The market value of unvested shares is calculated by multiplying the number of unvested shares by the closing market price of our common stock on NYSE on December 31, 2021, the last trading day of the year, which was \$16.70 per share.
- (5) If a named executive officer experiences a covered termination during a change in control period, any then outstanding unvested shares of common stock subject to this option will become fully vested and exercisable. See the section below titled "—Change in Control Severance Plan" below for additional information.

Employment Arrangements

Each of the named executive officers is an at-will employee with certain rights to advance notice prior to termination as provided under the Change in Control Severance Plan. Each named executive officer is eligible to participate in the IonQ, Inc. Change in Control Severance Plan under the terms and conditions of such plan, see the section below titled "—Change in Control Severance Plan" below for additional information.

Peter Chapman

In September 2021, we entered into an amended and restated offer letter agreement with Mr. Chapman which governs the current terms of his employment as our Chief Executive Officer. Mr. Chapman's current annual base salary for 2021 was \$350,000. Mr. Chapman is eligible to participate in any bonus plan that may be established for executive officers and is also eligible for reimbursement of business expenses and to participate in our standard employee benefit plans and programs.

Jungsang Kim

In September 2021, we entered into an amended and restated offer letter agreement with Dr. Kim that established an employment relationship and governs the current terms of his employment as our Chief Technology Officer. Dr. Kim's annual base salary for 2021 was \$280,000. Dr. Kim is also eligible for reimbursement of business expenses. Dr. Kim was granted an option to purchase 404,845 shares of common stock in March 2021, with an exercise price of \$2.39 per share.

Thomas Kramer

In September 2021, we entered into an amended and restated offer letter agreement with Mr. Kramer which governs the current terms of his employment as our Chief Financial Officer. Mr. Kramer's current annual base salary for 2021 was \$200,000. Mr. Kramer is eligible to participate in any bonus plan that may be established for executive officers and is also eligible for reimbursement of business expenses and to participate in our standard employee benefit plans and programs. In connection with commencement of his employment in 2021, Mr. Kramer was granted an option to purchase 2,701,844 shares of common stock with an exercise price of \$2.39 per share.

Change in Control Severance Plan

Upon the closing of the business combination, each of the executive officers, including the named executive officers, became eligible to receive severance benefits under the terms of the IonQ, Inc. Change in Control Severance Plan. The Change in Control Severance Plan provides for severance benefits upon a "covered termination" that occurs outside of or during a "change in control period" (each as described below).

Upon a covered termination that occurs outside of a change in control period, the “change in control period,” participants will be entitled to (1) a payment equal to the participant’s base salary for a period of months (12 months for Mr. Chapman; 6 months for Dr. Kim and Mr. Kramer) less applicable tax withholdings to be paid in equal installments on our regular payroll schedule or in a lump sum, as we determine, and in compliance with Section 409A of the Code, and (2) payment of continued group health benefits for a period of time matching the applicable severance term.

Upon a covered termination that occurs during a change in control period, participants will be entitled to (1) a payment equal to the participant’s base salary for a period of months (12 months for Mr. Chapman, Dr. Kim and Mr. Kramer) less applicable tax withholdings to be paid in equal installments on the Company’s regular payroll schedule or in a lump sum, as we determine, and in compliance with Section 409A of the Code; (2) a payment equal to a multiple of the participant’s target annual bonus (100% for Mr. Chapman, Dr. Kim and Mr. Kramer) less applicable tax withholdings to be paid in equal installments on our regular payroll schedule or in a lump sum, as we determine, and in compliance with Section 409A of the Code; (3) payment of continued group health benefits and full accelerated vesting of all outstanding equity awards subject to time-based vesting.

All severance benefits under the Change in Control Severance Plan are subject to the participant’s execution of an effective release of claims in favor of us and compliance with the terms of any confidential information agreement, proprietary information and inventions agreement and any other agreement between the participant and IonQ. For purposes of the Change in Control Severance Plan, a “covered termination” is a termination of employment by IonQ without “cause,” as defined in the Change in Control Severance Plan, or as a result of the participant’s resignation for “good reason,” as defined in the Change in Control Severance Plan, in either case, not as a result of death or disability. For purposes of the Change in Control Severance Plan, a “change in control period” is the period of time beginning on the date on which a “change in control,” as defined in our 2021 Equity Incentive Plan (“2021 Plan”), becomes effective and ending on the first anniversary of the effective date of such change in control.

Health and Welfare Benefits; Perquisites

Our named executive officers are eligible to participate in our employee benefit plans, including medical, dental, vision, disability and life insurance plans, in each case on the same basis as all of our other full-time employees. Part-time employees, including Dr. Kim, are not eligible to participate in our employee benefit plans. We generally do not provide perquisites or personal benefits to our named executive officers, except in limited circumstances, and we did not provide any perquisites or personal benefits to our named executive officers in 2021.

401(k) Plan

Our named executive officers (other than Dr. Kim) are eligible to participate in a defined contribution retirement plan that provides eligible U.S. employees with an opportunity to save for retirement on a tax advantaged basis. Eligible employees may defer eligible compensation on a pre-tax or after-tax (Roth) basis, up to the statutorily prescribed annual limits on contributions under the Code. Contributions are allocated to each participant’s individual account and are then invested in selected investment alternatives according to the participants’ directions. We currently make matching contributions into the 401(k) plan on behalf of participants equal to 100% on participant contributions up to 5% of their compensation. Participants are always vested in their contributions to the plan.

Participants vest in their company matching and nonelective contributions under a one to five-year graded vesting schedule. The 401(k) plan is intended to be qualified under Section 401(a) of the Code with the 401(k) plan's related trust intended to be tax exempt under Section 501(a) of the Code. As a tax-qualified retirement plan, contributions to the 401(k) plan (except for Roth contributions) and earnings on those contributions are not taxable to the employees until distributed from the 401(k) plan.

Director Compensation

Cash Compensation

We maintain a non-employee director compensation policy, pursuant to which the non-executive chair receives an annual base retainer of \$50,000, and each other non-employee director receives an annual base retainer of \$30,000. In addition, our non-employee directors receive the following cash compensation for committee services, as applicable:

- each chair of our audit, compensation and nominating and corporate governance committees receives an additional annual retainer of \$20,000, \$12,000 and \$8,000, respectively; and
- each other member of our audit, compensation and nominating and corporate governance committees receives an additional annual retainer of \$8,000, \$6,000 and \$4,000, respectively.

These retainers are payable in arrears in four equal quarterly installments on the last day of each quarter, provided that the amount of such payment will be prorated for any portion of such quarter that the director is not serving on the Board or the applicable committee. We also reimburse each of our directors for their travel expenses incurred in connection with their attendance at Board and committee meetings.

Equity Compensation

Initial Grant

For each newly appointed or elected director, an initial grant of restricted stock units ("RSU Award") and option to purchase shares of common stock ("Stock Option Award") with an aggregate fair market value as of the grant date equal to \$400,000, with such value split equally between the RSU Award and Stock Option Award.

The Initial Grant will vest over a three-year period, with one-third of the Initial Grant vesting on each anniversary of the grant date, such that the Initial Grant is fully vested on the third anniversary of the date of grant, subject to continuous service as a member of the Board through such vesting date.

Annual Grant

On the first business day following each annual stockholder meeting ("Annual Meeting"), each director who continues to serve as a non-employee member of the Board following such Annual Meeting (excluding any Eligible Director who is first appointed or elected by the Board at the Annual Meeting) will be granted an RSU Award and an Stock Option Award with an aggregate fair market value as of the grant date equal to \$200,000, with such value split equally between the RSU Award and Stock Option Award.

The Annual Grant will vest in full on the earlier of (i) the date of the following year's Annual Meeting (or the date immediately prior to the next Annual Meeting if the non-employee director's service as a director ends at such Annual Meeting due to the director's failure to be re-elected or the director not standing for re-election), or (ii) the one-year anniversary measured from the date of grant, subject in all cases to continued service as a member of the Board through such vesting date.

With respect to a director who is first elected or appointed to the Board on a date other than the date of the Annual Meeting, upon the first Annual Meeting following such director's first joining the Board, such director's first Annual Grant will be pro-rated to reflect the time between such director's election or appointment date and the date of such first Annual Meeting.

Vesting Acceleration

In the event of a change of control (as defined in our 2021 Plan), any unvested portion of an equity award granted to our non-employee directors will fully vest and, if applicable, become exercisable immediately prior to the effective date of such change of control, subject to the non-employee director's continuous service with us on the effective date of the change of control.

Election to Receive Equity in Lieu of Cash Compensation

Each non-employee director may elect to receive fully vested RSU Awards in lieu of his or her cash compensation. Such RSU Awards are issued on a quarterly basis, in arrears, and the number of such restricted stock units is calculated by dividing (1) the aggregate amount of cash compensation otherwise payable to such director divided by (2) the closing sales price per share of our common stock on the last day of the fiscal quarter in which the service occurred, rounded down to the nearest whole share.

Notwithstanding the foregoing, any member of our board of directors that is entitled to the above compensation may elect to forego all or a portion of such compensation from time to time by giving notice to the General Counsel of the Company.

Non-Employee Director Compensation Table

The following table sets forth information regarding the compensation earned for service on the Board by our non-employee directors during the year ended December 31, 2021. As a named executive officer, the compensation received by Mr. Chapman, Dr. Kim and Mr. de Masi is shown above in “—Executive Compensation—Summary Compensation Table.”

<u>Name</u>	<u>Fees Earned or Paid in Cash (\$)</u>	<u>Option Awards⁽¹⁾⁽⁵⁾ (\$)</u>	<u>Total (\$)</u>
Darla Anderson ⁽³⁾	—	—	—
Craig Barratt	16,500	3,108,925 ⁽²⁾	3,125,425
Blake Byers	10,500	—	10,500
Ronald Bernal	11,000	—	11,000
Francesca Luthi ⁽³⁾	—	—	—
Inder M. Singh ⁽⁴⁾	1,900	—	1,900
Charles E. Wert ⁽³⁾	—	—	—
Harry You	12,500	—	12,500

- (1) The amounts reported in this column reflect the aggregate grant date fair value of the shares underlying option awards granted to our directors as computed in accordance with ASC Topic 718. See Note 13 to our consolidated financial statements included elsewhere in this Annual Report for a discussion of assumptions made us in determining the aggregate grant date fair value of our option awards. Note that the amounts reported in this column reflect the accounting cost for these stock options and do not reflect the actual economic value that may be realized by the directors upon the vesting of the stock options, the exercise of the stock options or the sale of the common stock underlying such stock options.
- (2) In connection with Mr. Barratt's appointment to Legacy IonQ, he was granted a stock option to purchase 926,347 shares of our common stock. The shares of common stock underlying the option vested or shall vest 1/36th on the last day of each month commencing on December 30, 2020, subject to the holder remaining in Continuous Service with the Company on each vesting date. The option contains an early exercisable provision and was fully exercised by Mr. Barratt.
- (3) Resigned from our board of directors upon completion of the business combination on September 30, 2021.

- (4) In January 2022, Mr. Singh received a Stock Option Award of 33,570 shares of our common stock and an RSU Award of 11,190 shares of our common stock in connection with his appointment to our board of directors in December 2021.
- (5) The following table provides information regarding the aggregate number of equity awards granted to our non-employee directors that were outstanding as of December 31, 2021:

<u>Name</u>	<u>Restricted Stock Outstanding at Year-End (#)</u>	<u>Option Awards Outstanding at Year-End (#)</u>
Darla Anderson	—	—
Craig Barratt	617,567 ⁽¹⁾	—
Blake Byers	—	—
Ronald Bernal	—	—
Francesca Luthi	—	—
Inder M. Singh	—	—
Charles E. Wert	—	—
Harry You	—	—

- (1) Consists of shares of restricted stock issued pursuant to the early exercise of the stock option granted to Mr. Barratt in connection with this appointment to Legacy IonQ that remain subject to our repurchase right in accordance with the vesting schedule of the stock option.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters.

Security Ownership of Certain Beneficial Owners and Management

The following table sets forth information regarding the beneficial ownership of shares of our common stock as of March 15, 2022 by (i) each named executive officer, (ii) each director, (iii) all directors and executive officers as a group and (iv) each person, or group of affiliated persons, who is known by us to beneficially own more than 5% of our outstanding common stock. Other than as set forth in this table, we are not aware of any person or group that holds greater than 5% of our outstanding common stock.

Beneficial ownership of securities is determined according to the rules of the SEC and generally means, with respect to a security, that a person or entity possesses sole or shared voting or investment power of such security, including options and warrants that are currently exercisable or will be exercisable within 60 days of March 15, 2022. Options to purchase shares of our common stock that are exercisable within 60 days of March 15, 2022 are deemed to be beneficially owned by the person holding these options for the purpose of computing percentage ownership of that person, but they are not treated as outstanding for the purpose of computing any other person’s ownership percentage.

This table is based upon information supplied by officers, directors and principal stockholders and Schedules 13G or 13D filed with the SEC. Unless otherwise indicated in the footnotes to this table and subject to community property laws where applicable, we believe that all persons named in the table have sole voting and investment power with respect to all shares of our common stock beneficially owned by them. Applicable percentages are based on 197,671,494 shares of common stock outstanding as of December 31, 2021, adjusted as required by rules promulgated by the SEC.

<u>Name and Address of Beneficial Owner⁽¹⁾</u>	<u>Amount & Nature of Beneficial Ownership</u>	<u>Percent of Class (Common Stock)</u>
5% Stockholders:		
Entities affiliated with New Enterprise Associates ⁽²⁾	29,277,852	14.7%
Entities affiliated with GV ⁽³⁾	21,907,038	11.0%
Named Executive Officers and Directors:		
Peter Chapman ⁽⁴⁾	4,723,194	2.3%
Jungsang Kim ⁽⁵⁾	7,623,390	3.4%
Thomas Kramer ⁽⁶⁾	675,464	*
Craig Barratt ⁽⁷⁾	926,347	*
Blake Byers	300,000	*
Ronald Bernal ⁽²⁾	—	*
Niccolo de Masi ⁽⁸⁾	—	*
Inder M. Singh	—	*
Harry L. You ⁽⁸⁾	7,425,000	3.8%
All executive officers and directors as a group (11 persons)	28,639,364	14.1%

* Less than 1%.

- (1) Unless otherwise noted, the business address of each of the beneficial owners is c/o IonQ, Inc., 4505 Campus Drive, College Park, MD 20740.
- (2) Consists of (i) 29,229,659 shares of common stock held by New Enterprise Associates 15, L.P. (“NEA 15”) and (ii) 48,193 shares of common stock held by NEA Ventures 2016, L.P (“NEA Ventures”). The shares directly held by NEA 15 are indirectly held by NEA Partners 15, L.P. (“NEA Partners 15”), the sole general partner of NEA 15, NEA 15 GP, LLC (“NEA 15 LLC”), the sole general partner of NEA Partners 15 and each of the individual managers of NEA 15 LLC. The individual Managers of NEA 15 LLC (collectively, the “Managers”) are Forest Baskett, Anthony A. Florence, Mohamad Makhzoumi, Peter Sonsini and

Scott D. Sandell. The shares directly held by NEA Ventures are indirectly held by Karen P. Welsh, the general partner of NEA Ventures. NEA Partners 15, NEA 15 LLC and the Managers share voting and dispositive power with regard to the securities directly held by NEA 15. Ms. Welsh has voting and dispositive power with regard to the securities directly held by NEA Ventures. Ron Bernal, a member of our board of directors, and a Venture Partner at New Enterprise Associates, Inc. (“NEA”), has no voting or investment control over any of the shares held by NEA 15 and NEA Ventures. All indirect holders of the above referenced securities disclaim beneficial ownership therein except to the extent of their actual pecuniary interest.

- (3) Consists of (i) 4,556,532 shares of common stock held by GV 2019, L.P. and (ii) 17,350,506 shares of common stock held by GV 2016, L.P. GV 2019 GP, L.P. (the general partner of GV 2019, L.P.), GV 2019 GP, L.L.C., (the general partner of GV 2019 GP, L.P.), Alphabet Holdings LLC (the managing member of GV 2019 GP, L.L.C.), XXVI Holdings Inc. (the managing member of Alphabet Holdings LLC) and Alphabet Inc. (the controlling stockholder of XXVI Holdings Inc.) may each be deemed to have sole voting and investment power over the securities held by GV 2019, L.P. GV 2016 GP, L.P. (the general partner of GV 2016, L.P.), GV 2016 GP, L.L.C. (the general partner of GV 2016 GP, L.P.), Alphabet Holdings LLC (the managing member of GV 2016 GP, L.L.C.), XXVI Holdings Inc. (the managing member of Alphabet Holdings LLC) and Alphabet Inc. (the controlling stockholder of XXVI Holdings Inc.) may each be deemed to have sole voting and investment power over the securities held by GV 2016, L.P. The principal business address of GV 2019, L.P., GV 2019 GP, L.P., GV 2019 GP, L.L.C., GV 2016, L.P., GV 2016 GP, L.P., GV 2016 GP, L.L.C., Alphabet Holdings LLC, XXVI Holdings Inc. and Alphabet Inc. is 1600 Amphitheatre Parkway, Mountain View, California 94043.
- (4) Reflects shares of common stock issuable to Mr. Chapman pursuant to options exercisable within 60 days of March 15, 2022.
- (5) Consists of (i) 6,422,352 shares of common stock held by Mr. Kim, (ii) 391,347 shares of common stock issuable to Mr. Kim pursuant to options exercisable within 60 days of March 15, 2022, and (iii) 809,691 shares of common stock held by the Jungsang Kim Irrevocable Trusts For Children, dated January 27, 2021.
- (6) Consists of 675,464 shares of common stock held by Mr. Kramer, a portion of which are subject to a repurchase right.
- (7) Consists of 926,347 shares of common stock held by the Barratt-Oakley Trust dated November 29, 2004, of which Mr. Barratt is a trustee. A portion of these shares are subject to a repurchase right.
- (8) Consists of 7,425,000 shares of common stock held by dMY Sponsor III, LLC (the “Sponsor”). Each of Mr. You and Mr. de Masi are members of the Sponsor, and Mr. You is the manager of the Sponsor. Accordingly, Mr. You has voting and investment discretion with respect to the common stock held of record by the Sponsor. Mr. di Masi has no voting or investment control over any of the shares and disclaims any beneficial ownership of any securities held by the Sponsor.

Securities Authorized for Issuance Under Equity Compensation Plans

The following table sets forth the aggregate information of our equity compensation plans in effect as of December 31, 2021.

Plan Category	Number of securities to be issued upon exercise of outstanding options, warrants and rights	Weighted-average exercise price of outstanding options, warrants and rights (\$)	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a))
	(a)	(b)	(c)
Equity compensation plans approved by stockholders:			
2015 Equity Incentive Plan ⁽¹⁾	22,133,210	\$0.64	—
2021 Equity Incentive Plan	—	—	26,235,000 ⁽²⁾
2021 Employee Stock Purchase Plan	—	—	5,354,000 ⁽³⁾
Equity compensation plans not approved by stockholders	—	—	—
Total	22,133,210	\$0.64	31,589,000

- (1) Following the adoption of the 2021 Plan, no additional equity awards have been or will be granted under the 2015 Plan.
- (2) The number of shares of common stock reserved for issuance under the 2021 Plan will automatically increase on January 1 of each year, beginning on January 1, 2022 and continuing through and including January 1, 2031, in an amount equal to (1) 5% of the fully-diluted common stock on December 31 of the preceding year (as defined in the 2021 Plan), or (2) a lesser number of shares of common stock determined by the board of directors prior to the date of the increase (which may be zero). Pursuant to the terms of the 2021 Plan, the number of shares available under the 2021 Plan was increased by 12,947,703 shares effective January 1, 2022.
- (3) The number of shares of common stock reserved for issuance under the ESPP will automatically increase on January 1 of each year, beginning on January 1, 2022 and continuing through and including January 1, 2031, by the lesser of (1) 1% of the fully-diluted common stock on December 31 of the preceding calendar year (inclusive of the share reserve for the ESPP and of the 2021 Plan), (2) a number of shares equal to two times the initial share reserve, or (3) such lesser number of shares of common stock as determined by the board (which may be zero). Pursuant to the terms of the ESPP, no shares were added to the reserve on January 1, 2022.

Item 13. Certain Relationships and Related Transactions, and Director Independence.

Policies and Procedures Regarding Transactions with Related Persons

We have adopted a written related person transactions policy that sets forth our policies and procedures regarding the identification, review, consideration and oversight of “related person transactions.” For purposes of the policy only, a “related person transaction” is a transaction, arrangement or relationship (or any series of similar transactions, arrangements or relationships) in which we or any of our subsidiaries are participants involving an amount that exceeds \$120,000, in which any “related person” has a material interest.

Transactions involving compensation for services provided to us as an employee, consultant or director will not be considered related person transactions under this policy. A related person is any executive officer, director, nominee to become a director or a holder of more than 5% of any class of our voting securities (including the common stock), including any of their immediate family members and affiliates, including entities owned or controlled by such persons.

Under the policy, the related person in question or, in the case of transactions with a holder of more than 5% of any class of our voting securities, an officer with knowledge of a proposed transaction, must present information regarding the proposed related person transaction to the audit committee (or, where review by the audit committee would be inappropriate, to another independent body of the board) for review. To identify related person transactions in advance, we will rely on information supplied by our executive officers, directors and certain significant stockholders. In considering related person transactions, the audit committee will take into account the relevant available facts and circumstances, which may include, but are not limited to:

- the risks, costs, and benefits to us;
- the impact on a director’s independence in the event the related person is a director, immediate family member of a director or an entity with which a director is affiliated;
- the terms of the transaction;
- the availability of other sources for comparable services or products; and
- the terms available to or from, as the case may be, unrelated third parties.

The audit committee will approve only those transactions that it determines are fair to us and in our best interests. All of the transactions described above were entered into prior to the adoption of such policy.

Related Person Transactions

Other than compensation arrangements for our directors and executive officers, the following is a description of transactions since January 1, 2019 to which we were a party or will be a party, in which:

- the amounts involved exceeded or will exceed \$120,000; and
- any of our directors, executive officers or holders of more than 5% of our capital stock, or any member of the immediate family of, or person sharing the household with, the foregoing persons, had or will have a direct or indirect material interest.

dMY Relationships and Related Person Transactions

Founder Shares

On September 14, 2020, the Sponsor subscribed for 7,187,500 Founder Shares for a total subscription price of \$25,000, and fully paid for these on November 17, 2020. In October 2020, the Sponsor transferred 25,000 Founder Shares to each of Darla Anderson, Francesca Luthi and Charles E. Wert, dMY’s directors. On November 12, 2020, dMY effected a 1:1.1 stock split of the Class B Stock, resulting in an aggregate of 7,906,250 shares outstanding. All shares and associated amounts have been retroactively restated to reflect the stock split.

The Sponsor agreed to forfeit up to 1,031,250 Founder Shares to the extent that the over-allotment option was not exercised in full by the underwriters, so that the Founder Shares will represent 20.0% of dMY's issued and outstanding shares after the dMY IPO. On November 17, 2020, the underwriters partially exercised their over-allotment option to purchase 2,500,000 Public Units; thus, only 406,250 Founder Shares were forfeited, resulting in an aggregate of 7,500,000 Founder Shares outstanding.

The Initial Stockholders agreed, subject to limited exceptions, not to transfer, assign or sell any of the Founder Shares until the earlier to occur of: (A) one year after the completion of the initial business combination or earlier if, subsequent to the business combination, the closing price of the Class A Stock equals or exceeds \$12.50 per share (as adjusted for stock splits, stock capitalizations, reorganizations, recapitalizations and the like) for any 20 trading days within any 30-trading day period commencing at least 150 days after the initial business combination and (B) the date following the completion of the business combination on which IonQ completes a liquidation, merger, capital stock exchange or other similar transaction that results in all of the stockholders having the right to exchange their Common Stock for cash, securities or other property.

Private Placement Warrants

Simultaneously with the closing of the dMY IPO, dMY consummated the Private Placement of 4,000,000 Private Placement Warrants at a price of \$2.00 per Private Placement Warrant to the Sponsor, generating gross proceeds of \$8.0 million (including approximately \$7.95 million in cash and approximately \$50,000 in subscription receivable).

Each whole Private Placement Warrant is exercisable for one whole share of Class A Stock at a price of \$11.50 per share. A portion of the proceeds from the sale of the Private Placement Warrants to the Sponsor was added to the proceeds from the dMY IPO held in the Trust Account. The Private Placement Warrants are non-redeemable for cash and exercisable on a cashless basis so long as they are held by the Sponsor or its permitted transferees. The Sponsor exercised the Private Placement Warrants on a cashless basis in December 2021 and received 2.2 million shares of our common stock.

Related Party Loans

On September 14, 2020, the Sponsor agreed to loan dMY an aggregate of up to \$200,000 to cover expenses related to the dMY IPO pursuant to the Note. This loan was non-interest bearing and was paid off upon the completion of the dMY IPO.

Administrative Services Agreement

dMY entered into an agreement that provides that, commencing on the date of the dMY IPO continuing until the earlier of dMY's consummation of an initial business combination and dMY's liquidation, dMY paid the Sponsor a total of \$10,000 per month for office space, secretarial and administrative services provided to members of dMY's management team.

The Sponsor, executive officers and directors, or any of their respective affiliates were reimbursed for any out-of-pocket expenses incurred in connection with activities on dMY's behalf such as identifying potential target businesses and performing due diligence on suitable business combinations. dMY's audit committee will review on a quarterly basis all payments that were made to the Sponsor, executive officers or directors, or dMY's or their affiliates.

Private Placements of Securities by Legacy IonQ Prior to the Closing of the Business Combination

Series B-1 Preferred Stock Financing

Between August 2019 and November 2019, Legacy IonQ issued and sold an aggregate of 11,166,941 shares of Legacy IonQ Series B-1 preferred stock at a purchase price of \$5.5757 per share, for an aggregate purchase price

of \$62.3 million. Each share of Legacy IonQ Series B-1 preferred stock was canceled and converted into the right to receive the number of shares of common stock equal to the Exchange Ratio (as defined in the Merger Agreement) upon the consummation of the business combination.

The table below sets forth the number of shares of Legacy IonQ Series B-1 preferred stock purchased by Legacy IonQ's related parties:

	<u>Shares of Series B-1 Preferred Stock</u>	<u>Total Purchase Price</u>
New Enterprise Associates 15, L.P. ⁽¹⁾	896,748	\$4,999,998
GV 2019, L.P. ⁽²⁾	1,076,098	\$6,000,000

- (1) Ronald Bernal, a member of our board of directors, is a partner of New Enterprise Associates 15, L.P., a beneficial owner of greater than 5% of our capital stock.
- (2) Blake Byers, a member of our board of directors, was previously a partner of GV 2019, L.P., a beneficial owner of greater than 5% of our capital stock.

Business Combination Related Person Transactions

PIPE Investment

In connection with the execution of the Merger Agreement, dMY entered into subscription agreements with the PIPE investors, pursuant to which the PIPE investors agreed to purchase, and dMY agreed to sell the PIPE investors, an aggregate of 34,500,000 shares of dMY common stock, for a purchase price of \$10.00 per share and an aggregate purchase price of \$345.0 million, in the PIPE investment. The table below sets forth the number of shares of dMY common stock to be purchased by our related parties in the PIPE offering:

<u>Stockholder</u>	<u>Shares of dMY common stock</u>	<u>Total Purchase Price</u>
Blake Byers ⁽¹⁾	300,000	\$3,000,000
New Enterprise Associates 15, L.P. ⁽²⁾	200,000	\$2,000,000
GV 2016, L.P. ⁽¹⁾	200,000	\$2,000,000

- (1) Blake Byers, a member of our board of directors, was previously a partner of GV 2016, L.P., a beneficial owner of greater than 5% of our capital stock.
- (2) Ronald Bernal, a member of our board of directors, is a partner of New Enterprise Associates 15, L.P., a beneficial owner of greater than 5% of our capital stock.

Stockholder Support Agreement

On March 7, 2021, dMY, Legacy IonQ and certain Legacy IonQ stockholders, including holders affiliated with members of Legacy IonQ's board of directors and beneficial owners of greater than 5% of Legacy IonQ's capital stock, representing 54.88% of the voting power of Legacy IonQ's then-outstanding shares of capital stock, entered into the Stockholder Support Agreement, whereby such Legacy IonQ stockholders agreed to, among other things, promptly (and in any event within three business days) following the SEC declaring effective the proxy statement/prospectus, vote or provide consent with respect to the securities of Legacy IonQ set forth in the Stockholder Support Agreement, in favor of the approval and adoption of the Merger Agreement and the transactions contemplated therein. Additionally, such Legacy IonQ stockholders agreed, among other things, to not transfer any securities of Legacy IonQ set forth in the Stockholder Support Agreement from March 7, 2021 until the earlier of the effective time or the termination of the Merger Agreement in accordance with its terms, subject to certain exceptions.

Amended and Restated Registration Rights Agreement

In connection with the closing of the business combination, we, the Sponsor, the former dMY directors and certain of our securityholders entered into an amended and restated registration rights agreement. Pursuant to the

agreement, we agreed that we will file with the SEC a registration statement registering the resale of certain securities held by or issuable to such holders, and we will use reasonable best efforts to have such registration statement declared effective as soon as practicable after the filing thereof. In certain circumstances, certain holders can demand up to two underwritten offerings in any 12 month period, and certain holders are entitled to piggyback registration rights.

Lock-Up Agreement

In connection with the business combination, the Sponsor, the current management of Legacy IonQ, the former dMY directors and certain stockholders of Legacy IonQ entered into a lock-up agreement, which we refer to as the “Lock-Up Agreements.” The parties to such Lock-Up Agreements agree not to, without the prior written consent of the Board, during the applicable lock-up period:

- sell, offer to sell, contract or agree to sell, hypothecate, pledge, grant any option, right or warrant to purchase or otherwise transfer, dispose of or agree to transfer or dispose of, directly or indirectly, or establish or increase a put equivalent position or liquidate or decrease a call equivalent position within the meaning of the Exchange Act, and the rules and regulations of the SEC promulgated thereunder, any shares of common stock held by it immediately after closing (including common stock acquired as part of the PIPE investment or issued in exchange for, or on conversion or exercise of, any securities issued as part of the PIPE investment), any shares of common stock issuable upon the exercise of options to purchase shares of common stock held by it immediately after closing, or any securities convertible into or exercisable or exchangeable for common stock held by it immediately after closing (the “Lock-Up Shares”),
- enter into any swap or other arrangement that transfers to another, in whole or in part, any of the economic consequences of ownership of any of the Lock-Up Shares, whether any such transaction is to be settled by delivery of such securities, in cash or otherwise or
- publicly announce any intention to effect any transaction specified in the foregoing clauses.

Pursuant to the Lock-Up Agreement, the parties agreed to transfer restrictions as follows: (i) certain stockholders of Legacy IonQ will be restricted until the earlier of (x) March 30, 2022 (180 days after the closing date) and (y) the date on which the Company completes a liquidation, merger, capital stock exchange, reorganization or other similar transaction that results in all of our stockholders having the right to exchange their shares for cash, securities or other property; (ii) members of our management will be restricted until the earlier of (x) 365 days after the closing date, (y) the day after the date on which the closing price of our common stock equals or exceeds \$12.00 per share (as adjusted for stock splits, stock dividends, reorganizations, recapitalizations and the like) for any 20 trading days within any 30-trading day period commencing at least 180 days after the closing date and (z) the date on which we complete a liquidation, merger, capital stock exchange, reorganization or other similar transaction that results in all of our stockholders having the right to exchange their shares for cash, securities or other property; and (iii) members of dMY’s board of directors and the Sponsor will be restricted until the earlier of (x) 365 days after the closing date, (y) the day after the date on which the closing price of our common stock equals or exceeds \$12.00 per share (as adjusted for stock splits, stock dividends, reorganizations, recapitalizations and the like) for any 20 trading days within any 30-trading day period commencing at least 150 days after the closing date and (z) the date on which we complete a liquidation, merger, capital stock exchange, reorganization or other similar transaction that results in all of our stockholders having the right to exchange their shares for cash, securities or other property.

In addition, the PIPE investors have agreed to be bound by lock-up provisions with respect to their subscribed shares. The lock-up periods for strategic investors vary between 6 and 18 months, subject to certain conditions, depending on the number of shares of common stock subscribed for by each strategic investor and a number of other factors. Venture capital and other investors have agreed to be bound by lock-up provisions with respect to their subscribed shares for a period of 180 days, subject to the terms of their subscription agreements or, in the case of certain investors that were previously investors in dMY, the Lock-Up Agreement described above.

Indemnification Agreements

Our Certificate of Incorporation contains provisions limiting the liability of executive officers and directors, and the Bylaws provide that we will indemnify each of our executive officers and directors to the fullest extent permitted under Delaware law. The Certificate of Incorporation and the Bylaws also provide the board of directors with discretion to indemnify certain key employees when determined appropriate by the board.

We have entered into indemnification agreements with all of our directors and executive officers and certain other key employees. The indemnification agreements provide that we will indemnify each of our directors, executive officers, and other key employees against any and all expenses incurred by such director, executive officer, or other key employee because of his or her status as one of our directors, executive officers, or other key employees, to the fullest extent permitted by Delaware law, the Certificate of Incorporation and the Bylaws. In addition, the indemnification agreements provide that, to the fullest extent permitted by Delaware law, we will advance all expenses incurred by our directors, executive officers, and other key employees in connection with a legal proceeding involving his or her status as a director, executive officer, or key employee.

Board of Directors Independence

The Board has reviewed the independence of each director. Based on information provided by each director concerning his background, employment and affiliations, the Board determined that none of the directors, other than Messrs. Chapman and Kim, has any relationships that would interfere with the exercise of independent judgment in carrying out the responsibilities of a director and that each of the directors is “independent” as that term is defined under the NYSE listing standards. In making these determinations, the board considered the current and prior relationships that each non-employee director has with us and all other facts and circumstances the board deemed relevant in determining their independence, including the beneficial ownership of our securities by each non-employee director and the transactions described above.

Item 14. Principal Accountant Fees and Services.

Changes in Registrant's Certifying Accountant.

As previously disclosed, in connection with the closing of the business combination on September 30, 2021, WithumSmith+Brown, PC, ("Withum") was dismissed as our independent registered public accounting firm. This decision was approved by the Board. Withum served as the independent registered public accounting firm for dMY prior to the business combination.

The Board approved the appointment of Ernst & Young LLP ("Ernst & Young") as our independent registered public accounting firm on September 30, 2021. Ernst & Young served as the independent registered public accounting firm for Legacy IonQ prior to the business combination.

Principal Accountant Fees and Services

The following tables present the aggregate fees billed by Ernst & Young and Withum to us (including Legacy IonQ, in the case of Ernst & Young) for the fiscal years ended December 31, 2021 and 2020.

Ernst & Young

	Fiscal Year	
	2021	2020
Audit fees ⁽¹⁾	\$1,510,000	\$425,000
Audit-related fees	\$ —	\$ —
Tax fees	\$ —	\$ —
All other fees	\$ —	\$ —
Total fees	\$1,510,000	\$425,000

- (1) Audit fees in 2021 consisted of fees billed for professional services rendered for the audit of IonQ, Inc.'s 2021 consolidated financial statements, the reviews of 2021 interim condensed consolidated financial statements, audit services in connection with the accounting for the business combination, and audit services provided in connection with other regulatory filings and offerings, including the regulatory filings associated with the business combination and related financings. Audit fees for 2020 consisted of fees billed for professional services rendered for the audit of Legacy IonQ's consolidated financial statements (2019 and 2020), the reviews of the applicable historical interim condensed consolidated financial statements, and audit services provided in connection with other regulatory filings and offerings, including the regulatory filings associated with the business combination and related financings.

Withum

	Fiscal Year	
	2021	2020
Audit fees ⁽¹⁾	\$86,000	\$40,000
Audit-related fees	\$ —	\$ —
Tax fees ⁽²⁾	\$ 8,000	\$ —
All other fees	\$ —	\$ —
Total fees	\$94,000	\$40,000

- (1) Audit fees in 2021 consisted of fees billed for professional services rendered for the audit of dMY's restated 2020 annual financial statements, interim reviews of dMY's quarterly financial statements, and services that were normally provided by Withum in connection with regulatory filings. Audit fees in 2020 include fees billed for professional services rendered for the audit of dMY's annual financial statements and other required filings with the SEC.
- (2) Tax fees consisted of fees billed for professional services relating to tax compliance services.

All fees were pre-approved by our Audit Committee.

Pre-Approval Policies and Procedures

Our Audit Committee approves all audit and pre-approves all non-audit services provided by Ernst & Young before it is engaged by us to render non-audit services to ensure that the provision of these services does not impair the auditor's independence. These services may include audit-related services, tax services and other non-audit services.

The pre-approval requirement set forth above does not apply with respect to non-audit services if:

- all such services do not, in the aggregate, amount to more than 5% of the total fees paid by us to Ernst & Young during the fiscal year in which the services are provided;
- such services were not recognized as non-audit services at the time of the relevant engagement; and
- such services are promptly brought to the attention of and approved by the Audit Committee (or its delegate) prior to the completion of the annual audit.

The Audit Committee elected to delegate pre-approval authority to the chair of the Audit Committee to approve any one or more individual permitted non-audit services. The chair will report any pre-approval granted at the next meeting of the Audit Committee.

PART IV

Item 15. Exhibit and Financial Statement Schedules.

The financial statements schedules and exhibits filed as part of this Annual Report are as follows:

(a)(1) Financial Statements

Report of Independent Registered Public Accounting Firm (PCAOB ID 42)	F-2
Consolidated Balance Sheets	F-3
Consolidated Statements of Operations	F-4
Consolidated Statements of Comprehensive Loss	F-5
Consolidated Statements of Changes in Convertible Redeemable Preferred Stock, Warrants and Stockholders' Equity	F-6
Consolidated Statements of Cash Flows	F-7
Notes to Consolidated Financial Statements	F-8

(a)(2) Financial Statement Schedules

All other schedules are omitted because they are not required or the required information is included in the financial statements or notes thereto.

(a)(3) Exhibits

The exhibits required to be filed as part of this report are listed in the Exhibit List attached hereto and are incorporated herein by reference.

Exhibit Number	Description
2.1	Agreement and Plan of Merger, dated as of March 7, 2021, by and among dMY Technology Group, Inc. III, IonQ, Inc. and IonQ Trap Acquisition Inc. (incorporated herein by reference to Exhibit 2.1 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on March 8, 2021).
3.1	Second Amended and Restated Certificate of Incorporation of the Company (incorporated herein by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on October 4, 2021).
3.2	Amended and Restated Bylaws of the Company (incorporated herein by reference to Exhibit 3.2 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on October 4, 2021).
4.1	Specimen Common Stock Certificate (incorporated herein by reference to Exhibit 4.4 to the Company's Registration Statement on Form S-4/A (File No. 333-254840), filed with the SEC on August 11, 2021).
4.2	Warrant Agreement, dated November 12, 2020, between Continental Stock Transfer & Trust Company and IonQ, Inc. (incorporated herein by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on November 17, 2020).
4.3	Description of the Registrant's Securities.
10.1	Amended and Restated Registration Rights Agreement, dated September 30, 2021, between and among the investors party thereto and IonQ, Inc. (incorporated herein by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on October 4, 2021).

Exhibit Number	Description
10.2	Form of Subscription Agreement (incorporated herein by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on March 8, 2021).
10.3	Hyundai Subscription Agreement (incorporated herein by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on March 8, 2021).
10.4	Kia Subscription Agreement (incorporated herein by reference to Exhibit 10.3 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on March 8, 2021).
10.5	MSD Subscription Agreement (incorporated herein by reference to Exhibit 10.4 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on March 8, 2021).
10.6	Silver Lake Subscription Agreement (incorporated herein by reference to Exhibit 10.5 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on March 8, 2021).
10.7	BVE Subscription Agreement (incorporated herein by reference to Exhibit 10.6 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on March 8, 2021).
10.8	Form of Venture Capital / Other Investors Subscription Agreement (incorporated herein by reference to Exhibit 10.7 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on March 8, 2021).
10.9	Form of Sponsor Support Agreement (incorporated herein by reference to Exhibit 10.8 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on March 8, 2021).
10.10	Form of Stockholder Support Agreement (incorporated herein by reference to Exhibit 10.9 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on March 8, 2021).
10.11	Form of Lock-Up Agreement (incorporated herein by reference to Exhibit 10.10 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on March 8, 2021).
10.12+	IonQ, Inc. Change in Control Severance Plan and Summary Plan Description (incorporated herein by reference to Exhibit 10.36 to the Company's Registration Statement on Form S-4/A (File No. 333-254840), filed with the SEC on August 5, 2021).
10.13+	Form of Indemnification Agreement of IonQ, Inc. (incorporated herein by reference to Exhibit 10.13 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on October 4, 2021).
10.14+	2015 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.14 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on October 4, 2021).
10.15+	Forms of Stock Option Grant Notice and Option Agreement under 2015 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.15 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on October 4, 2021).
10.16+	2021 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.16 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on October 4, 2021).
10.17+	Forms of Option Grant Notice and Option Agreement under 2021 Equity Incentive Plan.
10.18+	Form of Restricted Stock Unit Grant Notice and Unit Award Agreement under 2021 Equity Incentive Plan.

Exhibit Number	Description
10.19+	2021 Employee Stock Purchase Plan (incorporated herein by reference to Exhibit 10.19 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on October 4, 2021).
10.20	Amended and Restated Office Lease, by and between University of Maryland – College Park and IonQ, Inc. (incorporated herein by reference to Exhibit 10.20 to the Company's Current Report on Form 8-K (File No. 001-39694), filed with the SEC on October 4, 2021)
10.21	Warrant to Purchase Shares, dated November 27, 2019, issued to Amazon.com NV Investment Holdings LLC by IonQ, Inc. (incorporated herein by reference to Exhibit 10.33 to the Company's Registration Statement on Form S-4/A (File No. 333-254840), filed with the SEC on July 16, 2021).
10.22	License Agreement, dated July 19, 2016, among the University of Maryland, Duke University and IonQ, Inc. (incorporated herein by reference to Exhibit 10.20 to the (incorporated herein by reference to Exhibit 10.20 to the Company's Registration Statement on Form S-4/A (File No. 333-254840), filed with the SEC on June 17, 2021).
10.23	Amendment No. 1 to Exclusive License Agreement, dated September 22, 2017, between Duke University and the Registrant (incorporated herein by reference to Exhibit 10.21 to the Company's Registration Statement on Form S-4/A (File No. 333-254840), filed with the SEC on June 17, 2021).
10.24†	Amendment No. 1 to Exclusive License Agreement, dated October 11, 2017, between the University of Maryland and IonQ, Inc. (incorporated herein by reference to Exhibit 10.22 to the Company's Registration Statement on Form S-4/A (File No. 333-254840), filed with the SEC on June 17, 2021).
10.25†	Amendment No. 2 to Exclusive License Agreement, dated October 4, 2018, between Duke University and IonQ, Inc. (incorporated herein by reference to Exhibit 10.23 to the Company's Registration Statement on Form S-4/A (File No. 333-254840), filed with the SEC on June 17, 2021).
10.26†	Amendment No. 2 to Exclusive License Agreement, dated October 9, 2018, between the University of Maryland and IonQ, Inc. (incorporated herein by reference to Exhibit 10.24 to the Company's Registration Statement on Form S-4/A (File No. 333-254840), filed with the SEC on June 17, 2021).
10.27†	Amendment No. 3 to Exclusive License Agreement, dated April 27, 2021, between Duke University, the University of Maryland and IonQ, Inc. (incorporated herein by reference to Exhibit 10.25 to the Company's Registration Statement on Form S-4/A (File No. 333-254840), filed with the SEC on June 17, 2021).
10.28†	Amendment No. 4 to Exclusive License Agreement, dated April 27, 2021, between Duke University, the University of Maryland and IonQ, Inc. (incorporated herein by reference to Exhibit 10.26 to the Company's Registration Statement on Form S-4/A (File No. 333-254840), filed with the SEC on June 17, 2021).
10.29†	Amendment No. 5 to Exclusive License Agreement, dated September 10, 2021, between Duke University and IonQ, Inc.
10.30†	Amendment No. 5 to Exclusive License Agreement, dated September 24, 2021, between the University of Maryland and IonQ, Inc.
10.31†	Exclusive Option Agreement, dated July 15, 2016, between Duke University and IonQ, Inc. (incorporated herein by reference to Exhibit 10.27 to the Company's Registration Statement on Form S-4/A (File No. 333-254840), filed with the SEC on June 17, 2021).

Exhibit Number	Description
10.32 [†]	First Amendment to Option Agreement, dated December 18, 2020, between Duke University and IonQ, Inc. (incorporated herein by reference to Exhibit 10.28 to the Company’s Registration Statement on Form S-4/A (File No. 333-254840), filed with the SEC on June 17, 2021).
10.33	Second Amendment to Option Agreement, dated March 19, 2021, between Duke University and IonQ, Inc. (incorporated herein by reference to Exhibit 10.29 to the Company’s Registration Statement on Form S-4/A (File No. 333-254840), filed with the SEC on June 17, 2021).
10.34	Non-Employee Director Compensation Policy.
21.1	List of Subsidiaries of Company (incorporated herein by reference to Exhibit 21.1 to the Company’s Current Report on Form 8-K (File No. 001-39694), filed with the Commission on October 4, 2021).
23.1	Consent of Ernst & Young LLP, an Independent Registered Public Accounting Firm.
24.1	Power of Attorney (included on the signature page to this report).
31.1	Certification of Principal Executive Officer Pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2	Certification of Principal Financial Officer Pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1*	Certification of Principal Executive Officer and Principal Financial Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101.INS	Inline XBRL Instance Document—the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL Document.
101.SCH	Inline XBRL Taxonomy Extension Schema Document
101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase Document
101.LAB	Inline XBRL Taxonomy Extension Label Linkbase Document
101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase Document
104	Cover Page Interactive Data File (formatted as inline XBRL with applicable taxonomy extension information contained in Exhibit 101).

* Furnished herewith and not deemed to be “filed” for purposes of Section 18 of the Securities Exchange Act of 1934, as amended (the “Exchange Act”), and shall not be deemed to be incorporated by reference into any filing under the Securities Act of 1933, as amended, or the Exchange Act (whether made before or after the date of the Form 10-K), irrespective of any general incorporation language contained in such filing.

+ Indicates a management contract or compensatory plan.

[†] Certain of the exhibits and schedules to this Exhibit have been omitted in accordance with Regulation S-K Item 601(b)(10)(iv). The Registrant agrees to furnish a copy of all omitted exhibits and schedules to the SEC upon its request.

Item 16. Form 10-K Summary

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, as amended, the Registrant has duly caused this report on Form 10-K to be signed on its behalf by the undersigned, thereunto duly authorized.

IonQ, Inc.

March 28, 2022

BY: /s/ Peter Chapman
Peter Chapman
President and Chief Executive Officer
(Principal Executive Officer)

POWER OF ATTORNEY

Each person whose individual signature appears below hereby authorizes and appoints Peter Chapman and Thomas Kramer, and each of them, with full power of substitution and resubstitution and full power to act without the other, as his or her true and lawful attorney-in-fact and agent to act in his or her name, place and stead and to execute in the name and on behalf of each person, individually and in each capacity stated below, and to file any and all amendments to this report on Form 10-K, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing, ratifying and confirming all that said attorneys-in-fact and agents or any of them or their or his substitute or substitutes may lawfully do or cause to be done by virtue thereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this report on Form 10-K has been signed below by the following persons on behalf of the Registrant in the capacities and on the dates indicated.

Name	Title	Date
<u>/s/ Peter Chapman</u> Peter Chapman	President and Chief Executive Officer and Director (Principal Executive Officer)	March 28, 2022
<u>/s/ Thomas Kramer</u> Thomas Kramer	Chief Financial Officer (Principal Financial and Accounting Officer)	March 28, 2022
<u>/s/ Craig Barratt</u> Craig Barratt	Chairman of the Board of Directors	March 28, 2022
<u>/s/ Ronald Bernal</u> Ronald Bernal	Director	March 28, 2022
<u>/s/ Blake Byers</u> Blake Byers	Director	March 28, 2022
<u>/s/ Niccolo de Masi</u> Niccolo de Masi	Director	March 28, 2022

<u>/s/ Jungsang Kim</u> Jungsang Kim	Co-Founder, Chief Technology Officer and Director	March 28, 2022
<u>/s/ Inder M. Singh</u> Inder M. Singh	Director	March 28, 2022
<u>/s/ Harry You</u> Harry You	Director	March 28, 2022

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

Report of Independent Registered Public Accounting Firm	F-2
Consolidated Balance Sheets	F-3
Consolidated Statements of Operations	F-4
Consolidated Statements of Comprehensive Loss	F-5
Consolidated Statements of Changes in Convertible Redeemable Preferred Stock, Warrants and Stockholders' Equity	F-6
Consolidated Statements of Cash Flows	F-7
Notes to Consolidated Financial Statements	F-8

Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of IonQ, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of IonQ, Inc. (the Company) as of December 31, 2021 and 2020, the related consolidated statements of operations and comprehensive loss, changes in convertible redeemable preferred stock, warrants and stockholders' equity and cash flows for the years then ended, and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2021 and 2020, and the results of its operations and its cash flows for the years then ended, in conformity with U.S. generally accepted accounting principles.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ Ernst & Young LLP

We have served as the Company's auditor since 2020.

Tysons, Virginia

March 28, 2022

Consolidated Balance Sheets
(in thousands, except share and per share data)

	As of December 31,	
	2021	2020
Assets		
Current assets:		
Cash and cash equivalents	\$ 399,025	\$ 36,120
Short-term investments	123,443	—
Accounts receivable	707	390
Prepaid expenses and other current assets (\$612 and \$1,013 attributable to related parties)	6,442	2,069
Total current assets	529,617	38,579
Long-term investments	80,110	—
Property and equipment, net	18,870	11,988
Operating lease right-of-use assets (\$4,032 and \$4,296 attributable to related parties)	4,032	4,296
Intangible assets, net	5,841	2,687
Other noncurrent assets (\$1,845 and \$2,365 attributable to related parties)	3,558	2,928
Total Assets	\$ 642,028	\$ 60,478
Liabilities, Convertible Redeemable Preferred Stock and Warrants, and Stockholders' Equity		
Current liabilities:		
Accounts payable	\$ 1,882	\$ 538
Accrued expenses	2,647	608
Current portion of operating lease liabilities (\$568 and \$495 attributable to related parties)	568	495
Unearned revenue (\$2,821 and zero attributable to related parties)	3,430	240
Current portion of stock option early exercise liabilities	1,164	—
Total current liabilities	9,691	1,881
Operating lease liabilities, net of current portion (\$3,643 and \$3,776 attributable to related parties) ..	3,643	3,776
Unearned revenue, net of current portion	1,533	1,118
Stock option early exercise liabilities, net of current portion	1,969	—
Warrant liabilities	33,962	—
Total liabilities	\$ 50,798	\$ 6,775
Commitments and contingencies (see Note 9)		
Convertible Redeemable Preferred Stock and Warrants:		
Series A convertible redeemable preferred stock; \$0.0001 par value per share; 2,000,000 shares authorized; after giving effect to the recapitalization there is no convertible redeemable preferred stock issued or outstanding as of December 31, 2021 and 2020	—	—
Series B convertible redeemable preferred stock; \$0.0001 par value per share; 9,753,798 shares authorized; after giving effect to the recapitalization there is no convertible redeemable preferred stock issued or outstanding as of December 31, 2021 and 2020	—	—
Series B-1 convertible redeemable preferred stock; \$0.0001 par value per share; 13,217,404 shares authorized; after giving effect to the recapitalization there is no convertible redeemable preferred stock issued or outstanding as of December 31, 2021 and 2020	—	—
Warrants for Series B-1 convertible redeemable preferred stock; after giving effect to the recapitalization there are no warrants for convertible redeemable preferred stock issued or outstanding as of December 31, 2021 and 2020	—	—
Stockholders' Equity:		
Common stock \$0.0001 par value; 1,000,000,000 and 160,318,719 shares authorized as of December 31, 2021 and December 31, 2020, respectively; 195,630,975 and 118,146,795 shares issued and outstanding as of December 31, 2021 and December 31, 2020, respectively	19	3
Additional paid-in capital	737,150	93,305
Accumulated deficit	(145,791)	(39,605)
Accumulated other comprehensive loss	(148)	—
Total stockholders' equity	591,230	53,703
Total Liabilities, Convertible Redeemable Preferred Stock and Warrants, and Stockholders' Equity	\$ 642,028	\$ 60,478

The accompanying notes are an integral part of these consolidated financial statements.

Consolidated Statements of Operations
(in thousands, except share and per share data)

	Year Ended December 31,	
	2021	2020
Revenue	\$ 2,099	\$ —
Costs and expenses:		
Cost of revenue (excluding depreciation and amortization)	1,040	143
Research and development	20,228	10,157
Sales and marketing	3,233	486
General and administrative	13,737	3,547
Depreciation and amortization	2,548	1,400
Total operating costs and expenses	40,786	15,733
Loss from operations	(38,687)	(15,733)
Change in fair value of warrant liabilities	(63,332)	—
Offering costs associated with warrants	(4,259)	—
Other income (expense), net	92	309
Loss before benefit for income taxes	(106,186)	(15,424)
Benefit for income taxes	—	—
Net loss	\$ (106,186)	\$ (15,424)
Net loss per share attributable to common stockholders—basic and diluted	\$ (0.77)	\$ (0.13)
Weighted average shares used in computing net loss per share attributable to common stockholders—basic and diluted	137,609,620	115,045,097

The accompanying notes are an integral part of these consolidated financial statements.

Consolidated Statements of Comprehensive Loss

(in thousands)

	Year Ended December 31,	
	2021	2020
Net loss	\$(106,186)	\$(15,424)
Other comprehensive loss, net of reclassification adjustments:		
Unrealized loss on available-for-sale securities, net	(148)	—
Total other comprehensive loss	(148)	—
Total comprehensive loss	\$(106,334)	\$(15,424)

The accompanying notes are an integral part of these consolidated financial statements.

Consolidated Statements of Cash Flows
(in thousands)

	Year Ended December 31,	
	2021	2020
Cash flows from operating activities:		
Net loss	\$(106,186)	\$(15,424)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	2,548	1,400
Non-cash research and development arrangements	1,335	—
Amortization of customer warrant	528	38
Offering costs associated with warrants	4,259	—
Stock-based compensation	7,748	1,224
Change in fair value of warrant liabilities	63,332	—
Other, net	101	77
Changes in operating assets and liabilities:		
Accounts receivable	(317)	(290)
Prepaid expenses and other current assets	(3,790)	(699)
Other noncurrent assets	(1,678)	(11)
Accounts payable	763	96
Accrued expenses	1,259	374
Operating lease liabilities	(44)	(150)
Unearned revenue	3,605	1,358
Net cash used in operating activities	(26,537)	(12,007)
Cash flows from investing activities:		
Purchases of property and equipment	(7,783)	(10,032)
Capitalized software development costs	(1,621)	(1,131)
Purchases of available-for-sale securities	(203,761)	—
Intangible asset acquisition costs	(620)	(513)
Net cash used in investing activities	(213,785)	(11,676)
Cash flows from financing activities:		
Proceeds from stock options exercised	5,457	276
Repurchase of early exercised stock options	(968)	—
Proceeds from public warrants exercised	26,070	—
Proceeds from merger and PIPE transaction, net of transaction costs	572,668	—
Net cash provided by financing activities	603,227	276
Net change in cash and cash equivalents	362,905	(23,407)
Cash and cash equivalents at the beginning of the period	36,120	59,527
Cash and cash equivalents at the end of the period	\$ 399,025	\$ 36,120
Supplemental disclosures of non-cash investing and financing activities		
Issuance of common stock for intellectual property	\$ 1,567	\$ —
Issuance of common stock for research and development arrangement	\$ 814	\$ 2,903
Property and equipment purchases in accounts payable and accrued expenses	\$ 553	\$ —
Intangible asset purchases in accounts payable and accrued expenses	\$ 83	\$ —
Noncash reclassification of warrant liabilities to equity upon exercise	\$ 79,719	\$ —
Vesting of customer warrants	\$ —	\$ 566

The accompanying notes are an integral part of these consolidated financial statements.

IonQ, Inc.
Notes to Consolidated Financial Statements

1. DESCRIPTION OF BUSINESS

IonQ, Inc. (“IonQ” or “the Company”), formerly known as dMY Technology Group, Inc. III (“dMY”), was incorporated in the state of Delaware in September 2020 and formed as a special purpose acquisition company for the purpose of effecting a merger, capital stock exchange, asset acquisition, stock purchase, reorganization, or similar business combination with one or more businesses. IonQ Quantum, Inc. (formerly known as IonQ, Inc., and referred to as “Legacy IonQ” herein), was incorporated in the state of Delaware in September 2015 and is headquartered in College Park, Maryland.

On March 7, 2021, Legacy IonQ entered into an Agreement and Plan of Merger (the “Merger Agreement”) with dMY and Ion Trap Acquisition Inc. (“Merger Sub”), a direct, wholly owned subsidiary of dMY. Pursuant to the Merger Agreement, on September 30, 2021 (“the Closing Date”), the Merger Sub was merged with and into Legacy IonQ with Legacy IonQ continuing as the surviving corporation following the Merger, becoming a wholly owned subsidiary of dMY and the separate corporate existence of the Merger Sub ceased (the “Business Combination”). Commensurate with the Business Combination, dMY changed its name to IonQ, Inc. and Legacy IonQ changed its name to IonQ Quantum, Inc. After the Business Combination, IonQ’s common stock and public warrants are traded on the New York Stock Exchange (“NYSE”) under the symbols “IONQ” and “IONQ WS,” respectively.

Unless otherwise indicated, references in this Annual Report on Form 10-K to the “Company” and “IonQ” refer to the consolidated operations of IonQ, Inc. and IonQ Quantum, Inc. References to “dMY” refer to the company prior to the consummation of the Business Combination and references to “Legacy IonQ” refer to IonQ, Inc. prior to the consummation of the Business Combination.

IonQ is engaged in quantum computing and develops general-purpose quantum computing systems designed to solve the world’s most complex problems, and transform business, society, and the planet for the better. Prior to 2019, the Company built certain quantum computing systems solely for research & development purposes. To operate the quantum computing systems, the Company has developed custom hardware, custom firmware, and an operating system to orchestrate the quantum computers. During 2019, the Company began to commercialize its quantum computing systems and entered into its first significant customer agreements. Currently, the Company permits customers to use the quantum computing systems through a quantum-computing-as-a-service (“QCaaS”) platform.

Business Combination

While the legal acquirer in the Merger Agreement is dMY, for financial accounting and reporting purposes under accounting principles generally accepted in the United States of America (“U.S. GAAP”), Legacy IonQ is the accounting acquirer and the merger is accounted for as a “reverse recapitalization” (i.e., a capital transaction involving the issuance of stock by dMY for the stock of Legacy IonQ).

For accounting purposes, the Business Combination was treated as the equivalent of Legacy IonQ issuing stock for the net assets of dMY, accompanied by a recapitalization. The net assets of dMY are stated at historical cost, and no goodwill or other intangible assets were recorded. Because Legacy IonQ was deemed the accounting acquirer in the Business Combination, the historical financial statements of Legacy IonQ are the historical financial statements of the Company upon the consummation of the Business Combination. As a result, the financial statements included in this report reflect: (i) the historical operating results of Legacy IonQ prior to the Business Combination; (ii) the combined results of dMY and Legacy IonQ following the close of the Business Combination on September 30, 2021; and (iii) the assets and liabilities of Legacy IonQ stated at their historical cost.

In accordance with guidance applicable to these circumstances, the equity structure has been retroactively restated in all comparative periods up to the Closing Date to reflect the number of shares of the Company's common stock, \$0.0001 par value per share, issued to Legacy IonQ's stockholders in connection with the Business Combination. As such, the shares and corresponding capital amounts and earnings per share related to Legacy IonQ convertible redeemable preferred stock and warrants and Legacy IonQ common stock prior to the Business Combination have been retroactively restated as shares reflecting the exchange ratio established in the Business Combination. Legacy IonQ's convertible redeemable preferred stock and warrants previously classified as mezzanine equity were retroactively adjusted, converted into common stock, and reclassified to permanent equity because of the reverse recapitalization.

At the Closing Date, the consummation of the Merger provided approximately \$636.0 million of gross proceeds, including \$345.0 million from the PIPE investment in common stock at \$10.00 per share. In connection with the Business Combination, Legacy IonQ and dMY incurred direct and incremental costs of approximately \$52 million related to the equity issuance, consisting primarily of banking, legal, accounting, and other professional fees, which were recorded to additional paid-in capital as a reduction of proceeds. Additionally, approximately \$4.3 million in offering costs were allocated to liability-classified warrants assumed in the Merger and expensed upon the close of the Business Combination.

Sponsor Support Agreement

Concurrently with the execution of the Merger Agreement, certain former dMY stockholders entered into a sponsor support agreement. Under the sponsor support agreement, and effective upon the consummation of the Business Combination, 10% of the dMY Class B common stock (or 750,000 shares), which were converted into shares of common stock at the consummation of the Business Combination, were unvested and subject to certain vesting and forfeiture provisions (the "Vesting Shares").

These provisions provide that (i) one-third of the Vesting Shares shall vest at such time as (x) the closing price of common stock equals or exceeds \$12.50 for any 20 trading days during any period of 30 consecutive trading days or (y) IonQ consummates a subsequent transaction (as defined) on or before the date that is five years after the consummation of the Business Combination, (ii) one-third of the Vesting Shares shall vest at such time as (x) the closing price of common stock equals or exceeds \$15.00 for any 20 trading days during any period of 30 consecutive trading days or (y) IonQ consummates a subsequent transaction (as defined), on or before the date that is five years after the consummation of the Business Combination and (iii) one-third of the Vesting Shares shall vest at such time as (x) the closing price of common stock equals or exceeds \$17.50 for any 20 trading days during any period of 30 consecutive trading days or (y) IonQ consummates a subsequent transaction (as defined), on or before the date that is five years after the consummation of the Business Combination.

The Vesting Shares are accounted for as equity classified instruments and were included as merger consideration as part of the reverse recapitalization and recorded in additional paid-in capital. As of December 31, 2021, all of the Vesting Shares had vested and were released from any restrictions.

Segment Reporting

The Company operates as one operating segment as its chief executive officer, who is the chief operating decision maker, reviews financial information on a consolidated basis for purposes of making operating decisions, allocating resources, and evaluating financial performance.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Basis of Preparation

The accompanying consolidated financial statements have been prepared in accordance with U.S. GAAP as determined by the Financial Accounting Standards Board ("FASB"). Such consolidated financial statements include the accounts of IonQ and its wholly owned subsidiary. All intercompany transactions and balances have been eliminated in consolidation.

Emerging Growth Company

The Company is an emerging growth company, as defined in the Jumpstart Our Business Startups Act of 2012 (the “JOBS Act”). Under the JOBS Act, emerging growth companies can delay adopting new or revised accounting standards issued subsequent to the enactment of the JOBS Act, until such time as those standards apply to private companies.

The Company has elected to use this extended transition period for complying with new or revised accounting standards that have different effective dates for public and private companies until the earlier of the date that it is (i) no longer an emerging growth company or (ii) affirmatively and irrevocably opt out of the extended transition period provided in the JOBS Act. As a result, the Company’s financial statements may not be comparable to companies that comply with the new or revised accounting pronouncements as of public company effective dates.

The Company remains an emerging growth company until the earliest of (i) December 31, 2025, (ii) the last day of the fiscal year in which the Company has total annual gross revenue of at least \$1.07 billion, (iii) the last day of the fiscal year in which the Company is deemed to be a large accelerated filer, which means the market value of the Company’s common stock that is held by non-affiliates exceeds \$700.0 million as of the prior June 30th or (iv) the date on which the Company has issued more than \$1.0 billion in non-convertible debt securities during the prior three-year period.

Use of Estimates

The preparation of financial statements in conformity with U.S. GAAP and regulations of the U.S. Securities and Exchange Commission requires management to make estimates and assumptions that affect the amounts reported in these financial statements and accompanying notes.

Significant estimates and judgments are inherent in the analysis and measurement of items including, but not limited to: revenue recognition, capitalization of internally developed software and quantum computing costs, useful lives of long-lived assets, commitments and contingencies, fair value of available-for-sale securities, forecasts and assumptions used in determining the fair value of historically granted common stock, stock options and warrants prior to the Business Combination and forecasts and assumptions used in determining the fair value of private placement warrant liabilities. Management bases its estimates and assumptions on historical experience, expectations, forecasts, and on various other factors that are believed to be reasonable under the circumstances. Due to the inherent uncertainty involved in making estimates, actual results reported in future periods may differ and be affected by changes in those estimates.

Fair Value Measurements

The Company evaluates the fair value of certain assets and liabilities using the fair value hierarchy. Fair value is an exit price representing the amount that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. Fair value is estimated by applying the following hierarchy, which prioritizes the inputs used to measure fair value into three levels and bases the categorization within the hierarchy upon the lowest level of input that is available and significant to the fair value measurement:

- Level 1—Observable inputs, which include quoted prices in active markets;
- Level 2—Observable inputs other than the quoted prices in active markets that are observable either directly or indirectly, such as quoted prices in markets that are not active, or other inputs such as broker quotes, benchmark yield curves, credit spreads and market interest rates for similar securities that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities;
- Level 3—Unobservable inputs that are supported by little or no market activity and that are based on management’s assumptions, including fair value measurements determined using pricing models, discounted cash flow methodologies or similar techniques.

The Company's assessment of the significance of a particular input to the fair value measurements requires judgment and may affect the valuation of the assets and liabilities being measured and their placement within the fair value hierarchy.

For assets that are measured using quoted prices in active markets, the total fair value is the published market price per unit multiplied by the number of units held, without consideration of transaction costs. Assets and liabilities that are measured using significant other observable inputs are primarily valued by reference to quoted prices of similar assets or liabilities in active markets, adjusted for any terms specific to that asset or liability.

Assets and liabilities that are measured at fair value on a non-recurring basis include property and equipment and intangible assets. The Company recognizes these items at fair value when they are considered to be impaired or upon initial recognition when acquired through a business combination or an asset acquisition. The fair value of these assets and liabilities are determined with valuation techniques using the best information available and may include quoted market prices, market comparable and discounted cash flow models.

Due to their short-term nature, the carrying amounts reported in the Company's financial statements approximates the fair value for cash and cash equivalents, accounts receivable, accounts payable and accrued expenses.

Cash and Cash Equivalents

Cash and cash equivalents include cash in banks, checking deposits and money market funds. The Company considers all short-term highly liquid investments with an original maturity at the date of purchase of three months or less to be cash equivalents.

Accounts Receivable and Allowance for Doubtful Accounts

Accounts receivable are non-interest bearing and stated at the gross invoiced amount. A receivable is recorded when the Company has an unconditional right to receive payment based on the satisfaction of performance obligations. Accounts receivable consists of the following at December 31, 2021 and 2020 (in thousands):

	<u>2021</u>	<u>2020</u>
Billed accounts receivable	\$261	\$390
Unbilled accounts receivable	446	—
Total	<u>\$707</u>	<u>\$390</u>

On a periodic basis, management evaluates its accounts receivable and determines whether to provide an allowance or if any accounts should be written off. This assessment is based on management's evaluation of the past due receivables, collectability of specific accounts, historical loss experience and overall economic conditions.

The Company did not have any allowance for doubtful accounts as of December 31, 2021 and 2020.

Investments

Management determines the appropriate classification of investments at the time of purchase based upon management's intent with regard to such investments. Investments are classified as available-for-sale at the time of purchase if they are available to support either current or future operations. This classification is re-evaluated at each balance sheet date. Investments not considered cash equivalents, with remaining contractual maturities of one year or less from the balance sheet date are classified as short-term investments, and those with remaining contractual maturities greater than one year from the balance sheet date are classified as long-term investments. All investments are recorded at their estimated fair value, and any unrealized gains and losses are recorded in

accumulated other comprehensive income (loss). Realized gains and losses on sales and maturities of investments are determined based on the specific identification method and are recognized in the consolidated statements of operations in other income (expense), net.

The Company performs periodic evaluations to determine whether any declines in the fair value of investments below cost are other-than-temporary. The evaluation consists of qualitative and quantitative factors regarding the severity and duration of the unrealized loss, as well as the Company’s ability and intent to hold the investments until a forecasted recovery occurs. The impairments are considered to be other-than-temporary if they are related to deterioration in credit risk or if it is likely that the underlying securities will be sold prior to a full recovery of their cost basis. Other-than-temporary fair value impairments are determined based on the specific identification method and are reported in other income (expense), net in the consolidated statements of operations.

Property and Equipment, Net

Property and equipment, net is stated at cost less accumulated depreciation. Historical cost of fixed assets is the cost as of the date acquired.

Prior to 2019, the Company built certain quantum computing systems solely for research and development purposes and these quantum computing systems were deemed to have no alternative future use. In 2019, the Company began to commercialize its quantum computing systems via the offering of QCaaS and quantum computing systems built thereafter were determined to provide a probable future economic benefit. As a result, hardware and labor costs associated with the building of such quantum computing systems were capitalized. Costs to maintain quantum computing systems are expensed as incurred.

Depreciation and amortization are calculated using the straight-line method over the estimated useful lives of the assets. Useful lives are as follows:

Computer equipment and acquired computer	
software	3 – 5 years
Machinery, equipment, furniture and fixtures	5 – 7 years
Quantum computing systems	2 years
Leasehold improvements	Shorter of the lease term or the estimated useful life of the related asset

Leases

The Company determines if an arrangement is a lease at inception. Operating leases are included in operating lease right-of-use (“ROU”) assets and current operating lease liabilities and operating lease liabilities, net of current portion on our consolidated balance sheets. As of December 31, 2021, the Company has no financing lease arrangements. The Company recognizes lease expense for its operating leases on a straight-line basis over the term of the lease.

The Company records a ROU asset and lease liability in connection with its operating leases. The Company’s lease portfolio is comprised primarily of a real estate lease, which is accounted for as an operating lease. The Company elected the practical expedient to not separate lease and non-lease components for all leases.

ROU assets and lease liabilities are recognized at the lease commencement date based on the present value of the future minimum lease payments over the lease term. Operating lease ROU assets also include the impact of any lease incentives. Amendments to a lease are assessed to determine if it represents a lease modification or a separate contract. Lease modifications are reassessed as of the effective date of the modification using an incremental borrowing rate based on the information available at the commencement date. For modified leases the Company also reassesses the lease classification as of the effective date of the modification.

The interest rate used to determine the present value of the future lease payments is the Company's incremental borrowing rate, because the interest rate implicit in the Company's leases is not readily determinable. The incremental borrowing rate is estimated to approximate the interest rate on a collateralized basis with similar terms and payments, and in economic environments where the leased asset is located.

The Company's lease terms include periods under options to extend or terminate the lease when it is reasonably certain that the Company will exercise that option. The Company considers contractual-based factors such as the nature and terms of the renewal or termination, asset-based factors such as physical location of the asset and entity-based factors such as the importance of the leased asset to the Company's operations to determine the lease term. The Company generally uses the base, non-cancelable, lease term when determining the ROU assets and lease liabilities.

Intangible Assets, Net

The Company's intangible assets include website domain costs, patents, intellectual property and trademarks. Intangible assets with identifiable useful lives such as patents and intellectual property are initially valued at acquisition cost and are amortized over their estimated useful lives using the straight-line method, which is generally 20 years. With respect to patents, acquisition costs include external legal and patent application costs. Intangible assets with indefinite useful lives are assessed for impairment at least annually.

Capitalized Internally Developed Software

Capitalized internally developed software, which is included in intangible assets, net, consists of costs to purchase and develop internal-use software, which the Company uses to provide services to its customers. The costs to purchase and develop internal-use software are capitalized from the time that the preliminary project stage is completed, and it is considered probable that the software will be used to perform the function intended, until the time the software is placed in service for its intended use. Any costs incurred during subsequent efforts to upgrade and enhance the functionality of the software are also capitalized. Once this software is ready for use as part of the Company's service offerings, these costs are amortized on a straight-line basis over the estimated useful life of the software, which is typically assessed to be 3 years. During the years ended December 31, 2021 and 2020, the Company capitalized \$1.7 million and \$1.2 million in internal-use software costs, respectively. The Company amortized \$0.8 million and \$0.3 million of capitalized internally developed software costs during the years ended December 31, 2021 and 2020, respectively.

Impairment of Long-Lived Assets

Long-lived assets, such as property and equipment and other long-term assets, are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. If circumstances require a long-lived asset or asset group be tested for possible impairment, the Company first compares undiscounted cash flows expected to be generated by that asset or asset group to its carrying amount. If the carrying amount of the long-lived asset or asset group is not recoverable on an undiscounted cash flow basis, an impairment is recognized to the extent the carrying amount of the underlying asset exceeds its fair value. No impairment loss was recognized for the years ended December 31, 2021 or 2020.

Early Exercise of Stock Options

Stock options granted under the 2015 Equity Incentive Plan provide employee option holders, if approved by the Board, the right to exercise unvested options in exchange for restricted common stock, which is subject to a repurchase right held by the Company at the lower of (i) the fair market value of its common stock on the date of repurchase or (ii) the original purchase price. Early exercises of options are not deemed to be substantive exercises for accounting purposes and accordingly, amounts received for early exercises are recorded as a liability. These amounts are reclassified to common stock and additional paid-in capital as the underlying shares vest.

Warrant Liabilities

The Company evaluates its financial instruments to determine if such instruments are derivatives or contain features that qualify as embedded derivatives in accordance with ASC Topic 815, “Derivatives and Hedging.” For derivative financial instruments that are accounted for as liabilities, the derivative instrument is initially recorded at its fair value on the grant date and is then re-valued upon exercise or at each reporting date for the unexercised warrants, with changes in the fair value reported in the consolidated statements of operations. The classification of derivative instruments, including whether such instruments should be recorded as liabilities or as equity, is evaluated at the end of each reporting period. The warrants of dMY assumed in the Business Combination are classified as liabilities and remeasured at each reporting period (as more fully described in Note 12). The determination of the fair value of the warrant liabilities may be subject to change as more current information becomes available and accordingly the actual results could differ significantly. Derivative warrant liabilities are classified as non-current liabilities as their liquidation is not reasonably expected to require the use of current assets or require the creation of current liabilities.

Revenue Recognition

The Company derives revenue from providing access to its QCaaS and professional services related to co-developing algorithms on the quantum computing systems. The Company applies the provisions of the FASB Accounting Standards Update (“ASU”), Revenue from Contracts with Customers (“ASC 606”), and all related applicable guidance. The core principle of ASC 606 is that an entity shall recognize revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services.

To support this core principle, the Company applies the following five step approach:

1. Identify the contract with the customer
2. Identify the performance obligations
3. Determine the transaction price
4. Allocate the transaction price to the performance obligations
5. Recognize revenue when (or as) the entity satisfies a performance obligation

The Company has determined that its QCaaS contracts represent a combined, stand-ready performance obligation to provide access to its quantum computing systems together with related maintenance and support. The transaction price generally includes a variable fee based on usage of its quantum computing systems and may include a fixed fee for a minimum volume of usage to be made available over a defined period of access. Fixed fee arrangements may also include a variable component whereby customers pay an amount for usage over contractual minimums contained in the contracts. For contracts with a fixed transaction price, the fixed fee is recognized as QCaaS subscription-based revenues on a straight-line basis over the access period. For contracts without fixed fees, variable usage fees are billed and recognized during the period of such usage. As of December 31, 2021 and 2020, all of the revenue recognized by the Company was recognized based on transfer of service over time. There were no revenues recognized at a point in time. In arrangements with cloud service providers, the cloud service provider is considered the customer and IonQ does not have any contractual relationships with the cloud service providers’ end users. For these arrangements, revenue is recognized at the amount charged to the cloud service provider and does not reflect any mark-up to the end user.

The Company may enter into multiple contracts with a single counterparty at or near the same time. The Company will combine contracts and account for them as a single contract when one or more of the following criteria are met: (i) the contracts are negotiated as a package with a single commercial objective; (ii) consideration to be paid in one contract depends on the price or performance of the other contract; and (iii) goods or services promised are a single performance obligation. The Company has entered into one revenue

arrangement in which it granted warrants to the counterparty. Refer to Note 11—Warrant Transaction Agreement for further information on the customer warrants.

Billed and unbilled accounts receivable relate to the Company's rights to consideration as performance obligations are satisfied when the rights to payment become unconditional but for the passage of time.

The variable fees associated with the QCaaS are generally billed a month in arrears. Customers also have the ability to make advance payments. If a contract exists under ASC 606, advance payments are recorded as a contract liability until services are delivered or obligations are met and revenue is earned. Contract liabilities to be recognized in the succeeding 12-month period are classified as current and the remaining amounts are classified as non-current liabilities in the Company's consolidated balance sheets.

As of December 31, 2021, approximately \$22.1 million of revenue is expected to be recognized from remaining performance obligations that are unsatisfied (or partially unsatisfied) for non-cancelable contracts. The Company expects to recognize revenue of \$7.2 million, \$6.7 million and \$5.2 million related to these remaining performance obligations in the years ended December 31, 2022, 2023 and 2024, respectively, with the remainder recognized thereafter. The Company has not estimated the timing of revenue recognition for the remaining unsatisfied performance obligations related to usage-based contracts as the timing of customer usage cannot be predicted given the limited historical data.

Total deferred revenues, including both current and noncurrent, were \$5.0 million and \$1.4 million at December 31, 2021 and 2020, respectively. The change in deferred revenue for the year ended December 31, 2021 was primarily due to cash payments received for which the performance obligation was not satisfied prior to the end of the period, partially offset by revenue recognized during the period, of which \$0.2 million was included in the deferred revenue balance at December 31, 2020.

For contractual arrangements where consideration is paid up-front, the transfer of the quantum computing services is completed at the discretion of the customer as the customer chooses to use the services starting from the date of contract inception. As such, the up-front payment of consideration does not represent a significant financing component.

Cost to Obtain a Contract

Applying the practical expedient, the Company recognizes the incremental costs of obtaining contracts as an expense when incurred if the amortization period of the assets is one year or less. For the years ended December 31, 2021 and 2020, the Company has not incurred any material incremental costs of obtaining contracts.

Cost of Revenue

Cost of revenue primarily consists of expenses related to delivering the Company's services, including direct labor costs, direct service costs and allocated shared resources. Cost of revenue excludes depreciation and amortization related to the Company's quantum computing systems and related software.

Research and Development

Research and development expenses consist of personnel costs, including stock-based compensation expense, and allocated shared resource costs for the Company's hardware, software and engineering personnel who design and develop the Company's quantum computing systems and research new quantum computing technologies. Unlike a standard computer, design and development efforts continue throughout the useful life of the Company's quantum computing systems to ensure proper calibration and optimal functionality. Research and development expenses also include purchased hardware and software costs related to quantum computing

systems constructed for research purposes that are not probable of providing future economic benefit and have no alternate future use.

In December 2020, the Company amended its option agreement with Duke University (“Duke”), and under this amendment, the Company issued common shares to Duke in consideration for research and development services through July 15, 2026. The amended arrangement is considered a research and development service arrangement and recorded as a prepayment based on the fair value of the common stock issued on the effective date of the amendment and amortized over the term of the arrangement as services are received.

In February 2021, the Company and the University of Maryland (“UMD”) amended the option agreement with UMD pursuant to which the Company issued shares of common stock to UMD as a nonrefundable upfront payment in exchange for research and development services by UMD and rights to any potential future intellectual property developed through July 2021. The amended arrangement is considered a research and development service arrangement and recorded as a prepayment based on the fair value of the common stock issued on the effective date of the amendment and amortized over the term of the arrangement as services are received.

See Note 7—Agreements with UMD and Duke for further information.

Advertising Costs

Advertising costs are expensed as incurred and are included in sales and marketing expenses in the consolidated statements of operations. These costs were \$1.1 million and \$0.4 million for the years ended December 31, 2021 and 2020, respectively.

Stock-Based Compensation

The Company measures and records the expense related to stock-based awards based on the fair value of those awards as determined on the date of grant. The Company recognizes stock-based compensation expense over the requisite service period of the individual grant, generally equal to the vesting period and uses the straight-line method to recognize stock-based compensation. The Company uses the Black-Scholes-Merton (“Black-Scholes”) option-pricing model to determine the fair value of stock awards and the estimated fair value for stock options. The Black-Scholes option-pricing model requires the use of subjective assumptions, which determine the fair value of share-based awards, including the fair value of the Company’s common stock, the option’s expected term, the price volatility of the underlying common stock, risk-free interest rates, and the expected dividend yield of the common stock. The assumptions used to determine the fair value of the stock awards represent management’s best estimates. These estimates involve inherent uncertainties and the application of management’s judgment. The Company records forfeitures as they occur.

The Company obtained third-party valuations to estimate the fair value of its common stock for awards granted prior to the Business Combination, for purposes of measuring stock-based compensation expense. The third-party valuations were prepared using methodologies, approaches, and assumptions consistent with the American Institute of Certified Public Accountants (“AICPA”) Accounting & Valuation Guide, Valuation of Privately-Held-Company Equity Securities Issued as Compensation.

Income Taxes

Income taxes are accounted for using the asset and liability method. Deferred income taxes are provided for temporary differences in recognizing certain income, expense and credit items for financial reporting purposes and tax reporting purposes. Such deferred income taxes primarily relate to the difference between the tax bases of assets and liabilities and their financial reporting amounts. Deferred tax assets and liabilities are measured by applying enacted statutory tax rates applicable to the future years in which deferred tax assets or liabilities are

expected to be settled or realized. Excess tax benefits or tax deficiencies from stock option exercises are recognized in the income tax provision in the period in which they occur.

The Company records a valuation allowance when it determines, based on available positive and negative evidence, that it is more-likely-than-not that some portion or all of its deferred tax assets will not be realized. The Company determines the realizability of its deferred tax assets primarily based on the reversal of existing taxable temporary differences and projections of future taxable income (exclusive of reversing temporary differences and carryforwards). In evaluating such projections, the Company considers its history of profitability, the competitive environment, and general economic conditions. In addition, the Company considers the time frame over which it would take to utilize the deferred tax assets prior to their expiration.

For certain tax positions, the Company uses a more-likely-than-not threshold based on the technical merits of the tax position taken. Tax positions that meet the more-likely-than-not recognition threshold are measured at the largest amount of tax benefits determined on a cumulative probability basis, which are more-likely-than-not to be realized upon ultimate settlement in the financial statements. The Company's policy is to recognize interest and penalties related to income tax matters in income tax expense. However, there were no amounts recognized relating to interest and penalties in the consolidated statements of operations for the years ended December 31, 2021 and 2020. The Company had no uncertain income tax positions as of December 31, 2021 and 2020.

Concentrations of Credit Risk

Financial instruments that potentially subject the Company to concentrations of credit risk consist primarily of cash, cash equivalents, investments, and trade accounts receivable. The Company maintains the majority of its cash, cash equivalents and investments with two financial institutions, both of which management believes to be financially sound and with minimal credit risk. The Company's deposits periodically exceed amounts guaranteed by the Federal Deposit Insurance Corporation.

The Company's accounts receivable are derived from customers primarily located in the U.S. The Company performs periodic evaluations of its customers' financial condition and generally does not require its customers to provide collateral or other security to support accounts receivable and maintains an allowance for doubtful accounts. Credit losses historically have not been material.

Significant customers are those which represent more than 10% of the Company's total revenue or gross accounts receivable. The Company's revenue was primarily from two significant customers for the year ended December 31, 2021. While we generated revenue in 2020, we executed an arrangement with a customer for the issuance of a warrant to purchase shares of Legacy IonQ Series B-1 convertible redeemable preferred stock. The warrant was evaluated and considered to represent consideration provided to a customer and as such, the recognition of the warrant expense is recorded as a reduction in revenue as revenue is earned under the contract. Other than this customer, the Company did not have any other significant customers for the year ended December 31, 2020. The Company's accounts receivable was from two significant customers as of December 31, 2021 and 2020.

Earnings (Loss) Per Share

Basic earnings (loss) per share is computed by dividing net income (loss) by the weighted-average number of shares of common stock outstanding for the period. Diluted earnings per share is computed by dividing net income (loss) by the weighted average number of shares of common stock during the period, plus common stock equivalents, outstanding during the period. If the Company reports a net loss, the computation of diluted loss per share excludes the effect of dilutive common stock equivalents, as their effect would be antidilutive.

Earnings (loss) per share calculations for all periods have been retroactively restated to reflect the conversion of the Company's convertible redeemable preferred stock and the equivalent number of shares reflecting the exchange ratio established in the reverse capitalization.

The following table sets forth the computation of basic and diluted loss per share attributable to common stockholders (in thousands, except share and per share data):

	<u>Year Ended December 31,</u>	
	<u>2021</u>	<u>2020</u>
Numerator:		
Net loss attributable to common stockholders	\$ (106,186)	\$ (15,424)
Denominator:		
Weighted average shares used in computing net loss per share attributable to common stockholders—basic and diluted	137,609,620	115,045,097
Net loss per share attributable to common stockholders—basic and diluted	\$ (0.77)	\$ (0.13)

In periods with a reported net loss, the effect of anti-dilutive stock options, unvested common stock (including unvested restricted common stock) and warrants are excluded and diluted loss per share is equal to basic loss per share. The following is a summary of the weighted average common stock equivalents for the securities outstanding during the respective periods that have been excluded from the computation of diluted net loss per common share, as their effect would be anti-dilutive:

	<u>Year Ended December 31</u>	
	<u>2021</u>	<u>2020</u>
Common stock options outstanding	24,206,373	9,033,927
Warrants to purchase common stock	8,301,202	8,301,202
Unvested common stock	1,407,500	553,196
Public and private warrants	2,359,179	—
Unvested founders' shares	129,452	—
Total	<u>36,403,706</u>	<u>17,888,325</u>

Recently Adopted Accounting Pronouncements

In August 2018, the FASB issued ASU 2018-15, Intangibles—Goodwill and Other—Internal-Use Software (Subtopic 350-40): Customer’s Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That Is a Service Contract. ASU 2018-15 requires a customer in a cloud computing arrangement that is a service contract to follow the internal-use software guidance in ASC 350-40 to determine which implementation costs to defer and recognize as an asset. The guidance is effective for annual reporting periods beginning after December 15, 2020, and interim periods within annual periods beginning after December 15, 2021. The Company adopted this standard effective January 1, 2021 prospectively to all new implementation costs incurred after adoption. The adoption of this standard had no material impact on the Company’s consolidated financial statements and related disclosures.

Recently Issued Accounting Standards Not Yet Adopted

In June 2016, the FASB issued ASU 2016-13, Financial Instruments—Credit Losses, along with various updates and improvements. The standard, including subsequently issued amendments, requires a financial asset measured at amortized cost basis, such as accounts receivable and certain other financial assets, to be presented at the net amount expected to be collected based on relevant information about past events, including historical experience, current conditions and reasonable and supportable forecasts that affect the collectability of the reported amount. ASU 2016-13 is effective for annual reporting periods beginning after December 15, 2022, with early adoption permitted. Based on the composition of the Company’s trade receivables and other financial assets, current market conditions and historical credit loss activity, the adoption of this standard is not expected to have a material impact on the Company’s financial statements and related disclosures.

In August 2020, the FASB issued ASU 2020-06, Debt, Debt with Conversion and Other Options (Subtopic 470-20) and Derivatives and Hedging Contracts in Entity's Own Equity (Subtopic 815-40) Accounting for Convertible Instruments and Contracts in an Entity's Own Equity. The ASU simplifies accounting for convertible instruments by removing major separation models required under current U.S. GAAP. Consequently, more convertible debt instruments will be reported as a single liability instrument with no separate accounting for embedded conversion features. The ASU removes certain settlement conditions that are required for equity contracts to qualify for the derivative scope exception, which will permit more equity contracts to qualify for the exception. The ASU also simplifies the diluted net income per share calculation in certain areas. The new guidance is effective for fiscal years beginning after December 15, 2023, including interim periods within those fiscal years, and early adoption is permitted. The Company does not expect adoption of this guidance to have a material impact on its consolidated financial statements and related disclosures.

3. CASH EQUIVALENTS AND INVESTMENTS

The following table summarizes the Company's unrealized gains and losses and estimated fair value of cash equivalents and investments in available-for-sale securities recorded in the consolidated balance sheets (in thousands):

	AS OF DECEMBER 31, 2021				AS OF DECEMBER 31, 2020			
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Estimated Fair Value	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Estimated Fair Value
Money market funds	\$123,690	\$—	\$—	\$123,690	\$36,120	\$—	\$—	\$36,120
Commercial paper	\$203,628	\$—	\$ (21)	\$203,607	\$—	\$—	\$—	\$—
Corporate notes and bonds	80,060	2	(109)	79,953	—	—	—	—
Municipal bonds	2,000	—	—	2,000	—	—	—	—
US government and agency	193,347	1	(20)	193,328	—	—	—	—
Total cash equivalents and investments	\$602,725	\$ 3	\$(150)	\$602,578	\$36,120	\$—	\$—	\$36,120

Unrealized losses related to investments were primarily a result of interest rate fluctuations, and none of the investments held as of December 31, 2021 have been in a continuous unrealized loss position for greater than one year. As of December 31, 2021, the Company did not consider any of its available-for-sale investments to be other-than-temporarily impaired nor does the Company intend, or believe it is more likely than not, that it will be required to sell the investments in an unrealized loss position before the recovery of the associated amortized cost basis.

The estimated fair value of the Company's cash equivalents and investments in available-for-sale securities as of December 31, 2021, aggregated by investment category and classified by contractual maturity date, is as follows (in thousands):

	1 Year or Less	1 Year or Greater	Total
Money market funds	\$123,690	\$—	\$123,690
Commercial paper	203,607	—	203,607
Corporate notes and bonds	14,818	65,135	79,953
Municipal bonds	2,000	—	2,000
US government and agency	178,353	14,975	193,328
Total	\$522,468	\$80,110	\$602,578

4. FAIR VALUE MEASUREMENTS

The Company's financial assets and liabilities subject to fair value measurements on a recurring basis and the level of inputs used for such measurements were as follows (in thousands):

	Fair Value Measured as of December 31, 2021:			
	Level 1	Level 2	Level 3	Total
Assets:				
Cash equivalents:				
Money market funds ⁽¹⁾	\$123,690	\$ —	\$—	\$123,690
Commercial paper	—	125,335	—	125,335
US government and agency	—	150,000	—	150,000
Total cash equivalents	123,690	275,335	—	399,025
Short-term investments:				
Commercial paper	—	78,272	—	78,272
Corporate notes and bonds	—	14,818	—	14,818
Municipal bonds	—	2,000	—	2,000
US government and agency	—	28,353	—	28,353
Total short-term investments	—	123,443	—	123,443
Long-term investments				
Corporate notes and bonds	—	65,135	—	65,135
US government and agency	—	14,975	—	14,975
Total long-term investments	—	80,110	—	80,110
Total Assets	\$123,690	\$478,888	—	\$602,578
Liabilities:				
Public warrants	\$ 33,962	\$ —	\$—	\$ 33,962

	Fair Value Measured as of December 31, 2020:			
	Level 1	Level 2	Level 3	Total
Assets:				
Cash and cash equivalents ⁽¹⁾	\$36,120	\$—	\$—	\$36,120

(1) Includes money market funds associated with the Company's overnight investment sweep account.

The Company's warrant liabilities are comprised of the public warrants. The private placement warrants were fully exercised as of December 31, 2021. Refer to Note 12 – Warrant Liabilities for further information. Transfers to/from Levels 1, 2 and 3 are recognized at the beginning of the reporting period. There were no transfers between levels during the period. As of December 31, 2021, the public warrants were publicly traded at \$6.49 per warrant.

The private placement warrants were marked to fair value on the date of exercise. The fair value of the private placement warrants was determined using Level 3 inputs. Management determined the fair value of the private placement warrants using unobservable inputs in the Black-Scholes valuation model. Inherent in the valuation were assumptions related to expected stock-price volatility, expected term, risk-free interest rate and dividend yield. The Company estimated the volatility of its common stock warrants based on implied volatility from the Company's traded warrants and from historical volatility of select peer company's common stock that matches the expected remaining life of the warrants. The risk-free interest rate was based on the U.S. Treasury zero-coupon yield curve on the grant date for a maturity similar to the expected remaining life of the warrants.

The expected life of the warrants was assumed to be equivalent to their remaining contractual term. The dividend rate was based on the historical rate, which the Company anticipates remaining at zero.

The following table provides quantitative information regarding Level 3 fair value measurement inputs for the private placement warrants as of the date the private placement warrants were exercised.

	<u>December 3, 2021</u>
Exercise price	\$11.50
Stock price	\$18.78
Volatility	74.10%
Term	4.83
Risk-free rate	1.10%
Dividend yield	— %

The Company did not have any Level 3 assets or liabilities as of December 31, 2021 as the private placement warrants were fully exercised. A rollforward of the fair value of the private placement warrants is as follows (in thousands):

	<u>Private placement warrants</u>
Fair value as of December 31, 2020	\$ —
Assumed as part of the Business Combination	24,412
Change in valuation inputs	27,523
Exercise of private placement warrants	<u>(51,935)</u>
Fair Value as of December 31, 2021	\$ —

5. PROPERTY AND EQUIPMENT, NET

Property and equipment, net as of December 31, 2021 and 2020, are composed of the following (in thousands):

	<u>2021</u>	<u>2020</u>
Computer equipment and acquired computer software	\$ 840	\$ 364
Machinery, equipment, furniture and fixtures	5,497	2,974
Leasehold improvements	827	736
Quantum computing systems	<u>15,151</u>	<u>9,617</u>
Gross property and equipment	22,315	13,691
Less: accumulated depreciation	<u>(3,445)</u>	<u>(1,703)</u>
Net property and equipment	<u>\$18,870</u>	<u>\$11,988</u>

Depreciation expense for the years ended December 31, 2021 and 2020 was \$1.7 million and \$1.1 million, respectively.

6. INTANGIBLE ASSETS, NET

Intangible assets as of December 31, 2021 and 2020 are composed of the following (in thousands):

	December 31, 2021			
	Weighted Average Useful Life (Years)	Gross Carrying Amount	Accumulated Amortization	Net Amount
Patents	20	\$3,555	\$ (51)	\$3,504
Trademark	Indefinite	82	—	82
Website and other	10-20	51	(11)	40
Internally developed software	3	<u>3,297</u>	<u>(1,082)</u>	<u>2,215</u>
Total		<u>\$6,985</u>	<u>\$(1,144)</u>	<u>\$5,841</u>

	December 31, 2020			
	Weighted Average Useful Life (Years)	Gross Carrying Amount	Accumulated Amortization	Net Amount
Patents	20	\$1,307	\$ (10)	\$1,297
Trademark	Indefinite	60	—	60
Website and other	10-20	51	(7)	44
Internally developed software	3	<u>1,608</u>	<u>(322)</u>	<u>1,286</u>
Total		<u>\$3,026</u>	<u>\$(339)</u>	<u>\$2,687</u>

Total amortization expense for intangible assets for the years ended December 31, 2021 and 2020 was \$0.8 million and \$0.3 million, respectively. As of December 31, 2021, the projected annual amortization expense for the Company's intangible assets is as follows (in thousands):

Year ending December 31,	
2022	\$1,116
2023	885
2024	401
2025	62
2026	63
Thereafter	<u>3,232</u>
Total	<u>\$5,759</u>

7. AGREEMENTS WITH UMD AND DUKE

Exclusive License Agreement

The Company entered into an exclusive license agreement ("License Agreement") in 2016 with UMD and Duke. The License Agreement grants to the Company an exclusive, perpetual license ("Initial Patents") to certain patents, know-how and other intellectual property utilized in trapped-ion quantum computing systems. The license granted to the Company is exclusive for all patents (and non-exclusive for other types of intellectual property), subject to certain governmental rights and retained rights by UMD and Duke and other non-profit institutions to use and practice the Licensed Patents (as defined below) and technology for internal research and other non-profit purposes. In exchange for the Initial Patents, UMD and Duke received an aggregate of 142,886 common shares after giving effect to the recapitalization.

On February 1, 2021, the Company and UMD executed two amendments to the License Agreement granting exclusive rights to license additional intellectual property in exchange for a total of 257,198 common shares after

giving effect to the recapitalization. Management evaluated the amendments and concluded that the arrangements qualify as equity-classified instruments and recorded an intangible asset and additional paid-in capital based on the fair value of the shares at the date the amendments were executed of \$1.6 million. The shares for each executed amendment were issued during the year ended December 31, 2021.

Exclusive Option Agreements

The Company also entered into an exclusive option agreement (“Option Agreement”) with each of UMD and Duke in 2016 whereby on the anniversary of the effective date of the License Agreement for a period of 5 years, the Company has the right to acquire additional intellectual property developed by UMD and Duke (the “Additional Patents” and together with the Initial Patents, the “Licensed Patents”) by exercising an annual option and issuing common shares each to Duke and UMD in consideration for the Additional Patents. The amount issued to UMD and Duke pursuant to the option over the 5-year term was equal to an aggregate of 642,995 common shares to each university after giving effect to the recapitalization. The Company may elect not to exercise the option if there was not a minimum number of intellectual property developed in a given year and then the Option Agreement would extend another year.

In December 2020, the Company amended its option agreement with Duke, and under this amendment, the Company issued 1,214,317 common shares after giving effect to the recapitalization, to Duke in consideration for research and development services through July 15, 2026. Under the terms of the amended Option Agreement, the issuance of shares is a nonrefundable upfront payment in exchange for research and development services by Duke whereby the Company will obtain rights to any potential future intellectual property developed during the term. As such, the fair value of the shares of common stock issued to Duke of \$2.9 million was recorded as a prepaid expense and is being amortized over the term of the arrangement as services are received. The Company recognized \$0.5 million and \$19 thousand of research and development expense related to the agreement with Duke during the years ended December 31, 2021 and 2020, respectively.

In February 2021, the Company and UMD amended the UMD Option Agreement pursuant to which the Company issued the remaining 128,599 shares of common stock after giving effect to the recapitalization to UMD as a nonrefundable upfront payment in exchange for research and development services by UMD and rights to any potential future intellectual property developed through July 2021. The fair value of the shares issued to UMD was \$0.8 million. The Company recognized \$0.8 million of research and development expense associated with the UMD Option Agreement amendment for the year ended December 31, 2021. The UMD Option Agreement was not executed as of December 31, 2020 and therefore no research and development expense was recognized for the year ended December 31, 2020.

Additionally, under the terms of the License Agreement and Option Agreement, UMD and Duke were provided an exit guarantee if a sale or liquidation of the Company would occur that provides for the following:

- acceleration of the issuance of common stock as if exercised through the License Agreement,
- additional consideration equal to the consideration which a holder of one-half of one percent (0.5%) of the common stock of the Company, on a fully-diluted basis, would have received in the sale to the extent it exceeds the amount UMD and Duke shall be entitled to as a result of ownership at the time of sale.

In December 2020, the Company and Duke amended the Duke Option Agreement to remove the exit guarantee. Additionally, the exit guarantee with UMD lapsed as a result of the Business Combination in September 2021.

The useful life of the Licensed Patents derived from the License Agreement and the Option Agreement is the remaining legal life at the time of acquisition. The value of the Licensed Patents is based on the fair value of the common stock given as consideration on the effective date of each agreement and exercise of option. The asset is amortized over the useful life of the Licensed Patents.

8. ACCRUED EXPENSES

Accrued expenses as of December 31, 2021 and 2020 are composed of the following (in thousands):

	<u>2021</u>	<u>2020</u>
Accrued salaries and other payroll liabilities	\$1,025	\$ 46
Accrued accounting and tax liabilities	700	115
Accrued expenses - other	922	447
Total accrued expenses	<u>\$2,647</u>	<u>\$608</u>

9. COMMITMENTS AND CONTINGENCIES

Warranties and Indemnification

The Company's commercial services are typically warranted to perform in a manner consistent with general industry standards that are reasonably applicable and materially in accordance with the Company's documentation under normal use and circumstances.

The Company's arrangements generally include certain provisions for indemnifying customers against liabilities if its products or services infringe third- party intellectual property rights. To date, the Company has not incurred any material costs as a result of such obligations and has not accrued any liabilities related to such obligations in the accompanying financial statements.

Litigation

On January 12, 2021, dMY Technology Group, Inc. II, dMY Sponsor II, LLC, dMY, and dMY Sponsor III, LLC ("Sponsor") accepted service of a lawsuit where they were named as counterclaim defendants in an underlying action by and between GTY Technology Holdings, Inc. ("GTY"), dMY Technology Holdings Inc., dMY Sponsor, LLC, dMY Sponsor II, LLC, dMY Technology Group Inc. II, dMY and Sponsor (collectively "dMY Defendants") and Carter Glatt ("Glatt") and Captains Neck Holdings LLC ("Captains Neck"), an entity of which Mr. Glatt is a member. The underlying lawsuit, filed by dMY Technology Group, Inc. and dMY Sponsor, LLC, seeks a declaratory judgment that Glatt and Captains Neck are not entitled to membership units of dMY Sponsor LLC, which was formed by Harry L. You, the co-founder and former President and Chief Financial Officer of GTY when Glatt was still working at GTY. The underlying lawsuit contains claims arising from Glatt's termination of employment from GTY, including theft and misappropriation of confidential GTY information, breach of contract, breach of the duties of loyalty and fiduciary duty and conversion. Glatt responded to the underlying lawsuit by adding members of the Sponsor and officers of dMY as additional counterclaim defendants (collectively with the dMY Defendants Glatt and Captains neck, the "Counterclaim Defendants") and adding Dune Acquisition Holdings LLC, a newly formed special purpose acquisition company, as a counterclaimant and asserting claims for breach of contract, fraudulent misrepresentation, negligent misrepresentation, tortious interference with business relations, quantum meruit and unjust enrichment. dMY, and now the Company, has never employed Glatt and has no business agreements with him. The Counterclaim Defendants have denied the claims against them and have filed a motion to dismiss the suit. Although the outcome of this matter cannot be predicted with certainty and the impact of the final resolution of this matter on the Company's results of operations in a particular subsequent reporting period is not known, management does not believe that the resolution of this matter will have a material adverse effect on the Company's future consolidated financial position, future results of operations or cash flows.

10. CONVERTIBLE REDEEMABLE PREFERRED STOCK AND STOCKHOLDERS' EQUITY

Our second amended and restated certificate of incorporation authorizes us to issue up to 1,000,000,000 shares of common stock, \$0.0001 par value per share, and 20,000,000 shares of preferred stock, par value \$0.0001 per share.

Convertible Redeemable Preferred Stock

Legacy IonQ's convertible redeemable preferred stock previously classified as mezzanine equity was retroactively adjusted, converted into common stock, and reclassified to permanent equity because of the reverse recapitalization as described in Note 1.

No shares of Legacy IonQ convertible redeemable preferred stock were issued during the years ended December 31, 2021 and 2020 requiring adjustment as a result of the reverse recapitalization.

Preferred Stock

Under our second amended and restated certificate of incorporation, our board of directors may, without further action by our stockholders, fix the rights, preferences, privileges and restrictions of up to an aggregate of 20,000,000 shares of preferred stock in one or more series and authorize their issuance. These rights, preferences and privileges could include dividend rights, conversion rights, voting rights, terms of redemption, liquidation preferences and the number of shares constituting any series or the designation of such series, any or all of which may be greater than the rights of common stock. Any issuance of preferred stock could adversely affect the voting power of holders of common stock and the likelihood that such holders would receive dividend payments and payments on liquidation. In addition, the issuance of preferred stock could have the effect of delaying, deterring or preventing a change of control or other corporate action. No shares of preferred stock have been issued as of December 31, 2021.

Common Stock

The terms, rights, preference, and privileges of the common stock are as follows:

Voting Rights

Except as otherwise required by law or as otherwise provided in any certificate of designation for any series of preferred stock, each holder of common stock possess all voting power for the election of our directors and all other matters requiring stockholder action. Holders of common stock are entitled to one vote per share on matters to be voted on by stockholders. The Company's second amended and restated certificate of incorporation and bylaws do not provide for cumulative voting rights.

Dividends

Subject to preferences that may be applicable to any then outstanding preferred stock, the holders of common stock may be entitled to receive dividends out of legally available funds if the board of directors, in its discretion, determines to issue dividends and then only at the times and in the amounts that the board of directors may determine. We do not anticipate paying any cash dividends in the foreseeable future.

Liquidation

In the event of our voluntary or involuntary liquidation, dissolution, distribution of assets or winding-up, the holders of common stock will be entitled to receive an equal amount per share of all of our assets of whatever kind available for distribution to stockholders, after the rights of the holders of the preferred stock, if any, have been satisfied.

Rights and Preference

Holders of the Company's common stock have no preemptive or other subscription rights, and there are no sinking fund or redemption provisions applicable to the common stock. The rights, preferences, and privileges of

the holders of common stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of the Company's preferred stock that may be issued. Currently no preferred stock has been issued as of December 31, 2021.

Founders' Shares

Upon incorporation of the Company, the founders of the Company (the "Founders") purchased an aggregate 16.2 million shares of common stock at a purchase price \$0.0006 per share after giving effect to the recapitalization. Subsequently, on July 25, 2016, upon the introduction of a new third-party investor, the Company imposed a share restriction on an aggregate of 12.1 million of the Founders' shares (the "Restricted Shares"), after giving effect to the recapitalization. If the Founders terminate their relationship with the Company for any reason, the Company will have the right to repurchase such shares for the initial purchase price and the repurchase period will begin from such termination date until 120 days after the termination date; provided, however, that if the Founders terminate their relationship with the Company or are otherwise terminated for good cause (each, a "Release Event"), in each case, within 12 months of a deemed liquidation event, the Company may not repurchase the shares. Payment for the Restricted Shares will be made in cash if the Company exercises its option to repurchase the Founder's shares. Of the Restricted Shares subject to the repurchase option, 1/48th of the Restricted Shares shall be released from the repurchase option on each monthly anniversary from July 25, 2016 until all Restricted Shares are released from the repurchase option. All Founders' Shares were fully vested as of December 31, 2020. See Note 13— Stock Based Compensation for further information.

Common Stock Reserved for Issuance

The Company's common stock reserved for future issuances after giving effect to the recapitalization are as follows:

	<u>As of December 31,</u>	
	<u>2021</u>	<u>2020</u>
Stock options outstanding	22,133,210	21,863,368
Warrants to acquire common stock	8,301,202	8,301,202
Public warrants outstanding	5,233,018	—
Shares available for future grant	<u>31,589,000</u>	<u>7,294,016</u>
Total common stock reserved	<u>67,256,430</u>	<u>37,458,586</u>

11. WARRANT TRANSACTION AGREEMENT

In November 2019, contemporaneously with a revenue arrangement, the Company entered into a contract, pursuant to which the Company agreed to issue to a customer a warrant to acquire shares of Legacy IonQ Series B-1 preferred stock (the "Warrant Shares"), subject to certain vesting events. Upon closing of the Business Combination, these warrants exercisable for Legacy IonQ Series B-1 preferred stock were assumed by the Company and converted into a warrant to purchase a number of shares of common stock equal to the product (rounded down to the nearest whole number) of (a) the number of shares of Legacy IonQ common stock issuable upon conversion of a share of Legacy IonQ Series B-1 preferred stock and (b) the Exchange Ratio (as defined in the Super 8-K filed with the SEC on October 4, 2021), at an exercise price per share (rounded up to the nearest whole cent) equal to (i) the exercise price per share of such Legacy IonQ Warrant Shares divided by (ii) the Exchange Ratio. Except as specifically provided in the merger agreement, the Warrant Shares will have the same terms and be subject to the same conditions (including applicable vesting conditions) as set forth in the Legacy IonQ warrant agreement. As of December 31, 2021, the contract allows for the customer to acquire up to 8,301,202 shares of common stock in the Company.

As the Warrant Shares were issued in connection with an existing commercial agreement with a customer, the value of the Warrant Shares was determined to be consideration payable to the customer and consequently is treated as a reduction to revenue recognized under the corresponding revenue arrangement.

Approximately 6.5% of the Warrant Shares vested and became immediately exercisable in August 2020. The remaining Warrant Shares will vest and become exercisable upon satisfaction of certain milestones based on revenue generated under the commercial agreement with the customer, to the extent certain prepayments are made by the customer. The exercise price for the Warrant Shares is \$1.38 per share and the warrant is exercisable through November 2029. The fair value of the Warrant Shares at the date of issuance was determined to be \$8.7 million.

During the year ended December 31, 2020, Warrant Shares with a fair value of \$0.6 million vested. This fair value of the unamortized warrants is recorded within other noncurrent assets and the Warrant Shares are amortized over time as the related customer revenue is earned. During the years ended December 31, 2021 and 2020, \$0.5 million and \$0.04 million of the warrant amortization was recorded as a reduction of the related customer revenue. As of December 31, 2021, the contract asset was fully amortized.

As discussed further in Note 1, the Warrant Shares were retroactively adjusted, converted to warrants for common stock and are presented in permanent equity as a result of the recapitalization as described in Note 1.

12. WARRANT LIABILITIES

The Company assumed 11,500,000 warrants, comprised of 7,500,000 public warrants and 4,000,000 private placement warrants, on September 30, 2021 as part of the Business Combination. As of December 31, 2021, there were 5,233,018 public warrants to purchase common stock outstanding. There were no private placement warrants outstanding as of December 31, 2021. Each warrant entitles the registered holder to purchase one share of common stock at a price of \$11.50 per share.

Public warrants

The public warrants may be exercised on the later of (a) 30 days after the completion of a Business Combination or (b) 12 months from the closing of the Initial Public Offering of dMY; provided in each case that the Company has an effective registration statement under the Securities Act covering the shares of common stock issuable upon exercise of the public warrants and a current prospectus relating to them is available (or the Company permits holders to exercise their public warrants on a cashless basis and such cashless exercise is exempt from registration under the Securities Act). The public warrants became exercisable on November 17, 2021.

Redemption of warrants when the price per share of common stock equals or exceeds \$18.00:

Once the warrants become exercisable, the Company may redeem the outstanding warrants for cash:

- in whole and not in part;
- at a price of \$0.01 per warrant;
- upon a minimum of 30 days' prior written notice of redemption; and
- if, and only if, the closing price of common stock equals or exceeds \$18.00 per share (as adjusted) for any 20 trading days within a 30-trading day period ending on the third trading day prior to the date on which the Company sends the notice of redemption to the warrant holders.

Redemption of warrants for when the price per share of common stock equals or exceeds \$10.00:

Once the warrants become exercisable, the Company may redeem the outstanding warrants:

- in whole and not in part;
- at \$0.10 per warrant upon a minimum of 30 days' prior written notice of redemption provided that holders will be able to exercise their warrants on a cashless basis prior to redemption and receive that number of shares determined by reference to an agreed table based on the redemption date and the fair

market value (as defined within the warrant agreement) of the common stock except as otherwise described within the warrant agreement; and upon a minimum of 30 days' prior written notice of redemption; and

- if, and only if, the closing price of common stock equals or exceeds \$10.00 per public share (as adjusted) for any 20 trading days within the 30-trading day period ending three trading days before the Company sends notice of redemption to the warrant holders.

No public warrants were redeemed as of December 31, 2021.

Private placement warrants

The private placement warrants are identical to the public warrants, except that the private placement warrants and the shares of common stock issuable upon exercise of the private placement warrants will not be transferable, assignable, or salable until 30 days after the completion of a Business Combination, subject to certain limited exceptions. Additionally, the private placement warrants will be non-redeemable so long as they are held by dMY Sponsor III, LLC or its permitted transferees. Otherwise, the private placement warrants have terms and provisions that are identical to those of the public warrants, including as to exercise price, exercisability and exercise period. In December 2021, 4.0 million private placement warrants were exercised on a cashless basis, resulting in the net issuance of 2.2 million shares. There are no private placement warrants outstanding as of December 31, 2021.

13. STOCK-BASED COMPENSATION

Equity Incentive Plans

The Company has a 2015 Equity Incentive Plan (the "2015 Plan"), which provided for the grant of stock-based compensation in the form of awards of options, stock appreciation rights, restricted stock awards and restricted stock units, to certain officers, directors, employees, consultants, and advisors to purchase shares of the Company's common stock. Upon the Closing of the Business Combination, no further awards will be made pursuant to the 2015 Plan and all outstanding Legacy IonQ stock options under the 2015 Plan were assumed by the Company. Each Legacy IonQ stock option issued and outstanding immediately prior to the Business Combination was converted into an option to purchase shares of common stock of the Company equal to the product of (a) the number of shares of Legacy IonQ common stock subject to such Legacy IonQ stock option agreement immediately prior to the Business Combination and (b) the exchange ratio at an exercise price equal to the (i) the exercise price per share of such Legacy IonQ stock option divided by (ii) the exchange ratio. Such stock options will continue to be governed by the terms of the 2015 Plan and the stock option agreements thereunder, until such outstanding options are exercised or until they terminate or expire by their terms. For awards granted under the 2015 Plan, vesting generally occurs over four to five years from the date of grant and all options granted have a contractual term of 10 years. Vested options held at the date of an employee's termination may be exercised within three months.

In August 2021, the Company's board of directors adopted the 2021 Equity Incentive Plan (the "2021 Plan") and the stockholders approved the 2021 Plan in September 2021. The 2021 Plan became effective immediately upon the closing of the Business Combination. The 2021 Plan provides for the grant of stock options, stock appreciation rights, restricted stock awards, restricted stock unit awards, performance awards and other forms of awards to employees, directors, and consultants. Initially, a maximum of 26,235,000 shares of common stock may be issued under the 2021 Plan. The number of shares of the Company's common stock reserved for issuance under the 2021 Plan automatically increases on January 1 of each year, beginning on January 1, 2022 and continuing through and including January 1, 2031, by 5% of the Fully Diluted Common Stock (as defined in the 2021 Plan) outstanding on December 31 of the preceding year, or a lesser number of shares determined by the Company's board of directors prior to such increase. No shares or awards were granted under the 2021 Plan as of December 31, 2021.

Stock Options

The Company estimates the fair value of stock options on the date of grant using the Black-Scholes option-pricing model. The Black-Scholes option-pricing model requires estimates of highly subjective assumptions, which affect the fair value of each stock option.

Expected Volatility—As the Company was privately held at the date of the grant and there has been no public market for its common stock prior to closing the Business Combination, the expected volatility is based on the average historical stock price volatility of comparable publicly-traded companies in its industry peer group, financial, and market capitalization data.

Expected Term—The expected term of the Company's options represents the period that the stock-based awards are expected to be outstanding.

The Company has estimated the expected term of its employee awards using the SAB Topic 14 Simplified Method allowed by the FASB and SEC, for calculating expected term as it has limited historical exercise data to provide a reasonable basis upon which to otherwise estimate expected term. Certain of the Company's options began vesting prior to the grant date, in which case the Company uses the remaining vesting term at the grant date in the expected term calculation.

Risk-Free Interest Rate—The Company estimates its risk-free interest rate by using the yield on actively traded non-inflation-indexed U.S. treasury securities with contract maturities equal to the expected term.

Dividend Yield—The Company has not declared or paid dividends to date and does not anticipate declaring dividends. As such, the dividend yield has been estimated to be zero.

Fair Value of Underlying Common Stock—Because the Company's common stock was not yet publicly traded on the date of grant, the Company estimated the fair value of common stock prior to closing the Business Combination. The Board of Directors considered numerous objective and subjective factors to determine the fair value of the Company's common stock at each meeting in which awards are approved. The factors considered include, but are not limited to: (i) the results of contemporaneous independent third-party valuations of the Company's common stock; (ii) the prices, rights, preferences, and privileges of Legacy IonQ's previously Convertible Redeemable Preferred Stock relative to those of its common stock; (iii) the lack of marketability of the Company's common stock; (iv) actual operating and financial results; (v) current business conditions and projections; (vi) the likelihood of achieving a liquidity event, such as an initial public offering or sale of the Company, given prevailing market conditions; and (vii) precedent transactions involving the Company's shares.

The assumptions used to estimate the fair value of stock options granted during the years ended December 31, 2021 and 2020 are as follows:

	<u>2021</u>	<u>2020</u>
Risk-free interest rate	0.96%	0.9%
Expected term (in years)	6.26	6.46
Expected volatility	77.04%	72.50%
Dividend yield	— %	— %

A summary of the stock option activity is as follows:

	<u>Number of Option Shares</u>	<u>Weighted Average Exercise Price</u>	<u>Weighted Average Remaining Contractual Term</u>	<u>Aggregate Intrinsic Value (in millions)</u>
Outstanding as of December 31, 2019	13,933,956	\$0.13	8.80	\$ 5.00
Granted	9,875,293	0.61		
Exercised	(1,726,471)	0.17		
Cancelled/ Forfeited	(219,410)	0.13		
Outstanding as of December 31, 2020	<u>21,863,368</u>	0.34	8.67	44.80
Granted	6,492,540	2.39		
Exercised	(3,378,782)	1.62		
Cancelled/ Forfeited	(2,843,916)	1.19		
Outstanding as of December 31, 2021	<u>22,133,210</u>	0.64	7.84	377.58
Exercisable as of December 31, 2021	8,726,504	\$0.29	7.27	\$151.91
Exercisable and expected to vest at December 31, 2021	22,133,210	\$0.64	7.84	\$377.58

The total intrinsic value of options exercised was \$54.4 million and \$3.8 million for the years ended December 31, 2021 and 2020, respectively. The weighted-average grant date fair value per share for the stock options granted during the years ended December 31, 2021 and 2020 was \$5.83 and \$0.76, respectively. The aggregate grant-date fair value of options vested during the years ended December 31, 2021 and 2020 was \$7.4 million and \$1.0 million, respectively. As of December 31, 2021, the total unrecognized compensation related to unvested stock option awards was \$30.4 million, which the Company expects to recognize over a weighted-average period of approximately 2.0 years.

Early Exercised Stock Options

As of December 31, 2021 and 2020, there were 1,420,662 and no shares respectively, subject to repurchase related to stock options early exercised and unvested. These amounts are reclassified to common stock and additional paid-in capital as the underlying shares vest. As of December 31, 2021, the Company recorded a liability related to these shares subject to repurchase in the amount of \$3.1 million in its consolidated balance sheet. The Company did not have any early exercises of stock options prior to 2021, and as a result, there was no such liability balance as of December 31, 2020.

During 2021, we exercised our right to repurchase 0.4 million shares related to the early exercise of stock options. The unvested shares were repurchased for \$1.0 million from an employee in connection with the termination of their service.

Unvested Restricted Stock – Founder’s Shares

In addition to the unvested common shares outstanding described above at “Early Exercised Stock Options,” the Company issued restricted stock to its founders. The fair value of the restricted shares determined based on the fair market value of Legacy IonQ’s common stock on July 25, 2016, the date the restriction was put into place, was \$1.2 million.

A summary of the unvested restricted shares activity is as follows:

	<u>Number of Unvested Restricted Shares</u>	<u>Weighted- Average Grant Date Fair Value per Share</u>
Unvested Balance as of December 31, 2019	1,771,198	0.10
Vested	<u>(1,771,198)</u>	<u>0.10</u>
Unvested Balance as of December 31, 2020	<u>—</u>	<u>\$ —</u>

The aggregate grant-date fair value of restricted shares vested was \$170 thousand for the year ended December 31, 2020. As of December 31, 2020, all restricted shares have vested and there were no new founders' shares issued during 2021.

Total stock based compensation expense for both stock option awards and unvested restricted shares is as follows (in thousands):

	<u>Years Ended December 31,</u>	
	<u>2021</u>	<u>2020</u>
Cost of revenue	\$ 62	\$ —
Research and development	2,841	716
Sales and marketing	67	—
General and administrative	<u>4,778</u>	<u>508</u>
Stock-based compensation, net of amounts capitalized	7,748	1,224
Capitalized stock-based compensation—Intangibles and fixed assets	275	110
Capitalized stock-based compensation—Other current assets	<u>—</u>	<u>45</u>
Total stock-based compensation	<u>\$8,023</u>	<u>\$1,379</u>

Employee Stock Purchase Plan

In August 2021, the Company's board of directors adopted the Employee Stock Purchase Plan (the "ESPP"), which was subsequently approved by the Company's stockholders in September 2021, and became effective upon the closing of the Business Combination. The ESPP is intended to qualify as an "employee stock purchase plan" within the meaning of Section 423 of the U.S. Internal Revenue Code of 1986, as amended (the "Code"). The number of shares of common stock initially reserved for issuance under the ESPP was 5,354,000 shares. The ESPP provides for an annual increase on January 1 of each year, beginning on January 1, 2022 and continuing through and including January 1, 2031, equal to the lesser of (i) 1% of the fully diluted shares of common stock outstanding on the last day of the prior fiscal year, (ii) 10,708,000 shares, or (iii) a lesser number of shares determined by the Company's board of directors prior to such increase. Under the terms of the ESPP, eligible employees can elect to acquire shares of the Company's common stock through periodic payroll deductions during a series of offering periods. Purchases under the ESPP are affected on the last business day of each offering period at a 15% discount to the lower of closing price on that day or the closing price on the first day of the offering period. As of December 31, 2021, no shares of common stock had been issued under the ESPP and no offering period has been set by the board of directors.

14. INCOME TAXES

The current and deferred components of the provision for income taxes for both Federal and State jurisdictions are zero for both of the years ended December 31, 2021 and 2020.

The Company's provision for income taxes differs from the amount determined by applying the applicable federal statutory tax rate to the loss before income taxes due to the valuation allowance for the net deferred income tax assets. A reconciliation of the U.S. statutory tax rate to our effective tax rate is presented below:

	Years Ended December 31,	
	2021	2020
U.S federal statutory income tax rate	21.0%	21.0%
State and local income taxes	1.2%	6.3%
R&D tax credits	1.7%	7.2%
Stock-based compensation	-0.6%	-0.7%
Warrant expense	-12.5%	—
Change in tax rates	-2.1%	—
Valuation allowance	-8.1%	-33.8%
Other	-0.6%	—
Effective tax rate	0.0%	0.0%

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. Significant components of the Company's deferred tax assets and liabilities were as follows (in thousands):

	2021	2020
Deferred tax assets:		
Accrued bonus	310	—
Deferred revenue	281	—
Non-qualified stock compensation	1,002	124
Accrued expenses	119	—
Warrant expenses	138	—
Depreciation and amortization	170	—
Other	809	8
Lease liabilities	1,023	1,176
R&D credit carryforwards	3,781	1,733
Net operating loss carryforwards	14,148	13,516
Total deferred tax assets	21,781	16,557
Valuation allowance	(20,388)	(11,747)
Total deferred tax assets net of valuation allowance	1,393	4,810
Deferred tax liabilities:		
Depreciation and amortization	—	(173)
Right of use assets	(979)	(1,135)
Capitalized patents	—	(181)
Internally developed software	—	(354)
Capitalized R&D costs	(414)	(2,967)
Total deferred tax liabilities	(1,393)	(4,810)
Net deferred tax assets (liabilities)	—	—

The Company had U.S. federal and state net operating loss carryforwards of approximately \$14.1 million as of December 31, 2021. The Company's net operating loss carryforwards generated prior to January 1, 2018 of \$1.1 million will begin to expire, if not utilized, in 2036. The Company's net operating loss carry forwards generated after

December 31, 2017 will carryforward indefinitely. As of December 31, 2021 the Company had U.S. federal and state tax credit carryforwards of \$3.8 million. The tax credit carryforwards will expire between 2025 and 2041.

The deductibility of such credits and net operating losses (“NOL”) may be limited. Under Section 383 and 382 of the Internal Revenue Code of 1986, as amended (the “Code”), and corresponding provisions of state law, if a corporation undergoes an “ownership change,” which generally occurs if the percentage of the corporation’s stock owned by 5% stockholders increases by more than 50% over a three-year period, the corporation’s ability to use its pre-change, credits and NOL carryforwards and other pre-change tax attributes to offset its post-change income, may be limited. We have not determined if we have experienced Section 383/382 ownership changes in the past and if a portion of our NOL and tax credit carryforwards are subject to an annual limitation. In addition, we may experience ownership changes in the future as a result of subsequent shifts in our stock ownership, some of which may be outside of our control. If we determine that an ownership change has occurred and our ability to use our historical NOL and tax credit carryforwards is significantly limited, it would harm our future operating results by effectively increasing our future tax obligations.

The Company has evaluated the positive and negative evidence bearing upon the realizability of its deferred tax assets. Based on the Company’s history of operating losses, including a three-year cumulative loss position as of December 31, 2021 and 2020, the Company has concluded that it is not more likely than not that its deferred income tax assets will be realized. Accordingly, the Company has provided a full valuation allowance, for each of the years ended December 31, 2021 and 2020. The net increase in the valuation allowance of \$8.6 million is due to the current year operating losses.

The Company is generally subject to a three-year statute of limitations by major tax jurisdictions. The current tax years that are subject for examination are tax years 2018 through 2020, although tax years dating back to 2016 remain open up to the tax attribute amounts carried forward for future use.

15. LEASES

The Company has one operating lease for its corporate headquarters that is also used for its research and development functions. The lease was amended in March 2020 to extend the terms of the agreement for the existing premise and lease additional expansion premise and in December 2020 to provide additional rent adjustments. The amended leases were entered into with UMD. Refer to Note 17—Related Party Transactions for further information. The Company determined the modified lease for the original premises and the lease for the expansion premises were both operating leases. The March 2020 amendment was determined to represent a modification to the existing lease with two lease components for both the original premises and expansion premises. The lease commencement date for the expansion premises was in December 2020. The modified lease for the original premises was reassessed utilizing an incremental borrowing rate at the effective date of the amendment. In December 2020, the original premise was further reassessed due to a rent adjustment associated with lessor assets paid for by the Company. For the original premises, these reassessments resulted in the recognition of an additional ROU asset and lease liability of \$0.6 million in March 2020 and \$0.1 million in December 2020. At the lease commencement date for the expansion premise, the Company recorded a ROU asset and lease liability of \$2.8 million. As of December 31, 2021 and 2020, the weighted- average remaining lease term was 9 years and 10 years, respectively. The weighted-average discount rate was 11.9% at December 31, 2021 and 2020, respectively.

The components of lease cost were as follows (in thousands):

	<u>2021</u>	<u>2020</u>
Operating lease cost⁽¹⁾		
Fixed lease cost	\$763	\$278
Short-term cost	13	35
Total operating lease cost	<u>\$776</u>	<u>\$313</u>

(1) The lease costs are reflected in the consolidated statements of operations as follows (in thousands):

	Years Ended December 31,	
	2021	2020
Cost of revenue	\$ 45	\$—
Research and development	613	263
Sales and marketing	8	—
General and administrative	110	50
Total	<u>\$776</u>	<u>\$313</u>

Supplemental cash flow and other information related to operating leases was as follows (in thousands):

	Year Ended December 31	
	2021	2020
Cash payments included in the measurement of operating lease liabilities	\$561	\$ 178
Operating lease right-of-use assets recognized in exchange for new operating lease obligations	—	3,565

As of December 31, 2021, maturities of operating lease liabilities are as follows (in thousands):

	<u>Amount</u>
Year Ending December 31,	
2022	\$ 644
2023	671
2024	750
2025	772
2026	796
Thereafter	<u>3,351</u>
Total lease payments	6,984
Less: imputed interest	<u>(2,773)</u>
Present value of operating lease liabilities	<u>\$ 4,211</u>

16. EMPLOYEE BENEFIT PLAN

The Company has a 401(k) savings plan (the “401(k) Plan”) that qualifies as a deferred salary arrangement under Section 401(k) of the Internal Revenue Code. Under the 401(k) Plan, participating employees may elect to contribute up to 100% of their eligible compensation, subject to certain limitations. The 401(k) Plan provides for a discretionary employer-matching contribution. The Company made a matching contribution of \$0.5 million and \$0.3 million to the 401(k) Plan for the years ended December 31, 2021 and 2020, respectively.

17. RELATED PARTY TRANSACTIONS

Transactions with UMD and Duke

As described in Note 7—Agreements with UMD and Duke, the Company entered into a License Agreement and Option Agreement with UMD and Duke whereby the Company, in the normal course of business, has licensed certain intellectual property and, in the case of the Amendment to the Duke and UMD Option Agreement, has purchased research and development services. The Company considers these agreements to be related party

transactions because during 2021 and 2020, the Company’s Co-founder and Chief Technology Officer served as a professor at Duke and the Company’s Co-founder and Chief Scientist served as a professor at the UMD. During 2021, the Company’s Chief Scientist moved to Duke and each, in their role as professors at Duke, are leading the research subject to the License Agreement and Option Agreement with Duke as of December 31, 2021.

In addition, the Company entered into an amendment to its operating lease for office space with the UMD. The lease was amended with UMD in March 2020 to extend the terms of the agreement for the existing premise and lease additional expansion premise and was amended in December 2020 to provide additional rent adjustments. Refer to Note 15 – Leases, for additional information regarding the Company’s leases.

In September 2021, the Company entered into a multiyear deal with UMD to provide certain quantum computing services and facility access related to the National Quantum Lab at UMD in exchange for payments totaling \$14 million over 3 years.

The Company’s results from transactions with UMD and Duke, as reflected in the Consolidated Statements of Operations are detailed below (in thousands):

	<u>Year Ended December 31,</u>	
	<u>2021</u>	<u>2020</u>
Revenue	1,179	—
Cost of Revenue	35	—
Research and Development	1,949	247
Sales and Marketing	8	—
General and administrative	218	35

The Company has the following balances related to transactions with UMD and Duke, as reflected in the Consolidated Balance Sheets:

	<u>Year Ended December 31,</u>	
	<u>2021</u>	<u>2020</u>
Assets		
Prepaid expenses and other current assets	612	1,013
Operating lease right-of-use asset	4,032	4,296
Other noncurrent assets	1,845	2,365
Liabilities		
Accounts payable	54	5
Current operating lease liabilities	568	495
Unearned revenue	2,821	—
Non-current operating lease liabilities	3,643	3,776

18. SUBSEQUENT EVENTS

In January 2022, the Company granted an aggregate of 1,687,669 restricted stock units (“RSUs”) and 900,170 stock options to certain directors, employees and consultants of the Company under the 2021 Equity Incentive Plan. The awards represent the contingent right to receive shares of the Company’s common stock, substantially all of which vest over a four-year period based on continuous service.

EXECUTIVE OFFICERS

Peter Chapman
President & Chief Executive Officer

Jungsang Kim
Chief Technology Officer

Christopher Monroe
Chief Scientist

Thomas Kramer
Chief Financial Officer

Laurie Babinski
General Counsel and Corporate Secretary

BOARD OF DIRECTORS

Craig Barratt
Independent Consultant

Ronald Bernal
Venture Partner
New Enterprise Associates

Blake Byers
Founder
Byers Capital

Peter Chapman
President & Chief Executive Officer
IonQ, Inc.

Niccolo de Masi
Chief Executive Officer and Director
dMY Technology Group, Inc. and affiliated entities

Jungsang Kim
Chief Technology Officer
IonQ, Inc.

Inder M. Singh
Executive Vice President & Chief Financial Officer
Arm Limited

Harry You
Chairman of the Board and Director
dMY Technology Group, Inc. and affiliated entities

LISTING

Our common stock and publicly traded warrants are listed on the New York Stock Exchange under the ticker symbols “IONQ” and “IONQ WS,” respectively.

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LEGAL COUNSEL

Cooley LLP, Washington, DC

ANNUAL MEETING

May 25, 2022, at 10:00 a.m. ET

Online Access at:

www.proxydocs.com/IONQ

FORM 10-K

A copy of our Form 10-K filed with the SEC will be made available to all stockholders at no charge.

The Form 10-K also can be accessed through the SEC website at **www.sec.gov**, or through our Investor website at **investors.ionq.com**.

To receive a copy by mail please contact:

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