Filed by Supernova Partners Acquisition Company II, Ltd.
pursuant to Rule 425 under the Securities Act of 1933
and deemed filed pursuant to Rule 14a-12
under the Securities Exchange Act of 1934

Subject Company: Supernova Partners Acquisition Company II, Ltd.
Commission File No. 001-40140
Date: November 23, 2021

Dad, I Have a Question
Nov. 23, 2021

0:00:01.3 S1: **Luke Rascoff**: Dad, I Have a Question. What is quantum computing? Hi everyone. I'm Luke. (Spencer Rascoff: And I'm Spencer.) And on today's episode of Dad, I Have a Question, we're going to be talking about quantum computing. **Spencer Rascoff**: Alright, look, it's a great question, and I have just the person to help us answer it. His name is Chad Rigetti, and he's the founder and CEO of Rigetti Computing, which is a company that is merging with my SPAC. And you'll remember from the SPAC episode that that's another way for companies to go public, so if anyone wants to learn more about SPACs, check out this back episode. But let's bring in Chad who knows as much as anyone in the world about quantum computing. Hi Chad. Thanks for joining. Please help explain to Luke and our listeners: What is quantum computing?

0:00:44.9 S2: **Chad Rigetti:** Quantum computing is one of the most important, exciting emerging technologies in the world today. So imagine if you could build a computer, say the size of a kitchen or a car, that would be more powerful than all the computers in the world today. That's what quantum computing is. And ultimately, what this technology does is leverage new physical laws like quantum mechanics to store and process information exponentially faster than traditional computers.

0:01:17.4 S1: **Luke Rascoff**: That sounds amazing. What is quantum mechanics and how would that play into quantum computers?

0:01:25.4 S2: **Chad Rigetti**: So at the lowest level of nature, if you look at the tiniest building blocks of the universe, things are governed by a set of laws called quantum mechanics. These are laws that… this is one of the things that made Albert Einstein famous… so discovering some of the principles of quantum mechanics. That theory describes nature at the lowest level. **Spencer Rascoff**: Can you give an example of a law of quantum mechanics?

Chad Rigetti: Yes, one of the most interesting things about quantum mechanics is that it describes nature as both waves and particles at the same time. So in quantum mechanics, things can exist in what are called superposition states. That might be, if you want to make an analogy of flipping a coin, it could be that the coin landed heads and tails at the same time. And so long as it's a quantum mechanical system, like a single atom or a single photon or electron — the building blocks of the universe at the lowest level — it behaves according to these strange laws of quantum mechanics. Quantum computers use these strange laws to represent and process information in fundamentally new ways.

0:02:33.1 S1: **Luke Rascoff**: So, I guess branching off of that, what makes a quantum computer function differently from a regular computer? How does it use the laws of quantum mechanics?

0:02:43.2 S2: **Chad Rigetti:** Quantum computers encode... The building blocks of quantum computers are different than classical computers. Traditional computers, all of them, whether they're laptops or giant super computers or even our iPhones that we carry in our pockets, are based on transistors. Quantum computers are based on things called qubits, and qubits behave according to the laws of quantum mechanics. And because of that, quantum computers are able to process information in these new ways, and they're able to solve problems by looking at solutions to problems simultaneously rather than doing so sequentially, as those traditional machines.

0:03:22.1 S1: **Luke Rascoff**: What kind of problems would a quantum computer be well equipped to solve that a traditional computer couldn't?

0:03:29.2 S2: **Chad Rigetti:** That's a great question. There's problems that require crunching massive amounts of data. There's things like very large scale climate simulations that are just limited by ability to represent and encode those problems. Crunching very large data sets to look for obscure correlations that might help understand why, maybe, rare side effects of a treatment might take place. Or problems that really relate to simulating nature itself. So understanding the building blocks of nature. One of the most exciting and impactful applications is going to be using quantum computers to simulate molecules and materials for new medicines, for example, new treatments for diseases, and accelerating the pace of research and development in pharmaceuticals.

0:04:19.1 S1: **Luke Rascoff**: And as someone well involved in the quantum computing industry, what do you see as the timeline for quantum computers? Are they already very much here or will we see them integrating in the next few years?

0:04:32.0 S2: **Chad Rigetti:** So you can go online tonight and open up an account and write a simple program and be running on a real quantum computer. Quantum computers have been around in different forms for about the past five years or so. And what's happening right now is that the performance and the scale of these systems is starting to reach a point where they're starting to exceed the performance of classical computers, traditional computers for the first time. And with that, there's a lot of excitement from a core technology perspective, and new people are moving into the industry, as well as companies starting to buy access to these machines.

0:05:15.4 S1: **Luke Rascoff**: And with that being said, do you think that there will be a point where the traditional computer perhaps phases out for people on all... on all levels? Maybe the individual computer, for someone, becoming a quantum computer one day?

0:05:31.1 S2: **Chad Rigetti**: If you go out many, many decades. I would never bet against the inevitable advance of technology. That said, over the next couple of decades, quantum computers are most likely going to be used as accelerators for existing computing systems. You might use it in conjunction with traditional chips or GPUs or something like that, or traditional cloud computing or high performance computing to accelerate and improve the overall performance of the integrated system. And one day it is possible that we'll have quantum computers in our laptops, but that day is pretty far out in the future.

0:06:11.7 S1: **Luke Rascoff**: And can you explain more about how a quantum computer is integrated with a traditional computer? You spoke about running the code, of typing in code to run a quantum computer on a traditional computer.

0:06:31.2 S2: **Chad Rigetti:** Quantum computers operate today as accelerators for traditional computers. So you'll write simple programs. Those programs will be executed by classical computers and they'll send instructions to a quantum computer, and then the data will come back from a quantum computer and both of those will really work in tandem to solve a problem. The interesting thing is that many of the familiar programming languages that people have learned over the past couple decades can also be used to build quantum programs, so those are then parsed by the technology stack to execute on both quantum and classical computing systems.

0:07:05.6 S1: **Luke Rascoff**: Very interesting. Dad, do you have any questions?

Spencer Rascoff: Yeah. Are there any downsides of quantum computing? So talk about code breaking. And I don't know, if these things are so, almost infinitely powerful, what negative effects might arise from them?

0:07:21.6 S2: **Chad Rigetti**: Computing technology has always been a core driver of economic development and societal progress. Computers can be used for… it's limited by the human imagination. Ultimately, quantum computers may enable us to crack codes that are today secure, at some point in the future, and ultimately that just makes it an incredibly interesting space. An incredibly interesting technology. Ultimately it's one of the reasons it's important to countries as well, not just to companies and not just to individuals. It is an important technology at the geopolitical level.

0:08:04.5 S1: **Spencer Rascoff**: Are there other countries… Where does the US stack up relative to other countries on investing in this industry?

0:08:13.7 S2: **Chad Rigetti:** From everything that we can see, the United States continues to be in a leadership position. There is obviously a large rivalry with China. This centers around advanced technology, and quantum computing is emerging as a big part of that kind of tech rivalry between those countries.

0:08:29.7 S1: **Luke Rascoff**: Interesting. Should I summarize what quantum computing is? To summarize, quantum computing is an emerging technology that allows traditional computers to interface and write code to conference and solve problems with the help of quantum computers, which are computers that have far more computing power because they can see information not as binary, but two things happening at the same time. So they can solve problems faster. Thank you so much for joining us.

Spencer Rascoff: Thanks a lot. I appreciate it.

0:09:13.4 S2: **Chad Rigetti:** Thank you, Luke. Thank you, Spencer. Great to talk with you both.

0:09:15.9 S1: Thank you.

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Additional Information and Where to Find It

Supernova Partners Acquisition Company II ("Supernova") has filed a registration statement on Form S-4 with the Securities Exchange Commission (the "SEC"), which includes a proxy statement/prospectus, that will be both the proxy statement to be distributed to holders of Supernova's common shares in connection with its solicitation of proxies for the vote by Supernova's shareholders with respect to the proposed business combination and other matters as may be described in the registration statement, as well as the prospectus relating to the offer and sale of the securities to be issued in the business combination. After the registration statement is declared effective, Supernova will mail a definitive proxy statement/prospectus and other relevant documents to its shareholders. This communication does not contain all the information that should be considered concerning the proposed business combination and is not intended to form the basis of any investment decision or any other decision in respect of the business combination. Supernova's shareholders and other interested persons are advised to read, when available, the preliminary proxy statement/prospectus included in the registration statement and the amendments thereto and the definitive proxy statement/prospectus and other documents filed in connection with the proposed business combination, as these materials will contain important information about Rigetti Holdings, Inc. ("Rigetti"), Supernova and the business combination. When available, the definitive proxy statement/prospectus and other relevant materials for the proposed business combination will be mailed to shareholders of Supernova as of a record date to be established for voting on the proposed business combination. Shareholders will also be able to obtain copies of the preliminary proxy statement, the definitive proxy statement and other documents filed with the SEC, without charge, once available, at the SEC's website at www.sec.gov, or by directing a request to Supernova's secretary at 4301 50th Street NW, Suite 300 PMB 1044, Washington, D.C. 20016, (202) 918-7050.

Participants in the Solicitation

Supernova and its directors and executive officers may be deemed participants in the solicitation of proxies from Supernova's shareholders with respect to the proposed business combination. A list of the names of those directors and executive officers and a description of their interests in Supernova is contained in Supernova's prospectus dated March 3, 2021 relating to its initial public offering, which was filed with the SEC and is available free of charge at the SEC's website at www.sec.gov. To the extent such holdings of Supernova's securities may have changed since that time, such changes have been or will be reflected on Statements of Change in Ownership on Form 4 filed with the SEC. Additional information regarding the interests of such participants will be contained in the proxy statement/prospectus for the proposed business combination when available.

Rigetti and its directors and executive officers may also be deemed to be participants in the solicitation of proxies from the shareholders of Supernova in connection with the proposed business combination. A list of the names of such directors and executive officers and information regarding their interests in the proposed business combination will be included in the proxy statement/prospectus for the proposed business combination when available.

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Certain statements in this communication may be considered forward-looking statements. Forward-looking statements generally relate to future events and can be identified by terminology such as “pro forma”, “may”, “should”, “could”, “might”, “plan”, “possible”, “project”, “strive”, “budget”, “forecast”, “expect”, “intend”, “will”, “estimate”, “anticipate”, “believe”, “predict”, “potential” or “continue”, or the negatives of these terms or variations of them or similar terminology. Such forward-looking statements are subject to risks, uncertainties, and other factors which could cause actual results to differ materially from those expressed or implied by such forward looking statements. These forward-looking statements are based upon estimates and assumptions that, while considered reasonable by Supernova and its management, and Rigetti and its management, as the case may be, are inherently uncertain. Factors that may cause actual results to differ materially from current expectations include, but are not limited to: the outcome of any legal proceedings that may be instituted against Supernova, Rigetti, the combined company or others following the announcement of the business combination and any definitive agreements with respect thereto; the inability to complete the business combination due to the failure to obtain approval of the shareholders of Supernova or to satisfy other conditions to closing; changes to the proposed structure of the business combination that may be required or appropriate as a result of applicable laws or regulations or as a condition to obtaining regulatory approval of the business combination; the ability to meet stock exchange listing standards
following the consummation of the business combination; the risk that the Business Combination disrupts current plans and operations of Rigetti as a result of the announcement and consummation of the Business Combination; the ability to recognize the anticipated benefits of the business combination, which may be affected by, among other things, competition, the ability of the combined company to grow and manage growth profitably, maintain relationships with customers and suppliers and retain its management and key employees; costs related to the business combination; changes in applicable laws or regulations; the possibility that Rigetti or the combined company may be adversely affected by other economic, business, or competitive factors; Rigetti’s estimates of expenses and profitability; the evolution of the markets in which Rigetti competes; the ability of Rigetti to implement its strategic initiatives, expansion plans and continue to innovate its existing services; the impact of the COVID-19 pandemic on Rigetti’s business; and other risks and uncertainties set forth in the section entitled “Risk Factors” and “Cautionary Note Regarding Forward-Looking Statements” in the registration on Form S-4 and proxy statement/prospectus discussed above and other documents filed with Supernova from time to time with the SEC.

Nothing in this communication should be regarded as a representation by any person that the forward-looking statements set forth herein will be achieved or that any of the contemplated results of such forward-looking statements will be achieved. You should not place undue reliance on forward-looking statements, which speak only as of the date they are made. Neither Supernova nor Rigetti undertakes any duty to update these forward-looking statements.