Xanadu Analyst Day
March 4, 2026

Corporate Speakers

- Natalie Wilmore; Xanadu; Chief Legal Officer
- Bill Fradin; Crane Harbor Acquisition Corp; Chief Executive Officer
- Christian Weedbrook; Xanadu; Founder and Chief Executive Officer
- Rafal Janik; Xanadu; Chief Operating Officer
- Michael Trzupek; Xanadu; Chief Financial Officer
- Unidentified Speaker; Xanadu; Unknown

Participants

- Unidentified Participant; Unknown; Analyst
- Craig Ellis; B. Riley Securities; Senior Managing Director, Director of Research
- Todd Copeland; CIBC; Analyst
- Antoine Legault; Wedbush Securities; Senior Associate
- Kingsley Crane; Canaccord Genuity; Analyst
- Ryan Choi; Bank of America; Analyst
- Suji Desilva; Roth Capital; Analyst
- Sahej Singh; Stifel; Analyst
- Quinn Bolton; Needham; Analyst
- Tyler Anderson; Craig-Hallum; Analyst
- David Williams; Benchmark; Analyst
- Nehal Chokshi; Northland Capital Markets; Analyst
- Unidentified Participant; Unknown; Analyst

PRESENTATION

Natalie Wilmore: Before we get started, just a quick note, the presentation today and the following Q&A session will contain forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. These forward-looking statements are based on management's current expectations, assumptions, and beliefs regarding future events. And as a result, they're inherently subject to significant business, economic, and competitive risks and uncertainties.

Forward-looking statements, which include views on market conditions, strategic initiatives, and future performance, are not guarantees of future results. Actual results will differ materially from those expressed or implied in today's presentation based on a variety of factors. For a robust discussion of those factors, please review our registration statement on Form F-4 filed with the SEC.

Finally, the information shared today is accurate as of today, March 4th, 2026, except as required by law, Xanadu undertakes no obligation to publicly update or revise any of our forward-looking statements, whether it's as a result of new information, future developments, or otherwise. So with that, I will hand it over to Bill Fradin. Bill is the CEO of Crane Harbor Acquisition Corp.

Bill Fradin: On behalf of Crane Harbor Acquisition Corp., I want to welcome you to today's Analyst Day. We're genuinely excited to have you here. And my name is Bill Fradin. I'm the CEO of Crane Harbor.

We believe this is a pivotal moment, not just for our transaction, but for the quantum computing industry more broadly. For years, quantum has been discussed as a long-term scientific ambition. And today, the conversation is shifting. The focus is now on scalability, architecture, commercialization, and capital formation. The market is beginning to differentiate between the theoretical promise and executable roadmaps. At Crane Harbor, we spend our time looking for companies that can define categories, companies with differentiated technology, disciplined execution, and leadership teams capable of building enduring public enterprises.

After studying the space closely for years, we believe Xanadu stands apart. And today, we'll walk you through why. Let me begin with the transaction itself.

Xanadu intends to complete a business combination with Crane Harbor Acquisition Corp., bringing together a leading photonic quantum computing company spanning both hardware and software with an experienced SPAC sponsor team that has founded, led, and acquired multiple public companies. The transaction is designed to provide Xanadu with significant capital and long-term alignment.

At closing, we expect approximately $455 million of net cash on the balance sheet, assuming no redemptions. That consists of roughly $225 million in trust and a $275 million fully committed, upsized, and oversubscribed PIPE. Importantly, the PIPE exceeds the minimum cash required to close, and that provides strong closing certainty and a well-capitalized foundation as Xanadu enters the public markets. We're targeting closing by the end of Q1 2026, subject to customary conditions, and we're also pleased to share that the SEC has declared our Form F4 effective as of Monday. From a valuation perspective, the transaction implies a pro forma enterprise value of approximately $3.1 billion for the combined company.

We believe that represents a compelling entry point relative to the public peers, particularly when you consider Xanadu's differentiated photonic approach, its leadership in quantum software with PennyLane, and its demonstrated technical milestones. The transaction has also been meaningfully validated by institutional investors. Prior to announcement, Xanadu raised $275 million in a fully committed PIPE proceeds from leading strategic and institutional investors. Over 90% of the PIPE comes from new investors who conducted extensive due diligence. This is the largest quantum PIPE tied to a deSPAC transaction since 2022, which we believe speaks to the conviction behind the opportunity. And just as importantly, interests are fully aligned.

Existing Xanadu shareholders are rolling 100% of their equity and will own approximately 84% of the combined company. They have agreed to a 6-month lockup. Crane Harbor sponsors are subject to a 12-month lockup with performance-based early release provisions. This is not structured as a short-term transaction. We are bringing a long-term, capital-intensive, generational technology platform. We believe the capital structure, investor base, and alignment we've put in place positions Xanadu to execute its roadmap with strength and stability as a public company. And with that foundation established, let me introduce the team that is building this company.

You'll hear from the three leaders responsible for building Xanadu across technology, commercialization, and financial execution. First, Christian Weedbrook. When this company goes public, we believe Christian will be the only founder physicist CEO leading a publicly traded quantum computing company. Over the course of our partnership, I've come to know Christian not only as an exceptional scientist, but as a visionary leader, disciplined, rigorous, and deeply mission-driven. He combines intellectual depth with operational seriousness. He's ambitious, but pragmatic. He is bold, but grounded in peer-reviewed science and measurable progress. He founded Xanadu with a clear thesis that photonics would ultimately prove to be the most scalable path to fault-tolerant quantum computing. More than a decade later, that conviction has translated into industry-leading milestones from quantum supremacy to the Aurora modular system to the widespread adoption of PennyLane across modalities.

Christian is here for the right reasons. To build enduring technology, to commercialize it responsibly, and to lead this company for the long term. As investors, we place enormous value on founder-led companies, and we believe Christian represents the kind of generational technical founder that public markets rarely have access to.

You'll then hear from Rafal Janik, who's been alongside Christian for nearly a decade. Raf will speak to how Xanadu translates breakthrough physics into real-world partnerships and revenue opportunities.

And finally, Michael Trzupek, who recently joined as Chief Financial Officer as we prepare for public company readiness. Michael brings deep experience as a technology CFO, and will walk through the financial profile, capital structure, and how we are positioning the company for discipline growth as a public entity.

With that, we're going to play a short video which will introduce Christian. Thank you.

(Start of Video Presentation)

Christian Weedbrook: I took a few years off after high school, and then I decided to go back to university and looked at what I was good at high school, which was mathematics. And then really got into the exciting field of quantum technologies, and that really set me off in my journey where I am today.

I really like the word obsession. I just love being obsessed with the ability to sort of build something from nothing.

Yes, this is the world's first scalable and networked quantum computer. We called it Aurora, and it's made up of, as you can see, four server racks that really don't look out of place in a normal data center, which is a good sign.

One of the biggest problems that we really want to solve in quantum computing, things related to material design and quantum chemistry. Imagine creating a new battery the world has never seen before, but could actually charge 10 times faster, have a range of 10 times longer than what we currently have. Take a specific example of drug discovery from the computer simulations all the way through clinical trials. Not many people know, but it can take 10 years. 90% of the candidates that they start off would fail. Imagine now, a new computer, a quantum computer that can actually solve this in not 10 years, but perhaps a year or less. Once we have a large scale quantum computer, what new discoveries are there to be made?

Ultimate vision here at Xanadu is to build a large scale quantum computer. So there would be hundreds of server racks that are networked together. We want to build these quantum data centers all around the world. And the other part of the strategy is to sell these individual quantum server racks to other partners around the world so they can build their own data centers as well.

We actually work with a number of partners in the automobile industry. Volkswagen, BMW and Toyota have been great partners.

I always love reading about Abraham Lincoln where people were describing him as a little engine that would never quit. Well, I could probably do that. That doesn't seem that hard. If you don't quit, how do you fail? When you have a mission that's meaningful and purposeful, you want to see it through. Put it in the context of building a new type of computer that is really going to help people and really change our worlds. Putting those two things together just keeps me going and I've no thought of giving up.

(End of Video Presentation)

Christian Weedbrook: Everyone, thank you for attending today. I really appreciate it. It's great to see everyone that turned out today. I'm actually trying to figure out what's harder, watching myself up there or building a quantum computer. I'm not sure. I feel a little squeamish. But it's great to have everyone turn up today. I think you're all excited as we are with our story of building quantum computers using light or photons. And also, welcome to everyone that's turned up online as well. We appreciate it.

This is always a great place to start, is our mission statement, which is to build quantum computers that are useful and available to people everywhere. Each word was chosen specifically for a purpose. Useful indicates that Xanadu is headed towards universal fault-tolerant quantum computers with hundreds of logical qubits. Think of that as when you'll start actually making money and start solving important customer problems.

And significant market opportunity, I think I don't really need to spend too much time on convincing folks here about why quantum. I believe it's more about why Xanadu. Available to people everywhere, cloud deployed, as mentioned in the video, that's really the best and easiest way to access these large-scale quantum computers once they're built. And we also have one of the most widely used software stacks anywhere in the industry with PennyLane which we'll talk more about later. And the really big thing that Xanadu has solved, as you can see there, is a scaling side of things, modularity, and the networking. No one solved that yet in the industry. Xanadu is the first and so far the only entity or company that has solved that.

It's kind of a lot of words here but let me try to distill it down. We're expected to be the first pure play publicly listed photonics quantum computing company offering differentiated exposure to credible path to scalability. It's a mouthful. Basically, we use light or photons to build our quantum computers. Very different to any other quantum company that's public currently. And as you'll see, we'll go over some real huge benefits to using photonics that will ultimately lead us to being one of the winners in this space.

Technical deep leadership team and post-closing board which we announced, we were excited to announce last week or the week before. We have expertise in photonic chip design and systems integration. The stat that I always like to talk about is a large part of our workforce, we have over 250 folks now, and a lot of the leadership team have been here from the very beginning which shows you, they believe in the approach and they're also some of the world's experts.

Category leading technical position, as mentioned, we'll talk more about that. Maybe just quickly, the challenges to building a large scale quantum computer are twofold for us and anyone in the industry. One is scalability, you do that through networking and the other one is performance, so how to reduce errors. And as it says there, we are one of the leaders in the field and particularly the leader in terms of networkability. We built the world's first networked modular and scalable quantum computer and it really positions us to scalability, solving this first problem and the second problem well on the way to that as well.

And a lot of the stuff that we mentioned here today has been peer reviewed and particularly that one was published in Nature last year. One of two Nature articles the team produced in a 12-month span which is very impressive. That's the hardware side of things. When you think of Xanadu, think photonics and really filling that gap in the public markets. The other big thing is Xanadu created PennyLane. It's an open source, Python-based quantum software library. Think of that as the operating system or the way to program quantum computers, the way to log in and ultimately use quantum computers.

And the other great thing about that, not only is it one of the leaders, but it's available on pretty much every other hardware provider out there, which allows you to build the ecosystem going forward. We'll talk more about that soon. And customer commercializations, that ties into the 2029-2030 timeframe of us building this large-scale quantum computer, again using photonics and complemented with our PennyLane software. We're well-capitalized, post-closing, with multiple successful rounds. We've raised $275 million on the PIPE as Bill mentioned. I always love the stat that 90% of that PIPE money came from new investors, which is a testament again to our approach using light or photons.

Anyways, they're just kind of take-homes and we'll talk more about them. If you look at us at a glance, headquarters in Toronto, we have the Canadian maple leaf flag there. That's a game changer for us because we essentially have the whole of Canada behind us. And so we have the talent there, we have the funding. We're founded in 2016 as mentioned. We have over 245 people now, 135 plus PhDs. I remember the first, I think 80 or 90 hires were all PhDs. And a lot of them have that ability to do research but also lead teams as well. So we're very fortunate to have some of these amazing folks. Funding I mentioned and patents, over 130 patents and counting. The big take-home again with photonics but also the Xanadu team created PennyLane, which is a leading quantum hardware agnostic quantum software platform as mentioned.

Some of the select investors in our PIPE, and also in the private rounds. The private rounds I believe we've raised up to $250 million. Great support from many investors, strategic partnerships there, you saw in the video, Rolls Royce, Toyota, RTX, Lockheed Martin that was announced recently as well. Actually, Lockheed Martin have been using our PennyLane software for many years even before we discovered they were using that. So, it shows you the broad outreach of PennyLane.

We're a fabless company so what that means is we design our own photonic chips, send them off to different foundries around the world. We work with a number of foundries. They make or fabricate these chips based on our designs, send them back to us and then we take over from there. And so, we work with a lot of Tier 1 fabrication partners, see Applied Materials. UMC is second largest pure play foundry in the world after TSMC. IMEC, AIM Photonics, Tower, great partnership there, we recently announced that as well.

In terms of the research partners, you can see some of the mentions there. DARPA, they're big champions and supporters of us. I think we've had four or five DARPA projects over the last few years and currently we're doing two now, including the famous, in the industry at least, QBI program where we're one of 11 companies that made it into stage B. And as you know, that's up to over $300 million if you make it through all the stages there.

Leadership team, we already heard it from myself and Raf and Michael. We also have Natalie that we saw, introduced Bill and Rebecca. I won't go through this. I think you'll have a copy of this, but really great team and really great additions recently of Michael and Natalie as well, which pushed us into another gear, which is really exciting to see.

Great board. We worked hard on getting the right type of people that's needed for a company like a quantum company. Really excited. We announced this maybe one or two weeks ago. We've got folks as a quick overview. Glenda on the boards of Global Foundry and Cerebus really fits that semiconductor need that we have. Eliot, CEO of Dominion Dynamics. Think of them as kind of the Canadian version of Anduril. It gets us into the government connections, both in the Canada ecosystem, but also the U.S. ecosystem. Heidi, great to have her deep into the Pentagon for many years. Michelle is great. We've known her for a little while now and she works at Reddit as the Chief Accounting Officer and she will be part of the audit committee. Really well-rounded board. We're really excited to announce that a couple of weeks ago.

There's a lot here. Let me just go over some of the highlights here that I think everyone will find interesting. Talked about when we were founded. Throughout this timeline, raised $290 million in the private sector, including, I think, $50 million (CAD), $40 million. Everything's in USD, $40 million from the U.S. and Canadian governments as well. Continued to expand, continued to raise. PennyLane was launched in 2018. That was key. That was really one of the first, if not the first, major launches in the industry. And you can see we've had now about an eight-year head start on many, and we've built such a strong ecosystem there. Developers really love PennyLane. It also resonates with investors as well.

Series B. 2020, we had the world's first commercial quantum photonic cloud platform released. So we actually had what we call our X8 system – I'll talk more about that soon – available online for customers to use, and we started generating revenue with that being online. Borealis was announced – I’ll talk more about that soon too – that was our quantum supremacy demonstration. Only the third time ever at that point after Google and China. So we were up there with the big guns around the world, and the first startup to do that first time in Canada, which was really exciting.

Really, PennyLane over the years has really solidified it as the leading framework. I think Raf will talk more about PennyLane, but PennyLane is also available in over 150 universities around the world and over 30 countries. So we're building that next generation of workforce as well. It also allows us to work with folks like Lockheed Martin and others, because they're already using it. And we can say, "Hey, we created PennyLane. Let's work together," and we form long-term partnerships there, which is really awesome. And then Aurora, we'll talk more about that, the world's first and only so far networked modular photonic quantum computer. And then we're all excited, it’s why we're here today, looking forward on the path to listing on the NASDAQ and the TSX as well.

So just briefly, the end vision, and I'm sure a lot of people in this room and online know this, the end vision for us and anyone in the industry is we all have quantum computers today, but they need to be bigger, and bigger so they can start solving important customer problems. That's what it's all about. And the vision for that for us and others is really to have hundreds of server racks that are networked together.

There's two big challenges with that, as I mentioned. One is how do you actually network these things together? And then the other one is how to actually improve the performance? Reduce errors, essentially.

So the first one is the one we solved through the networking. And the way to understand it is you're going to have to use light. By definition, interconnects are photonics and fiber optics are photonics. And any server rack will have your modality or hardware of choice. So let's take two server racks as an example. You'll have, say, hundreds, but you've got your modality here in one server rack and another server rack. They need to be connected very much like traditional computing. They need to talk to each other, a greater than the sum sort of thing. And so you need to connect the racks using fiber optics - that's a given.

Now, what happens is if you're using electronic-based approaches instead of our photonic-based approach, is you're computing using electrons. That means superconducting, ion trap, neutral atoms, everything except photonics. You've got to convert from electrons. You're computing here, distribute the entanglement, convert the photons, and convert back again to electrons to connect these two racks together via the photons. No one's done that before and definitely not in a scalable way for the electronic-based approaches. And as we like to say, call us out if there's any BS you're hearing because we're happy to send the papers. And these big results and big claims, we try to publish them and sort of say, here you go. You know, do your own sort of due diligence if you like. This was published in Nature.

Now, the challenges for the electronic ones, getting back to them, is this is probabilistic, this conversion or transformation, meaning it doesn't always work, it barely ever works. It's not impossible, but it's lossy and noisy. And that's why no one's done it before. And so the Xanadu team has achieved that. And so this is really a comparison. Every quantum computing company has it. I obsessively look at everyone's analyst decks and see what they're saying. And, you know, call me out on this and we'll send you the stats including our competitors’ stats, where you can find their data too. And so we try to be as honest as possible with this. And as I mentioned, scalable interconnects has been solved. We're the only one to have achieved that.

Another one that's interesting while we're talking about photonics and we've seen some really great news recently, we kept our eye on NVIDIA buying some photonics companies. I think that may seem a little bit non-connected to the quantum industry but not for us. It's a great sign for us. And in fact, we're all photonics. Everyone has to have photonic teams and connect, as I mentioned. They have to have the expertise there. And it's very, very hard. And we're into our 10th year now of mastering and patterning these things. So everyone has to care about photonics whether they want to or not. It's just we're using photonics everywhere.

Room temperature computation, this is a bit of an annoyance to me. I see ours being crossed and everyone else's. I think they're alluding to PsiQuantum, who not all photonics is created equally and PsiQuantum is doing great work. But we truly are the only company that's room temperature computation. The key word there, all of them is room temperature is key as well but computation.

Now for us or any computer, you have the inputs, you have the gates, and you have the outputs. That's true for our phones and laptops, also true for quantum computers, except you have quantum bits, quantum gates, and quantum outputs. All of those three stages for us are at room temperature. And what that means is no cryogenics, none of those chandeliers, nothing that actually has laser cooling as well, which is actually a thousand times even colder than the other cryogenics. So it really is true room temperature.

Now to be fair, everyone, including us, does need some cooling. But it's at the very start of the computation. Think of it as like initializing or turning on the computer. You need a little bit there to sort of prep you. But the qubits, the gates, and the outputs, all at room temperature. And that's a really key differentiator, honestly for us compared to anyone else.

Connectivity, photonics, to be fair, all photonic-based approaches have all connectivity. That's important for ultimately reduction in hardware. Two-qubit fidelity, we're going to be a bit more vocal about that. I think that's some of the feedback we get. We've got some really great results, but people may not know about that. Our two-qubit gate fidelity is a simple beam splitter, which makes it very easy to get high, in this case, four nines (99.99), which is up there with the best in the industry.

Logical overhead, we've been getting more questions on this, which is good. As I'm sure everyone knows, qubit count is not the be-all and end-all. It's just an easy way to sort of frame it within the media, which is understandable because there's a lot of technical details here. But the next thing people are paying attention to is you need a lot of bad qubits, physical qubits, to ultimately give you very good qubits. It's like a redundancy sort of thing.

It's like when I say to someone on the phone if the connection's bad, I don't say "A," I say "A" for Apple. So you've got the letter "A," then you've got five letters for Apple. And then so you're adding more stuff in to make sure they really get the letter "A." And you do that in quantum computing and how to correct for errors as well, you add some more stuff.

But you don't want to add too much, you want to minimize that. And that's really what the logical overhead is, physical to logical. And we truly have one of the lowest, if not the lowest, amount of logical, physical to logical, and they call it encoding, encoding rate, or logical overhead there. And the reason is the type of photonics-based approach that we have.

The other really cool thing we don't talk about too much is that there's a plethora or a family of error correction codes. A lot of companies have to say, "Today, we're going to use this code because everything else is a ripple effect. We have to design the chips based on that." But the really cool thing is our error correction codes can be chosen well into the future because we've got that flexibility, which is really important. We don't have to lock ourselves into a particular design.

Clock speeds, this is one of my favorite ones. Let's assume it's 2029, 2030, and there's a few of us that will make it to this large-scale quantum computer. Let's say everything is fixed, meaning every quantum computer that's made it there can solve any other problem. So they're equivalent. This is really kicker here, is that the speed of our gates, photonics, to be fair, anyone using photonics, is faster than everyone else, the lowest is 10 times faster and up to 1,000 times faster. So for ion traps and neutral atoms, in their papers, we have to dig up and see the latest results for ourselves. It's around 10 hertz to tens of kilohertz. Which means that if they solve the problem in one year, that's great because it would have taken 7 million years for certain problems, right? So that's a great thing. That's what's great about quantum computing.

If you look at how fast ours is, ours would have solved it in eight hours compared to a year for those guys. And so that's the other really huge advantage that's really fundamental. The intuitive thing is we're operating at the speed of light. You know, nothing's faster than that, as opposed to the other approaches, which are electronics.

So anyways, I encourage everyone to do their own research on that. I'm happy to help out with that as well. So now let's talk about the revolution that's happening in compute. Compute, I always think of that as being proportional to humanity's advancements. I mean, look imagine if we didn't have the Internet or integrated chips. I mean, where would we be? We'd have so many discoveries that wouldn't exist.

I don't want to spend – everyone has this slide, so I won't spend too much time on it. Basically, quantum computing is fast. That's really the take-home there, compared to classical computers.

And often, we all have these things where after a certain point in time on the graph on the right, we really start outpacing what a traditional computer can actually do. And that's why we're all here today, and this is why Xanadu exists, because it's a fundamentally different way of computing.

Also, we often get asked about AI. AI is amazing, but it's still based on chips that are running predominantly on classical compute. So it's just not an apples to apples comparison anymore. This is fundamentally going to change our world and change computing.

Same sort of stuff here as well. Maybe I'll just touch on the applications. Really, the industry often talks of applications, you know, once you have a large-scale quantum computer. Pharmaceuticals, so drug discovery, material design, so quantum chemistry, we focus on solar cells, next generation solar cells, and next generation batteries. Things like finance, defense we'll throw in there as well it's very much a horizontal play there. AI is another one, and also optimization and logistics.

Obviously, cryptography is the big thing that's really initially scared people, particularly in the governments in the 90s when it was theoretically shown if you had a large-scale quantum computer. But that's more of a motivator, I think, for funding rather than – I mean you're not going to see a use case where we're hacking people. A lot of very important problems that a quantum computer, ultimately once it's large enough, remember for us 2029-2030, that it can actually solve.

This is a really cool one here, a lot of information here but maybe focus on the graphic in the middle. So we are the third entity after Google and China, far less money, to actually solve what was known as quantum supremacy. And the take-home message of this slide here is that we all know data centers are getting larger and more energy intensive, and if you extrapolate out the amount of training it needs to do, it's not plateauing, it's just getting out of control.

So there's ways around it, people are looking at models that maybe are more specific to an industry therefore more trainable faster. But it's not heading in the right direction, definitely if you want to get to AGI. I would also bet, maybe not my life because it's a little precious at the moment, but in the future that you actually need quantum to get to AGI. Something other than bits or classical compute. I just don't see how if you're ultimately simulating reality, which actually has bits discrete and continuous or analog, so you're missing a big chunk. Anyway, that's a story for another day.

But the quantum supremacy demonstration here, we chose a well-defined math problem not a business problem, that's what we're all heading towards, a very important P of P or proof of principle demonstration. This math problem would have taken the world's fastest supercomputer at the time seven million years to solve and you can see the amount of energy or power that it would have taken to solve as well. And our computer, Borealis, solved the same problem in two minutes. So it took it from seven million years down to two minutes. And that brings the main idea that once we start solving important customer problems, it would have taken hundreds or thousands of normal data centers to solve the same problem that one of our data centers will solve. And that's really solving for very big problems, not all the problems but very big problems, the energy consumption crisis at the moment, particularly looking into the future and the next few years.

And so as it says there, it's a new pathway for AI. To be honest, I'm not going to get caught up too much in the AI side of things. I think AI is amazing, but the next big thing after AI is quantum and I see both of them as just solving important customer problems. Happy to answer any questions about AI, we often get them and we understand it, but think of quantum as just really being the next big thing after AI and it's coming already.

So the traditional slide of you know I mentioned the two big things and why we're going public is the photonic based approach and then the PennyLane side of things so now I'll talk about some of the tech advantages to using photonics. These are the typical ones we mentioned. I've already talked about no cooling required for the computation side of things. We do need some but far less of a footprint than anyone else and really once it's turned on no cooling is needed including no laser cooling.

I talked about error correction flexibility and the modular networkable. We've talked about clock speeds. So the final two compatible with telecom we did not have to invent fiber optics We did not have to invent the laser, among many other things The analogy would be that other people would have to still invent their versions of that. So if the ion trap equivalent and neutral atoms, we can skip all that phase.

That also ties in nicely with this big point here: Manufacturable using silicon processes. This is another slight pet peeve. There's a lot of great companies out there, but everyone says they're CMOS compatible or are manufacturable using silicon processes. Now it's not a lie, in principle they can, but a lot of the time they don't want to do it.

So for instance, we work with UMC second largest foundry in the world, we work with Tower, many of them. The reason is because the telecommunication industry has been working with these foundries for many decades now. And so what we can do is we can call them up which we've done this and say "look, you guys are using this particular line, this particular material, this particular approach, and process. We don't need you to change anything." We can use the same everything of the things I just mentioned there and we can use that, you can take our chip designs and not have to change anything about your process.

Now that might seem like 'okay,' but they're very, very, very, very finicky about anyone using their lines, even a speck of dust can throw it off, let alone saying like an ion trap or superconducting company, 'hey, we need you to make this esoteric material now in high volume.' It's not impossible, but it's very, very hard for them to do that. One example is in Tower, we've already been working with them for a few years now because of this, the compatibility aspect of things.

This is really important to know even though everyone else says they are CMOS-compatible, again do your own work I'd suggest to sort of look into that. We can actually work with these high volume manufacturers, like Applied Materials. 300 mil if you hear that phrase that just means essentially the most advanced tools, and that's a lot of our lines, not all of them, we also work at 200. But the key point is that that's not a barrier, and so others will probably have to build their own foundries. We saw IonQ doing great work, but they had to buy their own foundry, Skywater, so we can avoid the extra costs associated with that.

A little bit more about the other main other approaches here, I've already talked about a lot of this, but you know I'll just make a point that we think there'll be a few winners. We often get asked is it one winner takes all? We think there'll be a few winners. Obviously, we think we will be one but there's many smart approaches and very smart people. So we don't want to be sort of arrogant and think we're the only ones I think there's options for either all photonic based approaches or even some of these modalities. But they do have challenges to be fair and as I mentioned significant cooling and networking requirements, slower gate speeds, networking again.

Application specific for annealing. We saw D-wave I think made a great choice getting Quantum Circuits Inc so they can now be part of the superconducting one in that case as well. And so as mentioned we have limited cooling, we have some but it's very limited. Networking is being solved. Gate speeds they're at telecom now. Again to be fair, there are certain other aspects that need to be sped up at the quantum computer. But overall it's still the fastest and we can get there but you don't want a ceiling that says you can never get past a certain speed and telecom can operate gigahertz, so that's really promising for us particularly our future as well. We're scalable through networking and the modularity aspect and we're working on universal applications.

Okay, some more about our hardware. I always love presenting this slide really showing off how awesome our team is. We've had four big announcements to do with hardware. We have a great track record, often it's hard for investors to know because sometimes I look at everyone's decks and we're all saying the same stuff, and so you have to dig a bit a little bit deeper. And what we can say is that these four results were all published in Nature. You know, as everyone knows one of the best if not the best journals in the world for science. Peer reviewed by others, not by us, and so it really validates the approach that we're doing

Over the last few years leading up to two big ones in just last 12 months. We've demonstrated the X-Series this was the first photonic device available commercially on the cloud. Borealis, the first I didn't mention this before it was the third time boring quantum supremacy was demonstrated. But it was the first time anywhere in the world that it was available online for customers. So not even Google or China put it online. So we were the first and what that meant is we had it on the Xanadu cloud for customers. But also we had it on AWS for a year as well, so that their customers could use it. And so, no one had done that before and that's a pain because you want to make sure that at every instant in time you can actually prove quantum supremacy. You have to be very particular about that and the team was.

Aurora that's the modular network computer. I mentioned and then recently maybe six months ago we had the world's first error resistant photonic qubit as well. I mentioned at the start the vision is hundreds of server racks network together, and the two big challenges are networking and errors. We've solved networking, no one else has and the other one is the errors and that really fit into the second bucket. Think of that as performance improvements error reduction error correction, and we made our chips more error resistant which is obviously a good thing. It fits into the second bucket. So yes, all of our hardware results have been validated as mentioned. Now this Aurora computer you see some pictures of it around the place of the four server racks. It looks pretty cool. You're welcome to come and see it if you're ever in Toronto. It's four server racks that wouldn't look out of place in any data center, roughly seven foot high. The key point there was the networkability.

We were quite worried at the start, so let's say you have to go up to 200 server racks, whatever it is, hundreds of server racks. Loss is the biggest challenge we often get asked about, I'll talk more about that soon. The challenge there is we thought, well if you have to connect them all because all-to-all connectivity is key, how is loss going to behave when you connect the first one to the 200th one for instance because you're just adding more line and more loss. The team was able to be very ingenious about it and set up four server racks. So the structure was you only care about the server rack that's next door to you, so this far away, and that applies if you have N server racks or 100 or 200 whatever N is that it doesn't scale in that case exponentially, just linear. So that was one of the big solutions by the team. It's modular in the sense you've got individual server racks, it's scalable meaning we can go up to N hundreds of these server racks and network as mentioned. It essentially got the same fiber optics you're computing in using the same fiber optics to connect them as well.

We compute without cryogenics or laser cooling, so computes a keyword there.

Error resistance was mentioned before and also QML, so quantum machine learning. We often get asked about that. The take-home is despite what you may hear there's really nothing in the next couple of years for QML, to be fully transparent. But that's okay because quantum is already offering so much for us. Having said that, theoretically, we're the leaders I would say you can see one of our big approaches here was efficient training models where it simulate up to a thousand qubits and many hundreds of parameters as well. So we're headed there. There's a lot to be excited about independent of quantum machine learning, but it's still a nut to be cracked and I would say long term we know it's going to change the world quantum machine learning. But it really for us and others will need a far bigger quantum computer than what we're promising and others are promising by the end of this decade.

This goes back to the error correction the second bucket I mentioned before. Error correction for us and others is really you know for us, it's the final one. Others have also the networking to be concerned about, but that's really why we don't have large-scale quantum computers today. If you scale it up today with what we have, the errors are too large for it to correct even with error correction codes. So solving error correction can be thought of as a prerequisite to having hundreds of quantum server racks networked together.

The Aurora solution, we actually demonstrated, think of Aurora as the four server racks but also think of it as having everything you need to have this quantum data center, it has all the parts and the components. You don't need anything else, you have everything there. What you don't have is the performance. For us, it's loss, so we've got everything there with four server racks. We now just need to improve the performance, so we're very laser focused on what we need to achieve. And we've also demonstrated real-time error correction, detection and correction as well, so that's another example of all the parts are there. Loss-resistant qubits we mentioned, published in Nature, and we also have one of the lowest if not the lowest overhead requirements of physical qubits to logical qubits which I touched on before.

Our roadmap, very high level. I just want to get ahead of any questions both in this revenue questions and loss. We are restricted by what we can say at this point in time due to SEC regulations on forward-looking statements, but we do want to say something. And so these are the big milestones here: scalable and network quantum computer that was solved last year. That took over a year to solve and the team achieved that, published in Nature. And the roadmap can be thought of by 2029, 2030 is two major areas. One is continuing to improve the component performance. Loss is the big thing we'll talk about. But also building and completing the data center. So it was three things, it was networking, component improvements, and then data center build out. We've solved the first one, we got that other two left.

There's overlapping, it looks like they're discrete events but there's a lot of overlap there naturally as you're building stuff. The next big thing to look out for and we'll talk more about these in detail over this year, the qubit factory is the big thing. So we've got qubits now, they need to be better performance, and there need to be more of them. And so that's really what we're targeting now. Fault tolerance is the final thing, really leads up to the scaling up of the data center there. Remember the data center is hundreds of server racks networked together.

Okay, we often get criticized, and I think fairly about ‘well photonics' biggest challenge is loss.’ That's true, so we wanted to kind of get ahead of that and really this is a slide that hasn't been seen publicly, I believe, before, so really excited to talk more about this and get ahead of any questions about this because it is a good critique in question. Years ago, it was a wiring science. Let me just sort of set the stage: it goes back to 2021; it goes up to the present. So, it goes over a five- or six-year time span here. Millions and millions of photons make up a laser beam, they get stripped away or attenuated. So, photons get absorbed or scattered as you go further and further away and loss decays exponentially.

So that's the setting. Now, we're not even talking now about hundreds of meters or a kilometer away. On chips the size of our thumbnails, there are some chips and wafers outside if you want to look at, they're quite fun to see. The chips are normally say around a thumbnail, loss even plays a role not on the scale of kilometers, but on millimeter sort of scale and centimeter scale. So that's kind of how it works, and honestly, everyone has an issue with coherence. We often hear about coherence time. It just means how long is this thing staying quantum for. If it doesn't stay too long, it becomes classical and useless for us to do quantum computing. Depending on how you build your computer everyone has something that causes decoherence or a loss of quantumness, and therefore the speed ups. So that's the setting that applies to everyone and everyone has their own version of loss, ours just happens to be loss. It's what causes errors.

The way we deal with it and have been successful is by having better error correction codes some from a theory point of view, and then also working with foundries to make these wafers smoother. If you have roughness, the photons can be absorbed or scattered. They don't make it from start to finish basically. So, working with foundries and one of the reasons why we're going public and raising capital is to do more and more chip runs as well. Again a uniqueness that only photonics really shares in the industry, the ability to work with these large-scale foundries. So we often get asked about what is our biggest challenge? Loss. That's what loss is what I just mentioned and how we've been going.

So there are two main plots here. There are two just because you can think of the quantum computer as two main paths where the light can travel, just roughly speaking. So you've got lasers and it goes through a whole bunch of stuff, there are actually two ways it can go and then it recombines at the end.

So we're plotting two paths here and we have a bunch of optical elements wherever light travels is you're going to have losses, there are beam splitters, phase shifters, fiber optics, the light goes through, you're going to have loss at each of these things. So what we've done is we've brought them together and looked at on average, all the different parts, how they've performed over the last five or so years.

The trend you want to see, loss reduction goes down, you want to see these things going down. And so that's the first thing to notice. The other thing to notice is at some points they've gone up to 200 times in orders of magnitude loss reduction has been happening. So not only is it going down, but it's going down very fast. What we need to get to and this is an abstract, the math is really what's behind it to get to this line here. Technically it's one. It's not zero. It's just above zero. So we need to hit one and we can now see how close we're getting now. We're getting very, very close to getting to that line, and what that line means fault tolerance and error correction has been solved.

Now the most amazing thing, we often get taught in the media and hear about error rates. The really cool thing about our approach, is that once we get these four server racks performing or at threshold and below threshold, the way we reduce the errors even more is just by adding more and more server racks. That's the kicker. And that's really the best thing about photonics.

Anyways, I'm sure there'll be questions afterwards, but we wanted to show this slide and all the great work that the team has done. It does get harder as you get lower. You can make a lot of gains at the start - I think that’s intuitive. But the way we solve that, again theoretical progress looking at past results. We're very confident getting there and we've got it laid out where we need to get and fabrication chip runs is a big part of that.

Okay, I'm going to hand it over, I believe the next slide to Raf, our COO. Before I do that, this is really talking more about the future. We got to be careful, as mentioned. The top part is everything related to past achievements on hardware, anticipated for hardware, and we have the other one for software below.

I'll briefly talk about software, but Raf's going to go into more detail, that's our PennyLane. But from the top part, you know, I think we've already mentioned quite a lot. First chip fabricated, I don't think I explicitly said that before. That's in 2017. We mentioned these ones here. So if you look at 2026 to 2029, remember that the two big areas which can be broken down. We've broken them down internally, but broken down into component improvement, that's what we're obsessed about and then starting the data center build out. And the component improvement comes back to loss reduction that I mentioned.

And so there's a lot of stuff that we want to do. If you look at the end 2029-2030, we're aiming to have physical qubits on the order of a hundred thousand physical qubits, more importantly logical qubits. It's up to 500 logical qubits. That's really the key thing there, is how many logical or good qubits do you have?

That's also validated with the feedback we got from the DARPA program, we're one of only 11 companies to make it to stage B, is they really love our photonic-based approach, but just as importantly, the algorithms that we came up with that required less than 500 logical qubits. That was really key for us getting to the next stage and so that's when the world will change once you get up to there. And that's why we've targeted and we believe that we'll get there.

Clock rates, they'll be the logical clock rates. They'll be some of the fastest if not the fastest in the industry there. And before that, as I mentioned, we've had error correction breakthroughs of some great theoretical papers. We had the error resistant on chip one that I mentioned before and boosting component performance really summarizes the next couple of years what it's about. I think Raf will talk more about these in the next few slides, but as an overview, PennyLane was released in 2018. Before that we had the world's first photonic SDK as well. It's called Strawberry Fields. Legal has recommended I do not give any indication it was named after a Beatles' song, they were very clear about that. I'm not allowed to even suggest it. Okay?

First quantum chemistry features 2029, that's really what we're going after there. We're going after the quantum chemistry material design, not just us, everyone in the industry. That's really where the lowest number of logical qubits where you can really change the world and solve important things.

Rolls-Royce has been a great partner there. We've got CUDA quantum compiler support as well. MVP, and we look forward say from now to 2029 2030 we're aiming for MVP of quantum error correction. We need to do PennyLane at scale now. We've got PennyLane you can download to your computer and log in online. Now you need to do it at the data center scale, so that's some of the exciting things we're working on the software.

Anyways, I hope you've enjoyed that side of things, and I'm going to hand it over to it to Raf now and thanks Raf.

Rafal Janik: Thank you, Christian. So we've definitely covered our hardware, talked about the scalability modularity and how are we going to make that hardware actually useful and available to people everywhere but there's a whole other side to that story which is the software. None of this is going to be useful if you can't program, if you can't develop applications today.

And that's really where our product strategy and specifically with our full stack software platform PennyLane comes in. So PennyLane, like Christian mentioned is that operating system. It's the leading framework for programming quantum computers out there. But it's much more than that. With Lightning, it is actually one of the most advanced simulators for prototyping today's workloads. It can run from anything on your laptop to the largest supercomputers in the world and in fact we've run some of the largest simulations on the Department of Energy's Perlmutter Supercomputer, we're continuing to do great work with AMD on the recent supercomputers deployed by Oakridge National Lab to continue to advance that.

Similarly, when you write these programs. you do need to compile them, optimize them for the specific hardware that you're going to run. And this is actually our Catalyst Framework. Catalyst is a compiler that goes from the user layer where we're going to develop the program all the way down to the hardware. It makes optimizations and accelerates programs by orders of magnitude versus which you would be able to do if you just naively try to run your program. Around PennyLane, we've built out a huge ecosystem of not only hardware partners, so PennyLane doesn't only work on our quantum computer. It works on all publicly-available modalities out there, but we also build a great ecosystem of other software packages that can plug in directly to this framework.

So I mentioned that PennyLane that really does enable people to integrate quantum circuits with classical machine learning. This has been another really big pivotal, I would say key factor of PennyLane development. It was originally developed with the mind that you want to combine classical workloads with quantum workloads, so you want to be able to integrate with the Tensor Flows of the world and the best classical machine learning frameworks out there.

It also really does aim to provide a flexible prototyping environment. So this is something we work with top researchers. Whether it be in leading enterprises like Lockheed Martin, Rolls-Royce, whether they be in the Department of Energy, whether they be at universities, to ensure that the current development of quantum applications is fully supported. I already mentioned that it's fully modality agnostic. We work with many of our hardware competitors as partners to continue developing great support for their hardware, and we really see this as a funnel back to our platform as the hardware begins to mature and more.

You can think of the approach that NVIDIA took with CUDA and locking in the ecosystem to their platform and their software to drive people back to their hardware. We're taking a much more open approach, but we are getting everybody ready to be fully ready to take advantage of a quantum computer when it's online. We don't want to be waiting for customers to develop applications or to get trained up on this hardware. And also I want to identify that it's one of the most downloaded quantum frameworks out there. We have over 200,000 downloads in the 30-day trailing average. We have already over 35,000 active users visiting PennyLane.AI to get those additional resources.

I talked a little bit about the fact that PennyLane is not tied to a single architecture it integrates across neutral atom, trapped ion, superconducting platforms really positions us at the center of the broader quantum ecosystem. The cross-modality integration does provide great diversification for us as different hardware approaches progress at different speeds, PennyLane benefits from the ecosystem growth overall regardless of which modality will get to that threshold moment first.

Because we integrate also with all the major cloud providers and hardware providers, PennyLane has now become a core way of how quantum applications are actually built across the industry.

Strategically, this really does position us as both a hardware innovator, but more or equally as importantly a platform layer supporting the broader market, providing an opportunity and ecosystem where we can leverage that as the industry begins to mature.

A little bit of our thinking about how to tackle commercialization of this very rapidly-changing technology. We really kind of think about this in four different pillars. Access to our compute whether it be through cloud or actual hardware sales. The development of applications in our quantum software and then actually all the IP that we've developed along the way. On the hardware side really what we're very conscious of is that Quantum computing will have an outsized impact on pretty much every industry out there. Like Christian mentioned, we're not talking about doing something 10% better, we're talking about solving problems that would take 7 million years in two minutes.

It's really difficult to then go to a customer and say you know you have this multi-billion dollar problem that we can run in two minutes, give us $1 billion per minute, and we'll happily run it for you. So we're already engaged in JDAs with many partners like Volkswagen, Rolls-Royce, where we're co-developing applications and more importantly already discussing co-owning the output that comes out of that. So if it's a battery material problem, we're interested in capturing that value directly.

This won't work for all industries. We fully understand that for industries like biomaterials, pharma, this is a well-born path, but in other industries like financial services, this becomes a little bit more difficult. So there we will provide the classical access to our hardware through the cloud platform.

Already we have a leadership position in that. Christian mentioned our integration with AWS. In the past, we know how to send this hardware up online in a robust redundant way, and with PennyLane, we know how to provide broad access to the entire ecosystem. We also know that there are going to be partners that will be reluctant to send their data to us. We work very openly with the defense and intelligence community. They're going to be major drivers of this industry on a go-forward basis. We know they will want to deploy our hardware directly in their data centers.

Photonics is uniquely positioned in being able to do that. If you came to our facility in Toronto, you would see that these server racks are living on a 29th floor of an office tower. It requires no special citing. They're resistant to vibration, to temperature shifts. Basically if you can put a regular rack into a facility, you will be able to put one of our quantum computers into that facility as well.

On the quantum software side, we already are working with many large multinationals across many industries. You know, I think Christian mentioned the example of Lockheed Martin who about five years ago, reached out to us as they were already engaging with PennyLane long before they were ready to engage in a commercial project. And we're going to continue supporting that funnel. But importantly this year as well, we've gotten signals that there's a real desire for an enterprise platform for PennyLane. Something that is more robust, that can accelerate development of applications, and it can accelerate workforce development within these organizations.

And we're currently engaging with a limited number of partners on running some experiments whether this is a direction that we're going to go in.

Similarly, we are sitting on a very large amount of photonic IP. We are building a quantum computer, but along the way we have to design optical components, processes for packaging, heterogeneous integration, and manufacturing processes that have applicability not just in quantum compute, but in quantum sensing, and quantum communication, but also in traditional datacom, and telecom.

And there's many commercialization opportunities there. One that I'd like to highlight is that we have record-breaking packaging capabilities already in our facility in Toronto. And we've had a number of folks from the classical world, so datacom, telecom type providers, that are already experimenting with our packaging processes.

This is great. It gets our team actually a lot more experience with higher volumes and greater workloads and of course is able to drive some earlier revenue on that.

All of these, I'm going to say, we take with a very serious look to whether they're advancing our direction towards utility-scale quantum computing. When it comes to revenue, what we're not interested in is non-recurrent engineering, that is not aligned with that ultimate goal. The pot at the end of the rainbow is so much larger than anything along the way that we want to make sure that we're not distracting ourselves. So we only pick up projects in any one of these verticals when they're directly aligned with our technical roadmap.

To highlight maybe a handful of those on the algorithm development side, I want to do highlight these few select partners in Volkswagen, Mitsubishi Chemical, and Rolls-Royce. These have been long-term partners.

Some of them are investors that have really developed teams that are looking at how quantum will transform their industries. We've been working closely with our team to develop applications that are in fact some of the leading applications, even as identified by the DARPA QBI program.

With Volkswagen, we've been looking at lithium-access batteries and actually in simulation methods to accelerate their development. We took an application that Volkswagen realistically thought would be 15 to 20 years out, and by reducing the number of required qubits by a factor of two and the number of gates required by a factor of 10,000, we were able to bring this to something that will be able to run our utility-scale quantum computer that we're targeting and beginning to deploy in 2029.

With Mitsubishi Chemical, a really exciting application. Mitsubishi Chemical is one of the leaders in materials for the semiconductor industry, and they're developing EUV, Extreme EUV.

This is the latest and greatest ASML technology for building the best chips in the world. But there's a real limit on the photoresist, and they're developing actively right now better and better photoresist to make better chips. The issue is that you can't actually simulate this chemistry and the like-matter interaction with a classical computer. It's just computationally prohibitive, even with the largest supercomputers in the world.

We have now developed a method that can actually take that problem and run on a quantum computer that will be here within the end of the decade. Exciting for us as well. It's great to have a quantum computer that could potentially impact the development of future quantum computers as well.

And with Rolls-Royce, this is the aerospace company, not the auto company. We've been developing approaches to computational fluid dynamics simulations, and we were able to take the latest and greatest methods and actually improve them by a factor of 10,000.

This is real value we're generating today. We're capturing IP. Many of these approaches have filed patents with our partners on. We're publishing these papers. We're putting these applications directly into the PennyLane software stack to make them more broadly available.

The partners are not limited to application partners. Our ecosystem is pretty deep and validates our approach quite well. On the manufacturing side, we work with Tier 1 semiconductors and materials partners that are really aligned with our roadmap to not just building a quantum computer, but making sure that everything that we build can be done on an industrial scale.

Across academia, and there's a few partners there, we have active engagements with the leading universities in the world, supporting talent development and some of our frontier research projects. I believe there's five listed here. Last time I checked, we are engaged with 143 universities worldwide, where 230 courses are being taught using PennyLane. Our software stack is directly embedded in the workforce development across many countries in the world.

Then really to highlight maybe some of the research partners, Oakridge National Lab, DARPA, some of the early adopters of our technology, both on the photonic side, but also on the application development and compute side.

Then maybe just to reiterate one thing that Christian said, which is we're really standing on the shoulders of giants when it comes to manufacturing. From day one, we knew that whatever we were going to build had to be built at scale. If you step outside into the hallway, you'll see one of our wafers is a 300-millimeter wafer. This is the highest volume, largest wafer that you can get for any semiconductor manufacturing. We've shown these steady technical progress across multiple hardware generations, but at that high scale volume manufacturing type of process way.

One of the advantages is really this alignment with existing silicon photonics or silicon fabrication processes. We're not building a bespoke manufacturing system. We don't need to set up new foundries to support our types of materials. Each one of these materials, each one of these processes is at home at the largest labs around the world.

I'd like to highlight maybe a couple of partnerships. One of them is Corning. This is a really exciting one for me. I mentioned that we have one of the leading processes for packaging optical chips. This may seem like a very boring problem of attaching fiber optic cables to a photonic chip, but it actually represents a really challenging technical piece for us where we want to reduce the photon loss.

In the telecom, datacom world, historically, if you got 50% of the light into the chip or into the fiber, you were happy. We need over 98.5% going into the fiber. We're able to achieve that now in our lab on tens of fibers to tens of chips. Of course, industrializing that now to millions of fibers to millions of chips is work we're doing with partners like Corning. We're developing custom fiber bundles for us. For them, the excitement is that this development directly impacts datacom and telecom as well.

By aligning this roadmap with existing silicon and silicon photonic supply chain, we really believe that we're able to reduce the execution risk on a go-forward basis. This allows us to move to high volume production much more easily without having the need for these multibillion dollar investments that many of our competitors will need.

With that, I'll actually pass it off to Michael.

I'm going to say historically, we've been incredibly capital efficient. We've been great stewards of the money that we have raised. As we transition to public markets, we just need to step that operating rigor up. We brought in Michael who's got deep experience as a CFO across multiple hardware, both startup and large scale enterprises. Michael?

Michael Trzupek: All right. You know when you see the CFO, we're near the end of the prepared remarks. The end is close.

I want to thank everyone. I can see now that I'm up here, we have an overflowing room of analysts. Thank you for being here. We also haven't mentioned that there is hundreds of people also online, so thank you to all of you who have joined as well. We really appreciate the interest.

As many of you know, because I've met many of you already, I've been here less than two months, so I'm relatively new. I'm excited about the company. I had a very different but very similar circumstance to you. You're sitting here trying to understand the company. You're trying to decide whether or not to invest, make the recommendation to invest. And I had to make a personal decision whether or not to invest my time and my career here.

And I will tell you what was compelling about Xanadu, aside from Christian, was a few things. One was the fact that they are peer-reviewed in Nature and have developed and solved one of the big problems, which is networking the quantum computers. And Jonathan, God bless him and his energy, took me on a tour on one of my many visits. And as Christian said, I got to see it working upstairs. It looks like almost any data center I've been in, except that it's a quantum computer. And that was pretty compelling because people outside the company have said they're really doing this.

The second thing was as Christian and Raf spent a lot of time talking to me about the advantages that come with quantum computing. And those advantages, as you've heard today, you can take your own view on it, but I found it to be very compelling. And a big part of why I think that they're doing very interesting things here.

The third thing was that the PennyLane software was something that as I kicked the tires and talked to my network, everyone knew about PennyLane. Including my brother, who's like, hey, I've been working on that thing for years. It is a big part of the stack. It's an important part of the stack. And it's an important part of what makes this company different.

And the last thing is that Christian will tell you and will continue to tell you, this is a team that's executed, continues to execute. And as all know, execution is everything. And I believe by the time that I got through the process, that this is where I decided I was going to invest my personal time. Because I believed in the company.

My role now I'm here is to help bring quantum computers to everybody. I'm bought into the mission. My job very specifically is the capital allocation and helping us make the right choices. As Raf said, even before I got here, they were very focused on that. But now that I'm here and this transaction is going to take place, we're about to really accelerate.

So as I go to the next slide, I guess I control them. Used to other people doing that. Thank you. Sorry.

So I think -- how do I get ahead? You're behind here. Keep going. There you go.

Okay. So I wanted to go through the transactions. The valuation of this transaction is $3 billion. That is going to raise $500 million as Christian talked about. But let's break that down a little bit.

So first on the capital raise side, there's coming in two pieces. And we've covered this, but I wanted to reemphasize this. So there's the $275 million coming from the PIPE. And then $225 million roughly of cash coming from the trust. On the PIPE, this is happening upon the announcement of the merger. We concurrently entered into subscription agreements with investors who have committed to invest in the PIPE in Xanadu upon closing the transaction. It was, as Christian said, the largest pipe that's been raised in the quantum space since 2022, reflecting the excitement of Xanadu. And I think it's probably the third time you're going to hear it here today, 90% of the PIPE is new money. It includes AMD, BMO Global Assets Management, CIBC Asset Management, MMCAP ventures, and Planet First to name a few. The size of the capital raise as well as the fact that it came from new money versus existing cap table truly validates the business and financial merits of this transaction in our view as it relates to valuation, business model, technological capabilities, and Xanadu as a whole.

So next in valuation, we believe the $3 billion valuation level is an attractive entry point based on a number of factors. First, our last private valuation was a Series C in 2022. And in that transaction, we were valued at $1 billion.

We believe a 3X step up over the course of the past four years is a fair reflection of the technological and commercial progress that has been made since the initial unicorn status. Importantly, I would also reiterate, because it's been said a few times, that all existing Xanadu shareholders have also agreed to a six-month lockup on their shares.

Second, as I mentioned, this transaction is validated by one of the largest PIPEs and by new money investors rather than existing shareholders. This is important. As you know, the PIPE capital we view as a validation capital for the transaction overall.

And then thirdly, relative to our publicly-traded peers, we believe this represents an appropriate IPO discount versus the opportunity set ahead for Xanadu. So I realize in my desire to get to this slide, I did skip, and that's why you're trying to catch me. Let's go back, because it's important to go through the previous slide. So go back one over here, on 39. Thank you. So the -- oh, I guess I got it. Thank you.

So the use of capital is well laid out in our documents. But I want to go through them. The first is we're going to fund R&D and engineering, and this is going to enable us to do a couple things. One is that we're going to continue to bring in the top minds in quantum computing. But it's also going to get us additional runs with wafers. And as Christian and Raf have both talked about, the important thing here is to get through those cycles so that we can optimize it to reduce the error. And the funds is going to -- fundamentally, that is the most important thing that we're doing.

The second is that we're going to expand the manufacturing readiness and supply chain capacity. What that means is we're already looking at additional locations, because we're running out of space. We're in the basement of the building with our packaging line. That packaging line -- I worked at Intel for 10 years. That packaging line looks like a packaging line I've been at, except on a much smaller scale, of course. But that packaging line is not going to scale with where Christian is taking this company. So part of what we're doing here is to enable that.

This is also going to allow us to invest in the packaging -- I talked about the integration, the test and measure capabilities -- at a scale that we haven't been able to do, because we now have the additional resources to make that happen.

And then finally, the working capital that we have here is going to enable us not only to address our general corporate needs as a public company, but it's going to enable us to do things on a faster scale.

So when I talk to Christian about this, what Christian needs more than anything at this point is the ability to have engineers do their job to optimize on materials that we're piggybacking off the telecommunications industry and allow us to get through more cycles. And so what we're doing here is getting the ability to bring engineers in to do that, and we're getting the ability to get more wafers in to make that happen.

So I realize I kind of did those slides back and forth. But with that, I'm going to turn it over for one last slide from Christian, and then we'll have a video. And I will say it is okay. I heard one applause there after the first video. It is okay to applaud. It is not an implied consent, but you can applaud after the video.

So Christian?

Christian Weedbrook: Great. Thank you, Michael. So just the key takeaways, reiterate what we've been talking about this morning, and thank you again for your attention and listening to our story. The big one is we're expected to be the first pure play publicly listed photonic quantum computing company, as mentioned.

Deep technical leadership, that's really been exemplified by all of our past publications in peer reviewed journal and the ability to raise capital from very smart investors in the private markets.

Category-leading technical position, that's the Aurora quantum computer, world's first modular networked scalable quantum computer.

PennyLane, it's the other big one along with photonics. We created PennyLane. It's agnostic, meaning it runs on our hardware but everyone else's. Developers really love it, and we're seeing that over the years and will continue. We saw the downloads. It's one indicator.

We're targeting our large-scale quantum computer by 2029, 2030, and that's when real customer traction will happen. As mentioned, the PIPE was the largest since 2022 and 90% of new investors.

Anyways, we'll leave it there. I think we have a closing video, and I'll show you that, and we'll go from there. Thank you.

(Start of Video Presentation)

Christian Weedbrook: You've heard this story before with AI. What began as research became infrastructure. What once felt experimental became essential. Quantum computing is reaching that same point. Xanadu is set to become the first photonic pure-play quantum computing company to go public.

Unidentified Speaker: What is quantum computing, and why should everyone care about it?

Unidentified Speaker: Quantum computing is built on very different kinds of computing. Most quantum computers are built with electronic qubits. Xanadu builds with photons. Photons move at the speed of light, and we have demonstrated that they can scale without fragile infrastructures.

Unidentified Speaker: Today, Xanadu is the only company to demonstrate that this works. Using our Aurora system, Xanadu demonstrated the first modular, scalable, and networked quantum computer, not just announced, but peer-reviewed and published in Nature.

Unidentified Speaker: Aurora also demonstrated real-time error correction decoding algorithms with photonics for the first time. Others are trying. We believe Xanadu will succeed, but hardware alone is not enough.

Unidentified Speaker: That's why Xanadu builds PennyLane, a software platform that lets developers work in Python and connect quantum directly with AI and classical systems. Many of the world's leading developers already use it. This is how algorithms go from test cases to real-world applications. That's why partners and customers are already lining up Volkswagen, Rolls-Royce, Toyota, Mitsubishi Chemical.

Christian Weedbrook: Xanadu is building the technology and the ecosystem to help turn research into future systems that can solve the world's toughest problems. Not in theory, but step by step in the real world. Healthcare, energy, supply chains. Different problems, similar underlying complexity, and a need for a new kind of computing to tackle it.

That's the future Xanadu is building towards.

(End of Video Presentation)

QUESTIONS AND ANSWERS

Unidentified Speaker^ Here we go. Hey there.

Unidentified Participant^ Thanks for doing this, guys. Could you compare and contrast your approach to PsiQuantum? They've gotten a very high valuation. I'm just curious what, you know, just give us some sense as to where they are, maybe on the approach towards one on the noise or whatever it was, the loss, signal loss?

Christian Weedbrook: Yes, for sure. So if people, folks don't know, you know, as mentioned, you build a quantum computer out of photons or electrons. Not all photonic-based approaches are created equal. So Xanadu, as mentioned, we're photonic-based, and so is PsiQuantum. Historically, it's always been hard to know their achievements. They've taken a different approach of being predominantly stealth, but also, to be fair, raising a lot of money.

There is big differences, though, between us and PsiQuantum. The big one, one of the big ones is the fact that they have cryogenics nearly everywhere in their computer. And so they have a high premium on focusing on building out cryogenics for their computer. Just a reminder, for us once our qubits are created, the qubits, the gates, and the measurements, so the output, are all done at room temperature. For them, all three are at cold temperatures.

It also means, based on that, that they have certain types of materials they need to essentially take out of the lab and make industrial. So for us, we don't have to operate at those cold temperatures, so we can use off-the-shelf and sort of pre-existing foundry materials. They actually have to create what's known as barium titanate and make it for high-volume manufacturing. So they have to spend hundreds of millions of dollars in this, again, because they have to operate at very cold temperatures. They have to operate this fairly new material and spend hundreds of millions of dollars in buying their own tools and, I think, populating other foundries as well. So these are two very big issues for us. It ultimately leads to fast iteration times and lower cost.

The other one is we took a strategy from very early on, 2017, I think it was 2018, of PennyLane. And so they've only just started releasing some of their software now. We have a head start of many, many years, and we've built a great ecosystem in over 150 universities, 30 countries, and so forth. It's hard to build that -- even if you raise $1 billion -- to really get that excitement and developers using it, so we've got a long head start on that as well.

Craig Ellis: Craig Ellis, B. Riley Securities. Thanks for a very informative presentation, guys. Christian, you said there would be questions on your loss challenge, this slide, so I'll kick that off. The slide showed about a 10X improvement in loss over the last five or six years. The question is, as we look forward in driving loss even much lower, what are the things that need to be done versus what's proven out, and how much line of sight do you have on those things?

Christian Weedbrook: So what we have is a -- it's very easy to put these things together. We have a spreadsheet that has essentially a top 17 elements or optical elements; so beam splitters, phase shifters, fiber optics, and it's about 17 of them. We know where we are today, and it's more than -- in some cases, up to 200 times reduction, not just 10 in some of them as well. And we know where we have been and the improvements that we've made, and we also know where we are today. It's measured, as you know, in decibels, dB, and we know where we need to get up until 2029. So we have all this listed.

We look at past performance and improvements that we've made, particularly with having one of the biggest improvements has come by having our own folks working in the foundries, it's been huge for us. Because even though a lot of it we don't have to tell them to use different materials and different processes and so forth, we do apply our expertise in loss reduction. Historically, they've never cared about loss reduction because you just boost the power essentially. Now loss reduction is very key for quantum, but also traditional data centers are caring more about that too, just for energy constraints. So they're on board with that.

But the way we'll solve the loss and get there is through two things; spending more money on chip fabrication runs and getting involved with the foundries even more, and looking at past performances. We know we can get to that bottom line, which is normalized to one.

The other big thing is coming from a different direction. So improving the hardware, rather than a loss reduction, which is kind of how I presented it, it's more of a loss gap reduction. So things are not completely fixed. You can improve the performance from a physical substrate, meaning from the wafers, but also you can say the theory team, which they've done over the last few years, we asked you to get this amount of loss. That's what we thought the best, but now they're saying we can tolerate more from a theory. The theory keeps getting better and better. So now you're reducing it from both sides.

So we expect better theory results over the coming years as well, along with hardware development improvements, which all comes together to hitting that bottom line of one. And you need to go below one. That one is threshold, and to go below it. And that's really why we don't have quantum data centers today. We've mapped it out very carefully, and by 2029 we'll have the loss to where we need to be.

Craig Ellis: Really helpful. I'll mix it up a little, Rafal, this one's for you. You showed a slide that really depicted four ways to generate revenue, software systems, cloud, packaging, licensing. And I know we're not giving forward-looking financial statements, guys. But can you talk a little bit more about the path from here to when you can scale that up monetarily? What needs to be done? How close are we today? Where will we be in 2029 across those four vectors? What's bigger, what's smaller, et cetera? Thanks.

Rafal Janik: Yes, I'm going to say fundamentally this is all gated by the utility-scale quantum computer. Any revenue along the way, it's completely outsized by the promise of quantum computing. If you can solve problems that would have taken 7 million years in two minutes, we've all seen the different analyst studies out there about what that addressable market will be. So that is the push.

What I think the story is more for us about is not revenue generation, but market validation. You need to know that the algorithms you're going to develop, the applications you're going to develop, customers care about. So our main reason why we engage right now with Volkswagen and Rolls-Royce is to make sure that we're solving the problems that industry will actually pay for in the future. We have a handful, a number of projects now that we've identified that are all $1 billion-plus value problems that our customers have that we've developed applications for that will run on that early utility-scale quantum computer.

Now, the really interesting piece is that along the way, we are developing a lot of pieces that can be monetized, and whether it be our photonics IT and the fact that people from the data-com, telecom, quantum-sensing world are interested in, I'll highlight. We have a DARPA program where we're subcontracted to RTX, where we're selling them our chips that we developed for our quantum computer, but they're packaging it up into a quantum-sensing solution.

So where it makes sense, where it either improves our manufacturing pipeline, whether it upskills our folks on the packaging side, whether it accelerates our development algorithms, we will definitely pick up these programs and we'll capture that near-term revenue. But right now, we believe we won't be chasing that NRE type of revenue that you see some quantum computing companies go after. And the reason is simple. Very often, we would pay more to get that talent back than the revenue that you end up getting for that type of engagement. So it just slows you down too much. We have a big mission ahead of us and we're really focused on that utility scale quantum computer.

Todd Coupland: Great. Todd Coupland from CIBC. Nice to see you. Thank you for the presentation. I had a question on capital required to get you to 2029, and if you could just rough that out and then give us an idea on what the big splits are; staff, boundary, data center, et cetera. Thanks a lot.

Christian Weedbrook: So we'll be following previous trends in terms of allocation. We'll be following previous trends over the last 10 years where roughly 70% to 75% of the money goes to hardware. That includes foundry fabrication runs, and we've broken it down in much more detail on that for the budget. That also includes hardware, hires as well. And overall, if you extract out that, hires take up half of the money in general and that will continue to be the trend as well. And then the other 25% we've broken up with PennyLane development along with the usual stuff you need for finance and accounting and so forth. And patents will be a big part of that.

In terms of how much it'll cost, the ultimate vision is this large-scale quantum computer, quantum data center. We anticipate that up to $1 billion will be needed to build that and so we're looking to raise, by going public, up to $500 million. And the rest of the money we're anticipating to come through a variety of possibilities, particularly the governments both in the Canadian and U.S. side of things. We can say that everyone knows we're into the DARPA QBI program which, if successful to the end, will generate over $300 million in the lifetime of it. Canada has also announced very recently their own Canadian version of QBI, the Canadian Quantum Champions program. And they have publicly stated that they're looking to invest more than what the U.S. government has done, and we've already received up to $23 million and they moved very quick on that and they said it's just the beginning there.

So along with those two pockets. And then the ability, only for makes sense for our shareholders, in the future and depending on the stock price that, like other quantum companies, we have the option to do ATM if more money is needed. Again, depending on our shareholders. I would say though that if we keep knocking out of the park in terms of milestones, as us, and to be fair anyone gets closer to this large-scale quantum computer, I would be surprised if money isn't easy to raise at that point because you're getting very, very close now to the ultimate vision of what us and others are aiming for.

Antoine Legault: Thank you again for a very insightful and informative presentation. Antoine Legault from Wedbush Securities. Just, Christian, you mentioned 500 logical qubits as representing a very important milestone and some -- some of your peers have set the goalpost at maybe 100 logical qubits or 200 logical qubits as being sort of the dawn of quantum advantage. You know, how do you think about these milestones and which one do you expect to be more meaningful or to represent like a watershed moment for the broader quantum industry?

Christian Weedbrook: I think ultimately it's all about customers. It's not even about quantum, even though the fun part for us is quantum. So it's really, there was a big demonstration, you know, we were one of the first three of quantum supremacy, and it made a lot of headlines. The fact that you're now, not a business problem but a math problem that you could, you know, would have taken millions of years. I think the next big thing would be that quantum supremacy demonstration but not for an esoteric math problem, but for a business problem. And so announcing that with an important partner I think will be a watershed moment.

We do say up to 500 logical qubits so to your point we're also aware of, you know, we've been the discoverer of algorithms that need around 100, 200, 300, so it could be, you know, up to 500. But that's one of the reasons the feedback we got by getting into how we got into DARPA stage. It was not only our technology photonic based approach but some of the really amazing algorithms. It was really why we got into the next interface B, is algorithms because DARPA defines it as what you can do with a couple of hundred logical qubits. So that was also vetted essentially by the U.S. government as well.

Kingsley Crane: Kingsley Crane from Canaccord. I really appreciate you doing this. I regrettably have a question on the intersection of quantum and AI.

Christian Weedbrook: I regrettably have to leave.

Kingsley Crane: So in the near term, I think some of the work -- I believe some of the work that you've done with Lockheed Martin is center out improving kernel computation so you can train models with far less data. It's particularly helpful with industries like defense and pharma. So I'm curious than the near-term opportunity there. And then just longer term, you mentioned that, you know, as we progress towards AGI and higher levels of intelligence we may need to bring in other types of data, so not just large language, but also simulating the physical world where classical computers just can't produce the data that quantum can. So I'm curious here your take on the near term and the long term opportunity.

Christian Weedbrook: Yes, near term I think we saw it, is really about creating I guess what -- what they call synthetic data that -- but more importantly synthetic data has to be useful or relevant. There's no use just having junk sort of data. And it really harkens back to our quantum supremacy demonstration with Borealis where it solved a problem that would have taken seven million years in two minutes. But more importantly if you look under the hood, what's happening there is you're creating data, i.e. the answer, that would have taken seven million years to create.

So what us and others are working on is how do you now -- we know we've got devices that can create data that would have, you know, taken millions of years to create. How do you create data now that's relevant for actually problems of use knowing that it would have taken millions of years to normally create. So it's definitely something we're working on and be actively looking on.

But one of the things that we're trying to do is within reason avoid the hype. It's hard to know how to define hype sometimes because we do have to put ourselves out there. But just to be fully transparent, that is one use case. But it's unclear in the industry despite what you may hear of the near-term importance of quantum machine learning. We're working very hard with Lockheed Martin. We are the leaders, I would confidently say on that. That's how PennyLane started. It was originally called Open QML in 2017 or so. So we're working very actively on that.

The bigger point though for me is AI is -- it's all the rage and very fun and it's awesome. It's important. But it's just solving important customer problems. And I kind of look at it as the next big thing is going to be quantum. And it's -- people will be asked -- you know, people in a few years' time that are in our place here will be asked what's your quantum strategy. I'm sure of that. And so we keep our eye on the prize knowing that quantum is just as good or better in certain ways than normal AI. And we have something really valuable to offer without resorting to too much of how do quantum and AI go together. They will, but it's unclear.

Another point perhaps to make is large language models, you know, in general have been really vital for us in our development of our large-scale quantum computer. Broadly speaking, in optimization tasks like chip optimization and things like that. We have an internal chatbot also called Jukebox. And you know, they're kind of laughable sometimes. But this one has been really important for our progress because you can type in tailored to Xanadu's data, and you can type in and ask questions on the latest papers all relative to photonic quantum computing and quantum computing at large, which again fits into this theme of using current AI to have the next big thing which is quantum.

And the AGI thing, I'm certain but could also be very, very wrong because I'm not an expert, that if AGI's goal is to really simulate nature, you can't do it with bits, with zeros and ones. You need something else. Now whether that's quantum, that's a good debate to have. But I think quantum inherently is both discrete and continuous. It has both integers and real numbers, which is more like what nature is. When computers first started, some of the first ones were analog, those before bits, and that took off. And so they were looking at missile trajectories and that, which is solving differential equations which is inherently analog. So I think AGI is not possible the way it's going now. You need something different, whether it's quantum or biological quantum -- biological computing or something. We think it's quantum, but you know, who knows really.

Ryan Choi: Hey guys thanks again for time. Ryan Choi from Bank of America. I wanted to sort of ask, you mentioned with, I think Volkswagen, your partnership, you guys also co-own the output and capture value there. Is that something you're doing with all of your partners, or is that one -- like more of a one-off instance where you have more of a, I guess skin in the game with them? And I have a follow up.

Rafal Janik: It's pretty varied between partners. But what I'll say very often there's a pretty clean delineation between the underlying algorithm versus the direct application to a specific use case. In any situation where our partners own IP, we do have universal irrevocable license in order to be able to use it with other partners or anything like that. So we're very conscious in being able to retain across the board. But our partners are very conscious that their main engagement right now is de-risking the massive disruption to their industry that quantum is bringing.

So they want to have the freedom to operate with IP for use cases that they're interested in, the software stack to actually be able to integrate their systems with the eventual quantum ecosystem, and then also the workforce to be able to tackle this. So in any one of our partnership, those three things are happening.

Christian Weedbrook: And we co-patent but we also individually patent. Once we learn stuff from our partners as well.

Rafal Janik: Yes. I'd say the vast majority of algos are independently owned by us. One of those partnerships is often the application of that to do something specific.

Ryan Choi: Got it. And for you Christian, you mentioned earlier you're also focusing on system sales to partners down the road. When you think about prioritizing cloud access to customers versus on-premise deployment any that you can share right now about how you prioritize? Either you want to provide cloud access more, or you want to also ramp up that part of on-prem sales? Thank you.

Christian Weedbrook: Yes, that part on how we make money as Raf was mentioning, you just mentioned that our own data centers are selling the server racks themselves. We can be very flexible with that. We don't have to decide. A partner will decide for us, and we can quite easily do one or the other. We do want to build out the world's first quantum data center in Toronto in Canada, and then throughout the world, but we're open depending on as Raf said, like data sovereignty and what the customer wants that's the key thing. So that's -- yes, that should be no issue there.

Suji Desilva: Hi guys Suji Desilva, Roth Capital. Thanks for the informative session. So I'm sticking on the modality comparisons. Supercomputing requires all the cryogenics but seems to have a faster clock speed. I'm wondering if there's a way to think about that trade-off, if you can get higher utilization out of a system with the faster speed versus the cost of the cryogenics, or if there's a pathway for you to improve your clock speed that's kind of closing the gap.

Christian Weedbrook: Yes, we -- I think it's okay at the moment because they do have faster clock speeds compared to neutral atoms and ion trapped, but still not faster than us. We're still at least 10 times faster than the superconducting approaches.

And inherently it's still -- in terms of your question about what we can learn it still fits into either photonics or electronics buckets. And you're going to be restricted by how fast the electrons go. And I think -- I think electrons move at a few percent of the speed of light, something like that. So automatically if you're working at photonics, and we're working at 1550, the telco wavelength, you're already moving at the speed of light. In fact, our biggest challenge is sometimes we need to slow it down, as well for certain parts of the computer which is a good problem to have. So yes, overall you know I think at least 10 times faster superconducting, as mentioned up to 1,000 times or more for the other approaches.

Sahej Singh: Hey guys, Sahej from Stifel. Good stuff. I mean, great presentation. So congrats on that. I think I heard Raf say Volkswagen was a ‘29 deliverable. How cemented is your 2029 outlook based on contracted demand?

Christian Weedbrook: Well it's yes, it's 2029-2030. But there's no restrictions tied up to working with customers.

Rafal Janik: No, so everybody kind of understands the pathway that we're on to developing this utility scale quantum computer. A lot of our partners have pretty intimate knowledge of where we are along the stack and are very committed to us and building towards that utility scale quantum computer.

So it's not that that partnership itself is tied to that date, it's just that is when we're going to start putting online that utility scale quantum computer and the real value of quantum begins to be unlocked. So you know, they see it as a clock almost like their Y2K, that that's the date they need to be ready by. So a lot of the work we're doing with them is to get them ready for the disruption that the utility scale quantum computing will bring, in that case to mobility, but you know, Lockheed Martin is to defense, with Mitsubishi Chemical it's to materials and quantum chemistry.

Sahej Singh: Helpful, thank you. And then particularly on the A&D side when you mentioned Lockheed and Raytheon. Are these -- I'm assuming these are cost plus contracts right now, and do you see them moving into fixed firm price procurement type?

Rafal Janik: Yes, the structure is very partner to partner I would say. You know, once again, not very concerning exactly the structure right now. Eventually, what we want to do is make sure we're pricing this on value and not on cost, right. The impact that quantum is going to have for a lot of these partners is going to be massive, so we want to make sure that we're capturing that upside fully.

Quinn Bolton: Great. Hi. Quinn Bolton with Needham. Thank you for the presentation. Christian, two technical questions. First, you showed us your roadmap to reducing loss for the various optical components, for photonic components in the system. Do you need to hit those targets before you start work on quantum error correction? Or can you just talk to us about your roadmap for quantum error correction, because obviously for fault tolerance you need that. Does quantum -- sorry, does error correction work the same way in the photonic systems as it does the electronic? Do you have syndrome extraction decoding? How do you do all of that? Is that something you're developing? Do you work with partners? And then I've got a follow-up on the photonic qubit?

Christian Weedbrook: Yes, for sure. So we do all that in-house and ourselves. And one of the great things about that networked Aurora computer that was in Nature, it was the world's first photonic demonstration of detection. You get a syndrome like you mentioned. You analyze it, then you feed it back on and correct the error. That was done in that system, the world's first photonic system. So it works the same way. It's just, theories all the same except how the noise occurs, you'll have to take into account. So in our case, the noise or errors caused by loss.

And in terms of the error correction roadmap, it really is -- Aurora, the four server racks has everything you need. We have this kind of virtual thought experiment. Imagine there's a dial on the side somewhere that you just -- it's DB of loss and you're just bringing it down. And really, everything is related to that. Meaning, all the error correction, systems are set up within the system already, but the loss needs to be lower until the error correction kicks in and actually makes a difference. At the moment, you're doing a syndrome and, you know, you're correcting -- you got the mechanisms working, but it's not correcting errors. It's just correcting noise basically. You need to bring it down.

So really it comes back to what the next couple of years is component boosting component performance, meaning loss reduction in the top 17 that I mentioned. And that's really our roadmap. It's very simple to say. It's not easy to do. We'll get there. But it all comes back to that, knowing that all the parts of error correction and fault tolerance are already built into the system. You just got this virtual dial that you're trying to bring down the loss.

Quinn Bolton: Great, thank you. And then the second question, you guys talked about the GKP qubits and your demonstration last year of that for the first time. I guess, what is the Aurora system, what type of qubit are you using today, and will your fault tolerance system in 2029 be based on the GKP qubits? Thank you.

Christian Weedbrook: Yes, so, Aurora is based on GKP as well. So everything you can think of from the last couple years to the future will be GKP. Aurora, you can think of it as showing and demonstrating workability, which it achieved, and also having all the parts there, correction, and that, and knowing we need to improve the performance. So it actually had GKP qubits in it, but the better way to describe them is really noisy or lousy GKP qubits. And you've got this dial, you need to improve it. All the functionality is there, so it's GKP all the way.

Tyler Anderson: Hi, this is Tyler Anderson from Craig-Hallum. Thank you for the presentation. So to reach 500 logical qubits, how many racks would you need, and do you still expect a one to three laser rack ratio? And is there any redundancy needed to keep the uptime 24/7 for the cryogenics that are involved?

Christian Weedbrook: The cryogenics, they operate 24 hours a day, they already do. If there's some downtime for cleaning it, for instance, we have other backups, so that -- that part won't be a problem.

And what was the first part? Sorry?

Tyler Anderson: The laser rack ratio.

Christian Weedbrook: Right. So let's say for up to 500, the back of the envelope is assumed there's one very, very, very good qubit per server rack, roughly speaking. Terms of the ratio of, say, one to three for the laser system to the quantum computers as we have in Aurora, it'll be much, much better than that. This is really a principle [BP] to show networking has been solved. And then that goes throughout the whole system. Even the three server racks will be -- all the chips in there will be densified, and we packed in and do more of that. That applies to the laser system as well.

Tyler Anderson: Okay. And then speaking on what was mentioned earlier about 100 and 200 logical qubit counts versus your 500, is there any path to getting a system that has less than 500 qubits available before 2029?

Christian Weedbrook: So we do say up to 500. So up to 500, will pass through 100 or 200 to get to 500. So where we're going to target 100 and 200, we want to just be careful, that choice of words, that we're aiming for up to 500. So it could be 100 or 200 when the applications start kicking in.

And so the good thing about -- this is the thing I really want -- why photonics is awesome, is to add more qubits, add more server racks, you really have to master a couple, one, two, three, or four, whatever it is, server racks, really, to bring down the error rate to things like 10 to the minus 12 to minus 15, which we're hearing more about in the media now. You just add more server racks. You add more things of the thing you've already passed it. And that's why it's so important for a few server racks to get to that line, that normalized line to one and below it, is everything gets solved after that.

So to add more qubits, to getting back to your point, once we're at 100, it's just money that we need to spend on copying and pasting more server racks. That's the beauty of solving networking, it's really is a copy and paste endeavor now. And so we will pass through 100 and then 200, 300, up to 500. So at any point in time before that, once we've got a few, we'll be talking to customers to do advanced bookings a year or two out and show them, look, it really is so great about it. This is what's great about it. And it's very difficult for the other approach. It's not impossible. To be fair, there's some great approaches, but the networking is the thing they're all kicking down the road.

David Williams: Hey, let me add my congratulations on the wonderful presentation today. David Williams from Benchmark. I guess, maybe first, you talked about your IP and your capabilities there and some of the enabling technologies you've created. What do you think that the chance there of moving maybe into these adjacent areas, sensing those types, and maybe a path to monetization on some of this IP that you've created? Just maybe talk through that, please.

Rafal Janik: It's always something we're thinking about. So I'm going to say those experiments are continuously running, whether that's directly us building out a product, whether that's us working with a partner or licensing that IP. And we have some great people that have done this in traditional semiconductor industries that are advising us on what is possible. But the risk is always that it's a distraction. So we're, I'm going to say, always very sensitive to this piece of, you know, our goal is utility scale quantum compute. And it's sometimes hard to turn away revenue as a company. But if you look at the long-run health, our responsibilities to our investors, it's the right thing to do.

So I'm going to say with a company like RTX, it was natural. We didn't have to do much. They were going to do a system integration. We're going to sell them chips. In fact, we'll get more information back because they're validating our chips and our technology and providing more insights, that made perfect sense. Some of the projects we've seen that we've been asked to participate in, which are massive amounts of energy that take us far outside of our core expertise, we were going to continue turning away.

Nehal Chokshi: Thank you. Nehal Chokshi from Northland Capital Markets. Christian, you had a comment here that you have record-breaking optical packaging technology. On what metric is this out on, and what's the reason behind that? I have a couple of follow-up questions to that as well.

Christian Weedbrook: Yes, the reason really is the fact we've learned to, maybe as any startup, we need to earn as much as we can, because no one's going to care about this or anything we do as much as what we do. And so the packaging -- we actually work with a company, I believe in the U.S., and it would take 3 months. We'd send out chips to them and that package them, take up to 3 months. They did a good job. But we now, by bringing in a house, we can do the same thing within 8 hours period.

And the first part of your question is loss is everywhere, and it's really one of the biggest things we need to concern ourselves with. And loss also happens when you're packaging, so you need to keep that as low as possible.

Nehal Chokshi: So it is essentially the coupling between different components that you have lower loss on?

Christian Weedbrook: In this case, yes. There's loss even through fiber optics where it's not coupled but transversing through. But in the packaging, yes, you want to -- you're coupling fiber to chip or electronics the chip, and you want to keep the loss. Really wherever light goes through, you need to keep the loss lower, and packaging and coupling is one example.

Nehal Chokshi: Okay. So in the 2025 Nature article, have you published what is your loss level at the system level?

Christian Weedbrook: We've published what it was at that time in that paper, but our lowest ones, our latest [data], they are now lower than what was in there. And I believe, you know, giving you an example of where they are on that plot is where we are currently. We're still probably a bit further. That was as far ahead we can sort of show. So whatever was in those papers is probably six months to a year old, and we have better numbers, and that's what we showed today.

Nehal Chokshi: Okay. And then my final question is that you guys are utilizing a hybrid photonic approach as opposed to a monolithic approach. Can you discuss why the hybrid approach, you believe, will lead to a superior solution over time? I can totally understand it'll lead to a faster time to market, but I'm not sure about a superior solution over time.

Christian Weedbrook: Do you mean hybrid is in different materials for the chips, or are you thinking some other way?

Nehal Chokshi: Different materials or different discrete components throughout the optical train.

Christian Weedbrook: Yes. It really comes back to -- all our decisions come back to loss again. And so three different types of chips are within the computer. You have how to create the qubits, that's silicon nitride. How to kind of direct them or switch them around, that's lithium niobate. And then the measurement side of things is standard III-V material.

We're locked in for various reasons in those, the hybrid choices that you mentioned. Like for instance, why don't we just have silicon nitride everywhere? It would make things at least more focused for us. But the best types of switches given loss reduction will be in lithium niobate. The way to create the squeezes are through ring resonators. The best ring resonators currently are in silicon nitride. And really the only way to measure light is through III-V material. So it really comes back to what is each of the purposes, and then what's the lowest loss around. Now, we have the option to change our mind if something new comes along, so forth. But that's getting back to your hybrid question. That's why we've chosen that. It all comes back to what gives us the best chance to have the lowest loss.

Unidentified Speaker: Let’s take one more question.

Unidentified Participant: Well, a follow-up for me. Maybe one for you, Michael. Slide 40, gave your enterprise value, and it was just equity value minus the cash that you're raising. So question there is, does that imply no debt to the degree you're able to talk about it? If you're not able to, just let me know, I'm fine.

And then point two on that is, what is your appetite towards raising debt as opposed to an ATM, let's say a future funding is needed?

Michael Trzupek: Yes, so a couple things. So it is in our F-4, so you can go into the F tables. We do have a little bit of debt that's in there, sub $40 million. And we've had debt in the past, and two of those loans have been paid off, so you can find the details in there.

I would say from a capital formation perspective, obviously, if it goes without saying first, whatever is in the best interest of the shareholders is always paramount to us. But we are open to multiple vehicles to raise cash in order to achieve the goals that we've laid out here. So I would say that -- I'm sure the bankers in the room love that answer because it means there's a lot of ways we can go forward here. But we will try to make the optimal decision when those times come.

(Inaudible)

Michael Trzupek: Thank you, everyone.

Christian Weedbrook: Thank you, everyone.