Top Quantum StartUps to look out For

Quantum technology is a novel and rapidly developing sector with limitless promise. This field has exploded in popularity in recent years because it has the ability to tackle many of the challenges that we currently face. These devices will be able to process far larger amounts of data in a fraction of the time.
Researchers have predicted that by the year 2026, the overall worth of the QuantumTechnology industry will reach $31.57 billion. With IBM, D Wave and Rigetti all launching commercial quantum computers the field has seen a huge surge in the number of startups who have been able to land clients and funding.
Here, we have listed a few startups that have shown tremendous potential in the past couple of years for the growth of quantum technology and its applications.

1. **IonQ**
   While most major firms, such as IBM and Google, are rushing to develop Transmon qubits, IonQ is concentrating on developing Ion trapped quantum computers. They claim that superconducting qubits have shown to be error prone, their devices on the other hand trap individual ionized ytterbium atoms as their qubits.
   The communication between qubits is provided by precisely aimed laser beams, these laser beams also help cool the system and provide a lot of advantages over the more widely used LC resonators.
   IonQ is the first company to present a 32 qubit system which works on ion traps;the device has broken multiple records as it is much less prone to noise as compared to other quantum computers. The researchers say that this is just a stepping stone and they are currently working on much bigger systems. If they are able to prove the prowess of their systems over the Transmon systems they will change the face of the Industry as we know it.

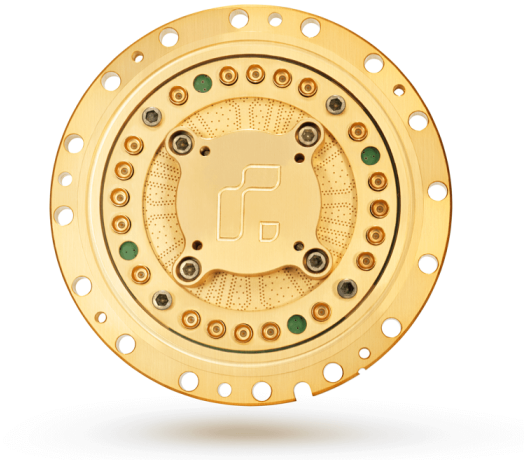
The perfect 32 Qbit system by IonQ (source)

2. **Q-CTRL**
   The biggest issue facing this generation's quantum computers, often known as the NISQ devices, is decoherence and noise. The information in quantum processors is extremely fragile, and interactions with the environment cause errors also known as noise and

decoherence. The word NISQ itself stands for noisy intermediate scale quantum machines, the fact that scientists had to coin a term for it shows how big of a problem we have at our hands.
Q-CTRL uses software based solutions in order to tackle the problem of decoherence and noise. They provide different packages in order to deal with noise at gate level, improve measurements and to utilize the full potential offered by cloud based quantum computing. The Australian company also provides tools for modifying algorithms such that they will be less prone to errors.
Softwares by Q-CTRL will be able to increase the scope of the NISQ devices and will be able to help uplift the Quantum Computing Community.

3. **1QBit**
   Using quantum computers, the 1Qbit firm hopes to solve the industry's most computationally difficult challenges. They give their users the opportunity to connect to hardware via 1QCloud, pre-built algorithms that may be customised based on the needs, tools for various types of testing, and a tool that can convert quantum computing difficulties into polynomial form.
   They have also worked in collaboration with other quantum software companies in order to find better applications of quantum computers. One of their recent projects with Accenture labs and Biogen is to leverage these devices for molecular comparison. This can be used in order to accelerate drug discovery. The procedure for creating a drug starts by early phase drug design and molecular comparison, this is where the software created by 1Qbit comes in. This will help scientists cut down the cost and time for creating a new drug.
   1Qbits work will turn out to be beneficial for the whole mankind, one example would be using their above mentioned project with Biogen and Accenture to cure the next Pandemic.

4. **Rigetti Computing**
   They are a full stack quantum computing company. Working on both hardware such as superconducting quantum integrated circuits to software for design and applications of quantum algorithms.
   In 2017, they launched *Forest* there own cloud which gives the access to devices and provides them with an interface upon which the users can use python and Quil (Quantum Information Language) to create and execute their algorithms. FAB-1 is one of the most high tech rapid prototyping fabrication labs and is owned by Rigetti computing, this empowers them to produce transmon qubit chips at a fast pace. Their circuits are also designed in FAB-1.
   Rigetti Computing is one of the leading corporations in quantum computing and has been compared to Google and IBM by Peter Diamandis, the founder of X-Price.



Quantum Integrated chip(source)

5. **Post Quantum**
   In the next few years anyone with enough knowledge and a big enough quantum computer will be able to get any information in the world by breaking the current encryption schemes. As we are aware that most of the transactions use RSA encryption and these can be easily broken using the famous Shor's algorithm.
   Post Quantum focuses on providing protection of information against such quantum threats. They offer a wide range of cryptography solutions for commercial as well as government clients, making it their duty to make sure that data of each individual remains safe.
   NTS-KEM, one of the best quantum cryptography algorithms, is one of the methods that they have been implementing in their softwares.NTS stands for "Never the Same", the name comes from the fact that the ciphertext that is used is always new and different, making the encryption extremely hard to break. This is the only code based algorithm to be a finalist in the *NIST* (National Institute of Standards and Technology) process to produce a new global standard.

This blog article merely scratches the surface of the field's expansion. Many more startups and researchers are pushing the limits of Quantum Computing on a daily basis, making the world a better place. I hope this motivated you to explore more and maybe start your own quantum start-up someday.

Resources:

1.https://www.researchandmarkets.com/reports/5317365/quantum-technology-market-by-computing?w=5&utm_source=CI&utm_medium=PressRelease&utm_code=jwnczw
2.https://q-ctrl.com/solutions/quantum-computing/
3.https://ionq.com/
4.https://www.networkworld.com/article/3489098/10-hot-quantum-computing-startups-to-watch.html
5.https://www.startus-insights.com/innovators-guide/5-top-emerging-quantum-computing-startups/
6.https://www.predictiveanalyticstoday.com/what-is-quantum-computing/
7.https://www.post-quantum.com/
8.https://en.wikipedia.org/wiki/1QBit
9.https://newsroom.accenture.com/news/accenture-labs-and-1qbit-work-with-biogen-to-apply-quantum-computing-to-accelerate-drug-discovery.htm
10.https://www.post-quantum.com/quantum-resistant-encryption/