



Azure Quantum | *Innovative Quantum Computing*

What is quantum computing?

Classical computers process information using 'bits' which can be either 0 or 1. Quantum computers use 'qubits' which have a 'superposition' of all possible states between 0 and 1. This makes them better at solving complex problems that would be impossible for classical computers or take a very, very long time.

What is Microsoft's approach to quantum computing?

Microsoft is using 'Majorana Fermions' to create topological qubits. These are more stable and scalable than other qubits.

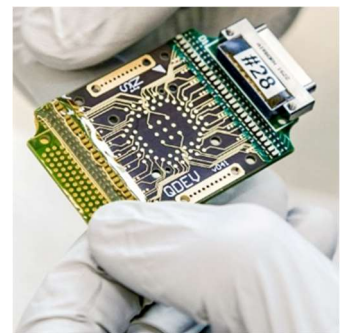
Microsoft's qubits are made by growing a semiconductor crystal with a method called Molecular Beam Epitaxy. A superconductor is then deposited on the semiconductor and the hybrid structure is fabricated into a device using traditional techniques in the cleanroom. The qubits are cooled to a temperature near absolute zero (~30mK) for measurement and testing.

Microsoft is developing a scalable full-stack quantum solution accessible on the Azure platform to enable every person and organization to achieve more.

Why quantum computing?

Quantum computing is predicted to revolutionize the future of healthcare, finance, climate change, and many other aspects of our lives! Some areas impacted by quantum computing are:

- Simulation- Accurate modeling of atoms and quantum systems can lead to improvements in many fields from new quantum computers to biological systems.
- Cryptography- Many current encryption algorithms could be solved efficiently with quantum computers which may require redesigning current cyber security techniques.
- Machine Learning- Machine learning speed can be significantly increased, which will further increase its impact on many aspects of society from science to business.



Learn more about the Microsoft Quantum Laboratory located in West Lafayette!



Register for the Quantum Innovator Series hear first-hand accounts from today's scientists!