VOL. 57 MAY 2025

NTU Q

HIGHLIGHTING NEWS

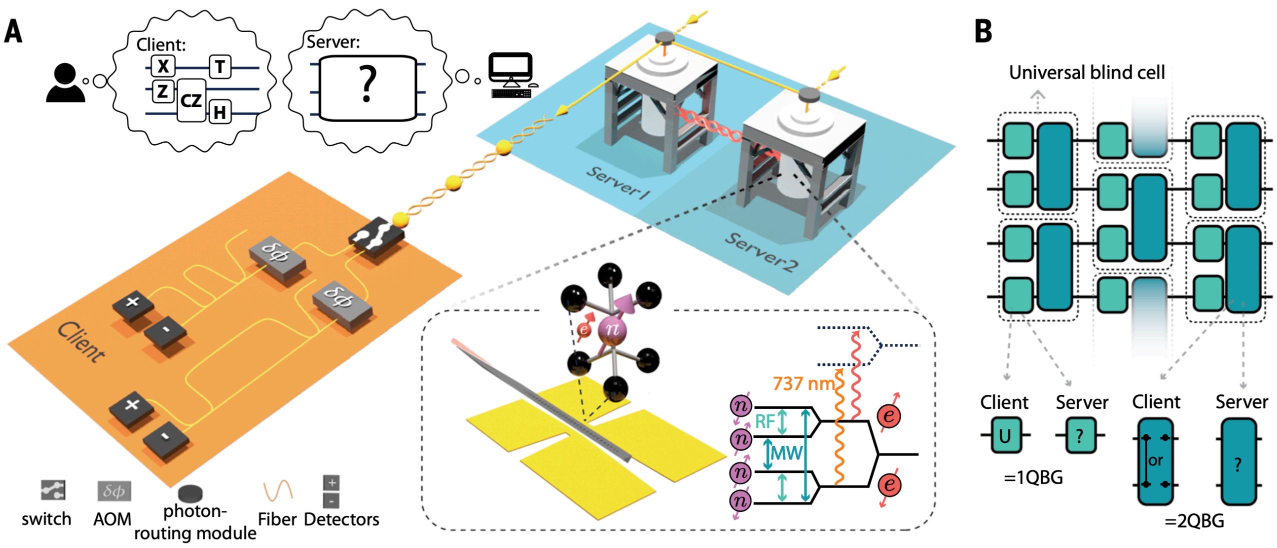
UNVEILING UNIVERSAL BLIND QUANTUM COMPUTATION: A SECURE STEP FORWARD

A critical milestone has been achieved in secure quantum cloud computing. A study recently published in *Science* reports the first experimental demonstration of **universal distributed blind quantum computation** (UBQC) using solid-state qubits. This protocol allows a quantum client to delegate computations to an untrusted quantum server—**without revealing the input, the computation, or the output**.

The researchers engineered a system that combines **quantum logic gates** and entangled photon states, enabling secure delegation of arbitrary quantum algorithms. This is a crucial advancement toward **privacy-preserving quantum computing**, especially for applications like encrypted database queries or sensitive scientific computations.

Implemented with integrated photonic circuits, the system overcomes traditional challenges associated with free-space optical setups. It further marks a concrete step in building **quantum-secure cloud services**, making advanced quantum resources available to users without compromising their data privacy.

This research not only proves the feasibility of UBQC in practice but also reinforces the potential of scalable photonic platforms in delivering secure, real-world quantum applications.



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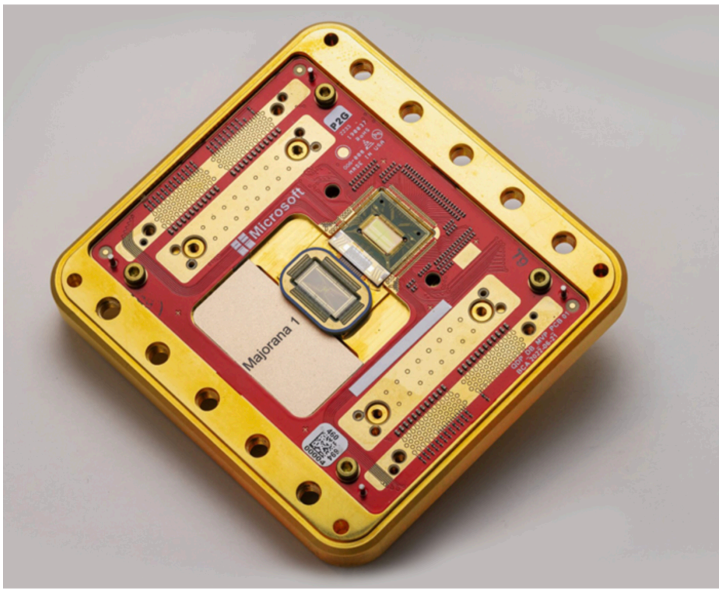
TOPOLOGICAL QUBITS IN ACTION: MICROSOFT'S MAJORANA 1 CHIP UNVEILED

Topological quantum computing has long been considered a game-changing route toward scalable and error-resilient quantum processors. Microsoft has now taken a major step forward with the introduction of its *Majorana 1* chip, the world's first quantum processor based on topological qubits. This breakthrough is built on **topoconductors**, exotic materials engineered to host **Majorana zero modes**, which serve as the foundation for fault-tolerant quantum operations.

According to Microsoft, the new architecture allows for qubits that are inherently protected from local noise, addressing one of the most pressing challenges in quantum computation: error correction overhead. The chip demonstrates a robust capability for **braiding operations**—a hallmark of topological computing—and opens the door to large-scale quantum systems with significantly reduced logical error rates. This innovation represents more than just a hardware upgrade: it validates years of theoretical proposals and materials science research, pointing the way toward scalable topological quantum computing. With Majorana 1, Microsoft aims to accelerate the timeline for building quantum computers capable of solving classically intractable problems.



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