HOLIDAY ISSUE
29/12/2025

# Q-Newsletter

As the International Year of Quantum draws to a close, the UCL Quantum Society Research Team reflects on advances that caught our attention and presents a set of curated holiday reads.

Warm wishes for a joyful holiday season and a prosperous New Year!

## Ready for Takeoff: Entanglement for Disaster Relief

In many disaster scenarios such as earthquakes, floods, or large scale fires, classical communication networks are among the first systems to fail. Cell towers are damaged, cables are cut, and coordination between emergency teams becomes difficult at the moment it matters most.

Addressing this challenge, researchers at Virginia Tech propose a quantum communication architecture designed specifically for such breakdowns. Their work explores the use of drones as mobile quantum nodes that can be rapidly deployed over affected areas.

Drones are already used in disaster response because they can be deployed quickly and do not rely on ground infrastructure. In this setup, they are responsible for distributing entangled particles between distant locations. Quantum entanglement, a phenomenon in which two or more particles share a single quantum state, independent of distance.

In this approach, drones act as temporary communication towers in the air. Each drone carries small quantum communication devices that can create and transmit entangled photons, which are sent through free space to other drones or to teams on the ground. By positioning several drones over a disaster area, researchers can form a flexible airborne network that replaces damaged towers and cables.

When two locations receive entangled photons, they can establish a secure communication link and immediately detect any attempt to intercept or interfere with the signal.

Since the drones can move, the network can be quickly reconfigured as conditions change or as rescue teams relocate, making it especially well suited to disaster scenarios where fixed infrastructure is unavailable.

What makes this research especially compelling is the way it integrates deep theoretical ideas with real engineering constraints. It sits at the intersection of quantum information, quantum networking, and autonomous systems, and treats quantum technology as part of a larger, adaptive framework rather than an isolated laboratory experiment.

As a closing highlight for the Year of Quantum, this work feels particularly meaningful. It reflects a broader transition taking place across the field, from asking whether quantum effects can be demonstrated to asking where they can make a difference.

By connecting abstract principles of quantum mechanics with humanitarian applications, this research serves as a reminder that some of the most important advances are not defined by spectacle or scale, but by purpose.



By: Defne Aydin

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## SEALSQ Takes Decisive Action To Boost Quantum Investment Fund

SEALSQ, a technology company specialising in secure semiconductor hardware and post-quantum cybersecurity solutions, has taken a notable step in shaping the quantum market by expanding its Quantum Investment Fund from $35 million to over $100 million. The move signals a clear shift away from narrow, single-technology bets toward building a broader quantum-safe ecosystem capable of supporting real-world deployment. Rather than concentrating solely on quantum computers themselves, SEALSQ is focusing on the surrounding infrastructure required to make quantum technologies usable, secure, and commercially sustainable.

The company plans to invest across several critical layers, including post-quantum cryptography, secure semiconductor manufacturing, digital identity systems, and quantum-safe communications. Some of the capital is already being deployed, notably in a post-quantum semiconductor personalisation and testing facility in Spain, backed by government support. SEALSQ has also directed funding toward secure digital identity platforms and satellite-based communications designed to remain resilient against future quantum attacks.

This approach mirrors where near-term market demand is forming. Enterprises and governments are increasingly preparing for quantum risks today, especially in cybersecurity, identity management, and critical infrastructure, rather than waiting for large-scale quantum computers to arrive. By scaling its investment fund, SEALSQ is positioning itself as an early builder of the foundational systems, manufacturing capacity, and security layers that will underpin a quantum-ready economy, bridging the gap between emerging quantum capabilities and practical, scalable deployment.

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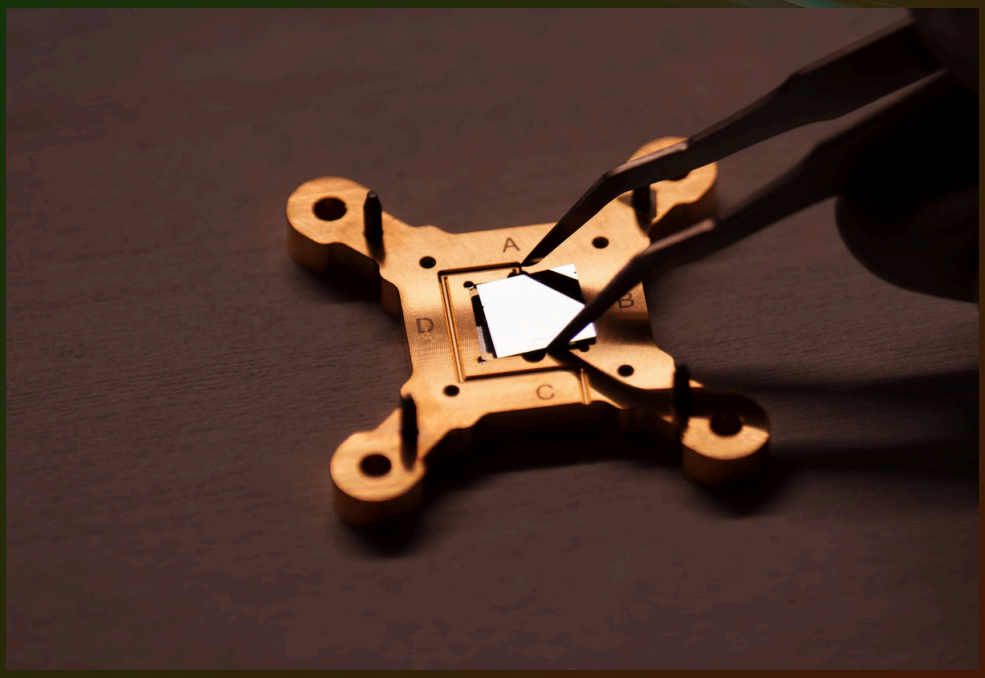
## New Tantalum Qubit




Last month, scientists from Princeton University announced a major advance in quantum processor design that dramatically extends how long quantum information can be preserved.

The Princeton team, led by Andrew Houck and collaborators including Nathalie de Leon, developed a new type of superconducting qubit using tantalum metal grown on high-resistivity silicon. This material combination significantly reduces imperfections and energy loss that typically cause qubits to lose their quantum state. As a result, these qubits can maintain coherence for up to about 1.68 milliseconds — roughly 15 times longer than the qubits used in leading commercial quantum processors from companies like Google and IBM.

Longer coherence times are crucial because they allow quantum computers to perform more operations before errors occur, which is one of the central challenges in scaling up quantum computing. The researchers demonstrated this improvement on systems with up to 48 qubits, signaling a meaningful step toward more stable and powerful quantum computers.


By: Ethan Kao

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# NOTABLE QUANTUM STARTUPS OF 2025

## PsiQuantum

Raised massive funding to build a million-qubit photonic quantum computer.

## QuEra Computing

Advanced neutral-atom quantum systems toward scalable, fault-tolerant computing.

## Alice & Bob

Secured major funding using error-resistant “cat qubit” quantum architecture.

## Sygaldry Technologies

Building quantum-accelerated AI servers to speed up AI training and inference.

## Conductor Quantum

Partnered to accelerate scalable silicon quantum computing with AI-based qubit automation.

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## Quantum sensing: EuQlid

Diamond-based quantum sensor startup unveiling non-destructive 3D semiconductor imaging tech.



By: Ethan Kao