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Q-Newsletter

HIGHLIGHT

[Quantum Timekeeping and its Hidden Cost]

A team led by Prof. Natalia Ares at the University of Oxford has uncovered a surprising thermodynamic cost in quantum timekeeping.

The researchers built a nanoscale quantum clock using a double quantum dot, where each electron hop acts as a tick. They discovered that while the clock itself uses almost no energy to tick, the act of measuring those ticks requires up to a billion times more energy. Converting quantum signals into classical information introduces entropy. This overturns expectations about efficiency in quantum clocks and reveals that measurement is the main source of thermodynamic cost.

The result strengthens the link between quantum thermodynamics and the arrow of time, and highlights that future quantum devices will need far more energy-efficient readout methods. The team suggests that understanding these principles could eventually allow us to design autonomous nanoscale clocks and sensors that keep time as efficiently as biological systems do.

RESEARCH

[Advancing Hybrid Quantum Computers]

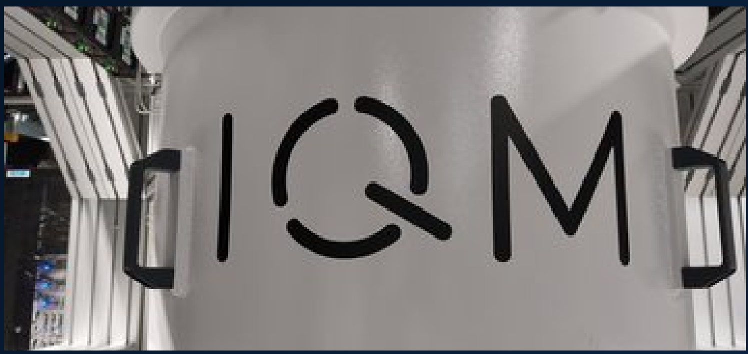
This month, researchers at the Niels Bohr Institute have reported a significant advance in hybrid quantum hardware with a demonstration of deterministic coupling between an ultracold atomic lattice and a suspended on-chip photonic waveguide. This achievement unites two leading architectures for quantum information processing: neutral-atom qubits, valued for long coherence times and precise control, and integrated photonics, which offers scalability and fast optical routing on compact chips.

The team successfully positioned atoms in a subwavelength optical lattice and coupled them to guided photons with high spatial precision. Crucially, the interaction is both deterministic and compatible with chip-level integration, addressing a major bottleneck in scaling neutral-atom platforms beyond laboratory-scale optical setups.

By enabling robust atom–photon interfaces directly on photonic chips, the work establishes a foundation for next-generation quantum processors and quantum-enhanced sensing devices. It marks a practical step toward large-scale, modular quantum systems that combine atomic coherence with photonic interconnects.

MARKET

[IQM invests more than €40m to expand its Quantum Production Facility]



IQM has announced a €40 million investment to expand its quantum-chip production facility in Finland. The expansion will double the clean-room space and increase assembly-line capacity, a move aimed at scaling quantum hardware manufacturing rather than experimenting in labs. This signals growing confidence that quantum processors will soon move from prototypes toward larger-scale production and commercial supply. For customers and partners, it means increased availability of quantum devices as material infrastructure, not just research curiosities.

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