

Scaling spin qubits for practical and affordable quantum computing

Lydia Baril

C12 Quantum Electronics, France

lydia.baril@c12qe.com

Quantum computing cannot scale through brute force alone. Increasing qubit counts while multiplying cryogenic systems leads to rising complexity and cost. A sustainable path to quantum advantage requires architectural innovation.

In this talk, we present a compact, modular approach based on spin qubits in carbon nanotubes. High-impedance resonators enable fast, selective long-range coupling with minimal crosstalk, while the intrinsic density of spin qubits opens the path toward highly integrated, potentially single-cryostat systems compatible with existing HPC infrastructure.

We will share recent validation results, including world-leading resonator performance and real-world optimization experiments demonstrating microsecond-scale solve times. Finally, we outline the roadmap from near-term NISQ applications to scalable fault-tolerant quantum computing, and how smarter scaling can make quantum computing practical and economically viable.