QUANTUM TOPICS SEMINAR

QUANTUM + AI:

Achieving Breakthrough Compute with Neutral Atoms

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We present on the first ever demonstration of a materials science application with logical qubits, performed on Infleqtion's *Sqale* neutral atom quantum computer. The demonstration achieves better logical than physical performance on a range of applications, including Bell states (12x error reduction), random circuits (15x), and a prototype Anderson Impurity Model ground state solver for materials science applications (up to 6x, non-fault-tolerantly).

We emphasize the deep connections between quantum and AI that enabled our demonstration, through a collaboration with NVIDIA. In particular, both our co-design feedback loops and materials science workflows leverage GPU acceleration. Finally, we reflect on two key applications that interpolate between GPU and QPU: (1) *Contextual Machine Learning*for extending AI/ML context windows and (2) feature selection for biomedical datasets.

JANURARY 16TH, 2025, 11:00-12:00 P.M. EST
BIRCK NANOTECHNOLOGY CENTER ROOM, 2001

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