



## Seminar/Talk

# "Quantum many-body mixed phase space revealed by hybrid feedback control"

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Host: Maksym Serbyn

Abstract: Understanding how complex systems transition between order and chaos is a central challenge of nonequilibrium physics. While weak perturbations of classical integrable systems give rise to a mixed phase space of coexisting regular and chaotic trajectories, analogous behavior in interacting quantum many-body systems has remained elusive. Here we develop and experimentally implement a hybrid quantum-classical feedback protocol that autonomously discovers and stabilizes long-lived regular trajectories in a superconducting quantum processor. Each iteration combines short-time quantum evolution with classical optimization that projects the dynamics back onto a low-entanglement variational manifold, effectively distilling coherence from chaotic evolution. The stabilized trajectories reveal a quantum many-body mixed phase space emerging from nonlinear variational dynamics, without a direct analogue in classical or few-body quantum systems. Our results establish a versatile framework for algorithmic discovery and control of coherent dynamics previously inaccessible to experiment.

**Tuesday, May 26, 2026 11:00am - 12:00pm**

Office Bldg West / Ground floor / Heinzl Seminar Room (I21.EG.101)



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