Quantum Science & Engineering Center

Quantum Computing Seminar Series

GEORGE MASON UNIVERSITY

Dr. Alexey Gorshkov

National Institute of Standards and Technology

Candidate for a Passively-Protected Quantum Memory in Two Dimensions

Monday, October 3, 12:30 – 1:30 PM | EXPL 3301 | Zoom

Abstract

An interesting problem in the field of quantum error correction involves finding a physical system that hosts a "passively-protected quantum memory," defined as an encoded qubit coupled to an environment that naturally wants to correct errors. To date, a quantum memory stable against finite-temperature effects is only known in four spatial dimensions or higher. Here, we take a different approach to realize a stable quantum memory by relying on a driven-dissipative environment. We propose a new model which appears to passively correct against both bit-flip and phase-flip errors in two dimensions: A square lattice composed of photonic "cat qubits" coupled via dissipative terms which tend to fix errors locally. Inspired by the presence of two distinct Z_2-symmetry-broken phases, our scheme relies on Ising-like dissipators to protect against bit flips and on a driven-dissipative photonic environment to protect against phase flips.

Meeting Information

Exploratory Hall, Room 3301
Zoom: https://go.gmu.edu/qcseminar

About the Seminar Series

The Quantum Computing Seminar Series are a series of working seminars organized and hosted by QSEC's quantum computing subgroup every Monday. These events are free and open to the public. More information is available on QSEC's Computing Events and Mathematical Sciences Department's Quantum Computing Seminars. For any questions, contact qsec@gmu.edu.