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“An introduction to quantum error correction”

Host: Stephen Gray

Monday, July 25, 2022 @ 1:00 p.m.

ZoomGov Meeting ID 161 677 4612 Meeting Passcode: 337514

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Abstract: Building a reliable quantum computer is challenging due to the fragile nature of quantum states. Several proposals and techniques like topological quantum computers and quantum error correction (QEC) exist to overcome this limitation. Error correction is an essential topic in classical coding theory and is concerned with communication and information storage problems in the presence of noise. QEC is an extension of classical error correction codes to quantum physics. This talk will start with an introduction to error detection and correction from coding theory. And then, we will study types of quantum errors and construct respective codes to correct them. After this, we will introduce the stabilizer formalism, which allows efficient resource management while constructing the QEC codes. Ultimately, we will analyze two QEC codes (one logical qubit) with different resource requirements. The first will be the famous Shor's code composed of 9 qubits, and the second will be a stabilizer code consisting of 5 qubits.

"Quantum computers have a great deal of potential, but to realize that potential, they need some sort of protection from noise." – Daniel Gottesman