Title:

Entangling two noninteracting qubits via a mesoscopic system

Abstract:

Entanglement is the essence of the quantum advantage in various quantum technologies, including quantum computation and quantum sensing. In this talk, I will describe new opportunities that mesoscopic many-body systems provide for creating entanglement between isolated quantum systems. First, I will introduce the indirect joint measurement technique that we proposed for entangling two non-interacting qubits through an intermediate mesoscopic system consisting of identical two-level systems. This technique provides a design element that can be integrated into quantum processor architectures and quantum measurement devices. Next, I will quantify the resources required for implementing the indirect joint measurement method when the intermediate mesoscopic system consists of spin-1/2 particles with internal magnetic dipolar coupling. This analysis provides a new approach for using an intermediate spin system for connecting separated qubits. It also opens a path in exploring entanglement between microscopic and mesoscopic spin systems.

For more on this topic, you can see:

M. S. Mirkamali, D. G. Cory, and J. Emerson, Phys. Rev. A, vol. 98, p. 042327, Oct 2018.
M. S. Mirkamali, D. G. Cory, Phys. Rev. A, vol. 101, p. 032320 , Mar 2020.