UCLA Department of Physics & Astronomy

COLLOQUIUM

Thursday, October 5th, 2023 at 4 p.m.
PAB 1-434

Quantum Materials for Eventual Quantum Computing

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I will review two routes to quantum materials that are being studied in the context of eventual quantum computing. The first is molecule-based magnetic compounds where spins can function as qubits. These molecule-based materials have unique magnetic functionalities that differ from those of inorganic materials and are intriguing to study. This field is seeking long coherence times for spins and methods to control and architecture them into devices. In particular we investigate how symmetry principles can be used to design magnetoelectric coupling so electric voltages can control spins and vice versa.

The second topic is quantum spin liquids. In certain spin liquids, quasiparticles are predicted to have topological properties and their braiding properties could be used for topologically-protected quantum computing. Both of these topics are in the scientific discovery stage and offer rich potential for physics discovery as well as being motivated by eventual applications. This work is funded by LANL, the NSF, and DOE - in molecular materials Zapf is a thrust lead for an Energy Frontier Research Center on molecule-based materials. In quantum spin liquids, Zapf is the deputy director of the Quantum Science Center, a DOE-funded National Quantum Initiative center.

Refreshments at 3:30 p.m. PAB Patio. **Undergraduates Welcome!**