

Department of Physics and Astronomy General Colloquium

Thursday, January 26th, 2023

PHYS 112 at 3:30 pm

Refreshments will be served at 3:00pm in PHYS 242

Professor Ashok Ajoy

UC Berkeley



New Opportunities with Hyperpolarized Nuclei

Controlling and steering quantum systems is fundamentally important for several applications in quantum information science (QIS). I will describe how the exquisite quantum control capabilities afforded by polarized nuclear spins in solids open interesting new avenues in quantum science and condensed matter. The nuclear spins are optically “hyperpolarized” into athermal states far from equilibrium, such that their magnetic resonance signatures are enhanced by several orders of magnitude. This allows immediate access to exploit their extraordinarily long coherence lifetimes, $T_2' > 90$ s, for useful tasks, as well as their ability to be manipulated into stable “Floquet states” via continuous quantum control. I will describe new applications for deployable quantum sensors, enhanced imaging agents, and fundamental avenues into preparing and probing prethermal states of matter, including time-crystals.