

CMQT Symposium
Guest Lecture Information

Ashok Ajoy

Ashok Ajoy is an Assistant Professor in the Department of Chemistry at U.C. Berkeley, and Faculty Scientist at the Lawrence Berkeley National Laboratory. He is an expert in quantum sensing and magnetic resonance. He earned his Ph.D. in Nuclear Science and Engineering at MIT in 2016, where he was recognized with the Manson Benedict Award and Del Favero Prize for best thesis. Recent honors have included the Google Faculty Research Scholar Award (2020), Air Force Young Investigator award (2022), CIFAR Azrieli Global Scholar in Quantum Science (2022), and the Caldarelli Prize (2022), Anatole Abragam Prize (2023), Ampere Prize (2023), and Atreya Prize (2025) in magnetic resonance.

Quantum sensing with molecular systems

Abstract: I will present our recent efforts to harness out-of-equilibrium electron and nuclear spins in molecular systems for developing highly sensitive quantum sensors. I will begin with complementary advances in semiconductor platforms—specifically NV centers and ^{13}C nuclei in diamond—where we achieve high nuclear polarization and remarkably long nuclear spin coherence lifetimes ($T_2^* > 800$ s). These features enable precision sensing of time-varying magnetic fields, with applications ranging from fundamental studies to chemical assays.

Building on this foundation, I will then discuss emerging molecular systems based on polyaromatic molecules hosting triplet-state polarizable electrons. These systems offer several compelling advantages: the ability to grow large crystals (cm-scale) at low cost, high levels of nuclear spin polarization, and extremely long spin lifetimes. Moreover, their inherent chemical tunability provides a versatile platform for sensor design. Together, these attributes open new directions for practical quantum sensing across a wide range of disciplines.