

Controlling relaxation of nuclear spin qubit ensembles for a more sensitive search for axion-like dark matter

Tuesday, 13 July 2021 15:00 (15 minutes)

Cosmic Axion Spin Precession Experiment (CASPER) is a laboratory scale experiment searching for ultralight axion-like dark matter, using nuclear magnetic resonance [D. Budker, et al. Phys. Rev. X, 4,021030 and D. Aybas, J. Adam, et al., Phys. Rev. Lett. 126, 141802]. I will describe our work on the next phase of the experiment, with the goal of searching in the kHz –MHz frequency band, using SQUID sensors. I will also describe our study of transient light-induced paramagnetic centers in ferroelectric PMN-PT $((\text{PbMg}_{1/3}\text{Nb}_{2/3}\text{O}_3)_{2/3} - (\text{PbTiO}_3)_{1/3})$ crystals. We use these paramagnetic centers to control the polarization and relaxation of the nuclear spin qubit ensemble, allowing us to improve sensitivity to axion-like dark matter.

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Primary author: ADAM, Janos

Co-authors: GRAMOLIN, Alexander (Boston University); AYBAS, Deniz (Department of Physics, Boston University); BUDKER, DMITRY (Helmholtz Institute Mainz and UC Berkeley); JACKSON KIMBALL, Derek (California State University, East Bay); SUSHKOV, Alexander (Boston University)

Presenter: ADAM, Janos

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