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## Probing Axions and Axion Like Particles through Cosmic Axion Spin Precession Experiment-High-field

*Monday, 16 September 2024 15:15 (20 minutes)*

Cosmic Axion Spin Precession Experiment (CASPEr) [1,2,3] investigates pseudoscalar bosons, axions, and axionlike particles (ALPs), through their interactions with standard model particles. Axions offer a solution to the formidable strong CP problem and provide a compelling link to Dark Matter. In this work, we study the coupling of the axion and ALP field with fermions. Utilizing Nuclear Magnetic Resonance (NMR) spectroscopy, we search for the coupling between Axions (and ALPs) and nuclear spins. In the CASPEr highfield setup featuring a 14.1 T superconducting magnet, we explore the frequency range of the axion field from 70MHz to 600 MHz using tunable LC circuits cooled to cryogenic temperatures. In conjunction with a shim coil integrated into the cryostat, we employ an additional shim stack to ensure field homogeneity. We also examine various hyperpolarization techniques and identify the most suitable samples for achieving high sensitivity. The poster presentation will elaborate further details on our experimental setup and the NMR-detection system.

- [1]. D. F. J. Kimball et al. “The Search for Ultralight Bosonic Dark Matter” Cham: Springer International Publishing, 2022, ISBN: 978-3-030 95851-0
- [2]. P. W. Graham, S. Rajendran, Phys. Rev. D 88, 035023 (2013)
- [3]. D. Budker, P. W. Graham, M. Ledbetter, S. Rajendran, A. O. Sushkov, Phys. Rev. X 2014

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