Contribution ID: 87

Type: Poster

Commissioning of Detection System for the Cosmic Axion Spin Precession Experiment (CASPEr)

Monday 8 August 2022 16:40 (3 minutes)

CASPEr-Gradient searches for axion-like particles (ALP) which are a potential dark matter candidate [1]. The gradient of the ALP field is predicted to resemble a magnetic field in its coupling to nuclear spins [2]. Therefore, a nuclear magnetic resonance (NMR) experiment is adopted to measure such a gradient.

The NMR detection system has been commissioned for this research. We performed a 10-hr measurement with thermally-polarized liquid methanol sample with a 25 ppm homogeneity at the 317 G leading field, which corresponds to searching for an ALP field at 1.349 533 MHz with 34 Hz bandwidth. Noise and ALP coupling constant exclusion are analyzed for the measurement.

References

Derek F. Jackson Kimball et al. "Overview of the Cosmic Axion Spin Precession Experiment (CASPEr)". In: Microwave Cavities and Detectors for Axion Research. Ed. by Gianpaolo Carosi and Gray Rybka. Cham: Springer International Publishing, 2020, pp. 105–121. isbn: 978-3-030-43761-9.
Peter W. Graham and Surjeet Rajendran. "New observables for direct detection of axion dark matter". In: Phys. Rev. D 88 (3 Aug. 2013), p. 035023. doi: 10.1103/PhysRevD.88.035023. url: https://link.aps.org/doi/10.1103/PhysRevD.88.035023.

Primary author: ZHANG, Yuzhe (HIM)Presenter: ZHANG, Yuzhe (HIM)Session Classification: Poster Lightning Talks