

Abstract Submitted
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A Room Temperature Resonant Axion-like Particle Search¹

AUSTIN REID, ELIJAH GUESS, IU Bloomington, WOLFGANG KILLIAN, PTB Berlin, JUSTIN SHORTINO, W. MICHAEL SNOW, IU Bloomington, LUTZ TRAHMS, JENS VOIGT, PTB Berlin, ARIADNE COLLABORATION — Axions and axion-like particles (ALPs) are CP-odd scalar particles appearing in many extensions of the Standard Model. They generate macroscopic P-odd and T-odd spin-dependent interactions which can be sought in sensitive laboratory experiments. Up to now no direct evidence of cosmological axions has been found. This talk will discuss an experiment that aims to measure fresh, locally sourced axion-like particles by observing precession induced by a periodic monopole-dipole interaction between a rotating mass and a hyperpolarized gas sample. We are developing a room-temperature apparatus with an array of nonmagnetic masses that can spin next to a cell of hyperpolarized ^3He and ^{129}Xe applying a calculable periodic potential. As ALPs' known coupling ($g_p^n g_s^N < 4.2 \times 10^{-30}$) is assumed to be far weaker than the electromagnetic coupling of the gasses, our sample must be isolated from ambient magnetic field shifts. PTB's BMSR-2 in Berlin has sufficiently low background magnetization that perturbations in the gasses precession frequencies can be read out by a SQUID array. This measurement will establish initial constraints and help probe for new sources of systematic error to benefit ARIADNE, a cryogenic resonant axion search.

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