

Using cryogenic Penning trap LC detection circuits to search for axion-like dark matter.

Tuesday, 31 August 2021 17:45 (15)

We present recent limits set by the BASE collaboration on the coupling between any dark matter axion-like particles (ALPs) and photons, measured using the superconducting resonant single particle detection circuit of a cryogenic Penning trap. To search for ALPs, we investigated the noise spectrum of our fixed-frequency resonant circuit for peaks caused by axion-to-photon conversion in the strong magnetic field of the Penning trap magnet. Uniquely, we used a single antiproton interacting with our detection circuit to measure the detector noise temperature. Our analysis constrained the coupling of ALPs with masses around 2.7906-2.7914 neV/c^2 to photons to be $g_{a\gamma} < 1 \times 10^{-11} \text{ GeV}^{-1}$. We have recently begun to upgrade our ALP antenna to cover >2000 times broader mass range at improved sensitivity.

Reference to paper (DOI or arXiv)

10.1103/PhysRevLett.126.041301

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Session Classification : Discussion Panel Dark Matter 4

Track Classification : Dark Matter and its detection