Contribution ID: **27** Type: **not specified**

Constraints on axion-like polarization oscillations in the cosmic microwave background with POLARBEAR

Tuesday 27 June 2023 16:40 (20 minutes)

Very light pseudoscalar fields, often referred to as axions, are compelling dark matter candidates and can potentially be detected through their coupling to the electromagnetic field. Recently a novel detection technique using the cosmic microwave background (CMB) was proposed, which relies on the fact that the axion field oscillates at a frequency equal to its mass in appropriate units, leading to a time-dependent birefringence. For appropriate oscillation periods this allows the axion field at the telescope to be detected via the induced sinusoidal oscillation of the CMB linear polarization. We search for this effect in two years of POLARBEAR data. We do not detect a signal, and place a median 95% upper limit of 0.65 degrees on the sinusoid amplitude for oscillation frequencies between 0.02 1/days and 0.45 1/days, which corresponds to axion masses between 9.6×10ˆ−22 eV and 2.2×10ˆ−20 eV. Under the assumptions that 1) the axion constitutes all the dark matter and 2) the axion field amplitude is a Rayleigh-distributed stochastic variable, this translates to a limit on the axion-photon coupling g < 2.4×10ˆ−11 GeV−1×(m/10ˆ−21eV).

Author: SPISAK, Jacob (University of California, San Diego)

Presenter: SPISAK, Jacob (University of California, San Diego)

Session Classification: Parallel

Track Classification: DM