



Contribution ID: 5

Type: Oral

nEDM as a dark matter detector: constraints on axion-like dark matter from limits on an oscillating EDM

Wednesday, 18 October 2017 15:45 (20 minutes)

nEDM as a dark matter detector: constraints on axion-like dark matter from limits on an oscillating EDM

N. J. Ayres for the nEDM collaboration at PSI

Axions and axion-like particles (ALPs) are popular dark matter candidates. Ultralight axion and ALP cold dark matter would manifest as a classical field, oscillating coherently on a galactic scale. Through their couplings to gluons, this field would induce an oscillation in the measured value of the EDMs of neutrons and other particles. We analyse datasets from the Sussex-RAL-ILL experiment (1998-2002) and the current PSI experiment (2015-2016) to obtain limits on a potential oscillation in the value of the EDM.

While many experiments probe the axion-photon coupling, we set the first laboratory limits on the axion-gluon coupling, improving upon the previous indirect cosmological limits by up to 3 orders of magnitude. Additionally, we improve upon laboratory constraints on the axion coupling to nucleons by up to a factor of 40.

Paper: arXiv 1708.06367 - Search for axion-like dark matter through nuclear spin precession in electric and magnetic fields

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Session Classification: WeAf2

Track Classification: Experimental techniques (cryogenic, room temperature, crystal)