

Contribution submission to the conference Bonn 2020

Method to search for axion-like particles (ALPs) in storage rings, demonstrated at COSY — ●SWATHI KARANTH — Institute of Physics, Jagiellonian University, Cracow, Poland

The axion was originally proposed to explain the small size of CP violation in quantum chromodynamics. It would be light in weight and weakly coupled to nucleons. If sufficiently abundant, it might be a candidate for dark-matter in the universe. Axions or axion-like particles (ALPs), when coupled with gluons, induce an oscillating Electric Dipole Moment (EDM) along the nucleon's spin direction. This can be used in an experiment to search for axions or ALPs using charged particles in a storage ring.

In spring of 2019, at the Cooler Synchrotron (COSY) in Jülich, we performed a first test experiment to search for ALPs using an in-plane polarized deuteron beam with a momentum of 0.97 GeV/c. If the EDM oscillation due to ALPs is in resonance with the spin precession frequency of the beam, then there is an accumulation of vertical polarization. The experiment involved the development of a beam with four bunches, each with different polarization direction and a long polarization lifetime. This allows the ALP to be detected despite ignorance about the oscillating EDM phase. We scanned a frequency window of 1kHz around the spin precession frequency of 121 kHz. I will talk about the experiment and present the preliminary results.

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