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## Method to search for axion-like particles (ALPs) in storage rings

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A particle called the axion has been proposed to explain the small size of the CP violating term 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, introduce 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 in a storage ring.

In spring of 2019, at the Cooler Synchrotron (COSY) in Juelich, 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 long polarization lifetime beam with four bunches, each with different polarization direction. Two of these bunches had orthogonal directions which allowed us to cover all values of the axion phase. We scanned the frequency space around the spin precession frequency of 121 kHz. I will present the working principle of this method and preliminary results.

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