

# New method to search for axion-like particles demonstrated with polarized beam at the COSY storage ring

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The axion was originally proposed to explain the small size of CP violation in quantum chromodynamics. It might be a candidate for dark matter in the universe. Axions or axion-like particles (ALPs) when coupled to gluons induce an oscillating Electric Dipole Moment (EDM) along the nucleon's spin direction. At the Cooler Synchrotron (COSY) in Juelich, this principle was used to perform a first test experiment to search for ALPs using an in-plane polarized deuteron beam. If the spin precession frequency equals the EDM oscillation frequency, a resonance occurs that accumulates the rotation of the polarization out of the ring plane. Since the axion frequency is unknown, the beam momentum was ramped to search for a vertical polarization jump that would occur when the resonance is crossed. At COSY, four beam bunches with different polarization directions were used to make sure that no resonance was missed because of the unknown relative phase between the polarization precession and the EDM oscillations. We scanned a frequency window of about a 1-kHz width around the spin precession frequency of 121 kHz. This talk will describe the experiment and show preliminary results.