

Deuteron polarimeter developments for a storage ring electric dipole moment search

Monday 14 September 2015 11:00 (30 minutes)

This talk will summarize progress made at the Forshunngszentrum Juelich COSY ring on deuteron beam polarimetry for a storage ring search for an electric dipole moment. Tests have demonstrated the feasibility of using thick carbon targets for highly efficient and continuous observation of the stored beam polarization. After calibration of the sensitivity to geometric misalignments and pileup contributions to the trigger rates, it is possible to correct cross-ratio polarization measurements in real time to levels below one part in 100,000. By marking each event with the clock time, the horizontal plane precession of the polarization in the ring magnets may be unfolded, yielding access to the magnitude of the horizontal polarization as a function of time. Accurate values require attention to biases from searches for the best precession rate and false enhancements to the magnitude at low polarizations. This technique facilitates studies of various means to extend the unstable horizontal plane polarization lifetime using bunching, electron cooling, sextupole correction fields, and beam current management with the result that polarization lifetimes now exceed hundreds of seconds. Future plans include feedback to control the polarization precession rate and phase (in preparation for maintaining the polarization parallel to the velocity in a future EDM ring), database measurements to enable better polarimeter engineering, and the extension of these studies to protons.

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