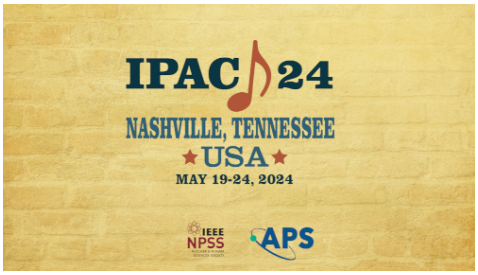

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Vertical quadrupole electric field systematics and its mitigation in the proton-EDM ring

Tuesday, 21 May 2024 16:00 (2 hours)

With the present proton electric dipole moment (pEDM) storage ring design [1], the counter rotating (CR) beam closed orbits will separate vertically if there is a nonzero radial magnetic field Bx. If a quadrupole electric field Ey is also present, then its direction would be opposite for the CR beams hence it becomes a potential source for a false EDM signal. In this work, we model this non-zero stray radial magnetic field Bx as a field perturbation source and it would cause the closed orbit distortion around the pEDM ring. This EDM-like background is due to the product of the electric quad multipole and the closed orbit distortion. We found the difference of the precession rates for CR beams and quadrupole magnet polarity would be a cure to this systematics.

Footnotes

[1] Zhanibek Omarov et al., Phys. Rev. D 105, 032001 (2022).

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Primary author: LEE, Jonathan (Stony Brook University)

Co-authors: MORSE, William (Brookhaven National Laboratory); MEOT, Francois (Brookhaven National Laboratory); SEMERTZIDIS, Yannis (Center for Axion and Precision Physics); OMAROV, Zhanibek (Center for Axion and Precision Physics); HACIOMEROGLU, Selcuk (Institute for Basic Science)

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