

Accelerator Physics and Technology Seminar

A Dedicated Muon EDM Experiment at Fermilab

Aakaash Narayanan, FNAL

Date: Tuesday, January 30

When: 4:00 pm CST

Where: One West (WH1W) and Zoom

Abstract: With the latest results of Fermilab Muon $g-2$ experiment out, the discrepancy from theory of the measured magnetic dipole moment (MDM) of the muon looks persistent, and there is much motivation to search for new physics in spin precession experiments. In this talk, we shall propose a novel idea of re-using a modified version of the Muon ' $g-2$ ' storage ring for a potential new scientific program to search for a non-zero muon electric dipole moment (EDM). Using both electric and magnetic dipole fields to produce a "frozen spin" condition for the MDM spin precession (all the while enhancing the EDM signal), the storage ring could operate at a lower central muon momentum to make a dedicated muon EDM measurement. Preliminary calculations and simulation results of muon production at 800 MeV PoT along with the determination of the muon closed orbit inside the hybrid ' $g-2$ ' storage ring configuration shall be presented. Possibilities of using the ' $g-2$ ' storage ring as a test bench to demonstrate the freezing of the MDM spin precession shall be discussed. The operational range of the muon's momenta and their respective window of electric and magnetic field values to establish the frozen spin condition shall be presented. We shall also briefly discuss the physics prospects and potential improvements in the muon EDM bound upon using Fermilab's PIP-II and Accelerator Complex Evolution (ACE) upgrades to the present accelerator systems.

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