

Search for a permanent muon electric dipole moment at the Fermilab Muon g-2 experiment

A new source of CP violation beyond the Standard Model is needed to explain the Baryon Asymmetry in the Universe (BAU). Assuming CPT symmetry, a permanent electric dipole moment (EDM) for an elementary particle can provide a new source of CP violation as it violates time-reversal symmetry and, therefore, CP symmetry. The current experimental limit of the muon EDM is 10^{-19} e cm, about 17 orders of magnitude above the Standard Model prediction of 10^{-36} e cm. The smallness of the SM value means that it is not reachable experimentally in the near future and therefore any detected muon EDM signal will be a strong hint of new physics. At Fermilab, we aim to perform a more sensitive search of the muon EDM using both tracker-based and calorimeter-based analyses. In this poster, we will present the calorimeter-based approach where the muon EDM signal is extracted from the relationship between the muon g-2 phase and the vertical hit position of positrons on the calorimeter.

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