

Search for the muon electric dipole moment at PSI

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The presence of a permanent electric dipole moment (EDM) in any elementary particle implies CP violation and thus could help explain the matter-antimatter asymmetry observed in our universe. Within the context of the Standard Model, EDMs of SM particles are extremely small. However, in many beyond SM theories, EDMs could be within experimental reach in the near future. Recently, muon EDM is of particular interest due to the tensions in the anomalous magnetic moment of the muon and the electron, and hints of lepton flavor universality violation in B decays. Moreover, the 23 orders of magnitude difference between the current experimental limit (10^{-19} e cm) and the SM prediction (10^{-42} e cm) means muon EDM is one of the least tested areas of the SM and any detected signal is a strong hint of new physics. In this talk, we discuss a dedicated effort at Paul Scherrer Institute to search for the muon EDM using a 1.5 T compact muon storage ring and the frozen spin technique [F.J.M. Farley et al, PRL 93, 052001 (2004)]. This technique is more sensitive than the usual “parasitic” method utilized by the BNL/FNAL/J-PARC collaborations by several orders of magnitude, and could reach (5×10^{-23} e cm) after a year of data taking with the 125 MeV/c muon beam at PSI [A. Crivellin et al, PRD 98, 113002 (2018)].

Working group

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Author: Prof. KHAW, Kim Siang (Tsung-Dao Lee Institute (CN))

Presenter: Prof. KHAW, Kim Siang (Tsung-Dao Lee Institute (CN))

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