

PHYSICS DEPARTMENT COLLOQUIUM

“A New Search on Neutron Electric Dipole Moment”

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Recently, a new experiment was proposed to search for the neutron Electric Dipole Moment (EDM) with an unprecedented sensitivity. The proposed search will have a two orders of magnitude improvement over the current neutron EDM limit given by the Particle Data Group. A search for a non-zero value of the neutron EDM is a direct search of the time reversal symmetry (T) violation. Therefore, it provides a unique insight of CP violation because of the CPT theorem. The Standard Model (SM) prediction for the neutron EDM is below the current experimental EDM limit by six orders of magnitude. However, many proposed models of electroweak interaction which are extensions beyond the SM predict much larger values of neutron EDM. The new experiment has the potential to reduce the acceptable range of predictions by two orders of magnitude. Furthermore, if new sources of CP violation are present in nature beyond the CKM (after Cabibbo, Kobayashi, and Maskawa) mechanism in the Standard Model and are relevant to hadronic systems, this experiment offers an unique opportunity to measure a non-zero value of neutron EDM. The current understanding of the baryogenesis suggests that other sources of CP violation might exist in nature beyond the Standard Model and beyond what have been observed so far. To explain the baryon number asymmetry in the universe through the grand unified theory or electroweak baryogenesis, substantial New Physics in the CP violation sector is required. In this talk, I will discuss this new experiment following a brief review of previous neutron EDM experiments.

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