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Neutron EDM Searches

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New measurements of the neutron electric dipole moment (nEDM) will place even tighter constraints on theories involving new sources of CP violation beyond the standard model. It is believed these are required in order to explain the predominance of matter over antimatter (baryon asymmetry) in the universe. The nEDM constrains new physics scenarios at the TeV scale and beyond which do not conserve CP. A new measurement also could impact a longstanding mystery in the standard model, involving the apparent lack of CP violation arising from the strong sector. A discovery of a nonzero nEDM would be a major discovery, because it would shed light on a broad range of theories.

The most precise experiments involve new intense sources of ultracold neutrons (UCN). UCN are slow moving neutrons that can be stored in material, magnetic, and gravitational bottles. The ability to trap the UCN makes them ideal for nEDM measurements. The most precise experiment to date was conducted at PSI and determined an upper bound on the nEDM of $|d_n| < 1.8 \times 10^{-26}$ $e$cm (90% c.l.). The next generation of neutron EDM experiments aim to improve the uncertainty to the 1×10^{-27} $e$cm level. In this presentation, I will review the current status of nEDM experiments worldwide, with a focus on recent experimental progress made by each project. This will include some discussion of the TUCAN EDM experiment at TRIUMF, which I am involved in.

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