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The Electric Dipole Moment of the Neutron and the PanEDM Experiment

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Since several decades people search for the electric dipole moment (EDM) of the neutron, an unambiguous manifestation of parity (P) and time reversal symmetry (T) violation. Assuming the conservation of CPT, T violation in a fundamental system also means CP violation. This has only been observed in very few systems in the Standard Model of particle physics (SM) as a tiny effect. However, it would be needed in much larger quantities to help explain the matter-antimatter asymmetry in the Universe. With a long history of innovation and persistence, the neutron EDM dn is now limited to below 3·10−26 e·cm, an extraordinarily small number, corresponding to an energy resolution of 10-22 eV. As a complementary system among a variety of possible options, it is still a very promising candidate due to its comparably simple composition and needed to understand the underlying fundamental physical processes. In this talk I will discuss experimental efforts and challenges to develop a next generation of neutron EDM searches, with one focus on the PanEDM Experiment, technological advances in ultra-low magnetic fields with broader impact and a new concept to reach 10-29 ecm sensitivity with mostly existing technology.

Content of the contribution

Experiment

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