

Measurement of the Static Electric Dipole Moment of the Neutron

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The static electric dipole moment of the neutron is one of the most sensitive probes of CP violation beyond the Standard Model. The world's most sensitive experimental measurement of this quantity is operated by a Sussex/RAL/ILL collaboration at the Institut Laue Langevin in Grenoble. The basic idea of the experiment is to construct an atomic clock using neutrons as oscillators and then look for a shift in the clock's frequency under the influence of a large applied electric field. Measurements with this apparatus have already reached a sensitivity which challenges models of physics beyond the Standard Model (such as the MSSM, which predicts values for the nEDM near or above the current limit from our experiment). A new experiment is being designed by a Sussex/RAL/Kure/ILL collaboration which should push the sensitivity by a further two orders of magnitude, completely probing the parameter range allowed by the MSSM. This new experiment is based on a new way of producing higher densities of ultra-cold neutrons by downscattering in superfluid LHe, and preliminary measurements of the production mechanism have already been successfully carried out. The talk will describe the existing experiment and the limits derived from it as well as describing the measurements and plans for the next-generation experiment.