

Particle Physics at the high-precision/low-energy frontier with Ultracold Neutrons at the Institut Laue-Langevin in Grenoble

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Due to their outstanding property to be storable and hence observable for long periods of time (several hundreds of seconds) in suitable material or magnetic traps, ultra-cold neutrons (UCN) with energies around 100 neV are an unique tool to study fundamental properties of the free neutron, like its beta-decay lifetime, its electric dipole moment and its wave properties.

The search for the electric dipole moment (EDM) of the neutron plays a prominent role in particle physics because of its direct bearing on CP and T violation: a non-zero value of the neutron EDM would be evidence of CP and T violation.

Precision measurements of the neutron lifetime provide stringent tests of the standard electroweak model as well as crucial inputs for tests of Big-Bang nucleosynthesis. Neutron lifetime can be related to CKM Matrix unitarity. Neutron lifetime also dominates the uncertainty in theoretical calculation of primordial 4He .

In this talk current ILL experiments linked to these fundamental questions are presented and a brief outlook is given.

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