

11th International Meeting of the Union for Compact Accelerator-driven Neutron Sources (UCANS11)

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Type: **Invited Talk (Category for invited speakers only)**

Ultra Cold Neutrons and (Some of) Their Applications in Fundamental Physics

Monday, 24 February 2025 14:10 (40 minutes)

Ultra-cold neutrons (UCN) are the slowest class of neutrons with typical energies in the neV range. They show the unique property that they are reflected at any angle from materials with sufficiently high optical potential, so that it becomes possible to confine and store them in material traps. The storage time can reach several hundred seconds and is theoretically limited by the free neutron's lifetime.

As a result of the long holding times UCN are extremely sensitive to small effects. This allows them to be used as probes to investigate fundamental physical phenomena, such as the understanding of the origin of asymmetry of matter and antimatter in the observed universe or search for signatures of dark matter particles. Examples of experiments that use UCN are, to name just a few, precision measurements to verify a non-vanishing permanent neutron electric dipole moment (EDM), bottle storing experiments to determine the neutron's lifetime and the preparation and study of gravitational eigenstates above a flat mirror surface.

The talk will give a short description of the aforementioned UCN experiments and discuss the questions they aim to answer.

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Presenter if not the submitter of this abstract

Funding Agency

Abstract classification - track type

Physics

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