

Service de Physique Nucléaire



Séminaire

le Vendredi 25 novembre 2011 à 11h

CEA Saclay, Orme des Merisiers, Bât. 703, Salle 135

Ultracold neutrons - a tool for studies in fundamental physics

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Ultracold neutrons (UCN) are an excellent tool to study fundamental symmetries and interactions. Experiments aim at highest precision at lowest energies and provide information complementary to high-energy physics and with impact on astrophysics and cosmology. Despite longstanding, the search for a non-vanishing electric dipole moment of the neutron is a hot topic pursued by several laboratories around the world. A non-zero result would provide strong evidence of CP violation beyond the mechanism of the standard model of particle physics and help understanding the creation of baryonic matter in the big bang. The neutron lifetime is another key observable investigated with ultracold neutrons. It determines the creation of the light chemical elements in the big bang and is still astonishingly poorly known. A plethora of further investigations comprises searches for dark matter seeking transitions of neutrons to their partner particles in a \tilde{O} mirror world, searches for violation of the Lorentz invariance, searches for axion-like particles and searches for deviations from Newton's gravity law at short distances in the micrometre range. As an important prerequisite the improvement of UCN sources ranks on top of the agenda of many research groups around the world. This talk will give an overview of the field and describe recent advances in UCN production at the ILL in Grenoble using superfluid helium as converter medium, as well as our plans for an improved neutron lifetime experiment.

Le café sera servi 10 minutes avant

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