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FUNDAMENTAL PHYSICS WITH ULTRA-COLD NEUTRONS COMES TO CANADA

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The knowledge of fundamental properties of the neutron helps us understand many aspect of the universe. It all starts right after the Big Bang: matter wins over antimatter in the Universe, making our existence possible. The main ingredient to that, matter anti-matter asymmetry, requires major violation of another fundamental symmetry, called CP violation. This, in turn might show up in a non-zero electric dipole moment (EDM) of the neutron, making EDM measurements the flagship of fundamental neutron physics.

The lowest limits on this quantity have been set by experiments using very slow neutrons (v < 7 m/s), called ultra-cold neutrons (UCN), the best being d<2.9e-26 ecm. UCNs have energies in the 100 neV region and can be manipulated and stored in traps via gravitational, strong and electromagnetic interaction.

The presentation will introduce the concept of neutron EDM measurements, ultra-cold neutrons and their production at the upcoming ultra-cold neutron facility at TRIUMF, Vancouver. It will give a status update and an outlook on the physics that can be done with UCN.

Author: PICKER, Rüdiger (urn:Google)

Presenter: PICKER, Rüdiger (urn:Google)

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