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Ultracold Neutrons as powerful probes in particle physics and cosmology

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Experiments with very slow –so-called ultracold –neutrons are a powerful probe of models of the early universe at the precision frontier. Flagship experiments with ultra-cold neutrons measure the lifetime of the free neutron and search for its electric dipole moment.

Ultracold neutrons are as well excellent objects to test gravity at short distances, as they are electrically neutral, only hardly polarizable, and offer large observation times. Today, flagship experiments apply spectroscopic techniques to investigate gravity at short distances. The results are used to test various Dark Energy and Dark Matter scenarios in the lab, and to study the interplay between gravity and quantum mechanics.

In my talk, I will review the experiments, explain key technologies and summarize the results obtained.

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