

High Precision Experiments with Cold and Ultra-Cold Neutrons

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The Neutron and Quantum Physics Group at TU Wien pursues various research approaches in the field of particles and cosmology.

In this talk, I will present a precise determination of the weak axial vector coupling g_A from a measurement of the β -asymmetry in the decay of free neutrons and the relationship to the unitarity of the CKM matrix. New symmetry tests of various kinds are coming within reach with the neutron decay facility PERC at Munich research reactor FRM2 or at ESS, the European Spallation Source. In focus are searches for possible deviations from the Standard Model (SM) of particle physics with cold and ultra-cold neutrons.

Next, we present a novel direct search strategy with neutrons based on a quantum bouncing ball in the gravity potential of the earth. The aim is to test the law of gravitation with a quantum interference technique, providing constraints on dark matter and dark energy.