

Plenarvortrag PV XI Mi 8:45 RW 1
Spectroscopy of Gravity with Ultra-Cold Neutrons —
•HARTMUT ABELE — Atominstitut - Technische Universität Wien,
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This talk is about a test of gravitation at small distances by quantum interference. The method is based on a new spectroscopy technique, devoid of electromagnetic coupling. The quantum bouncing ball allows us to observe transitions between gravitational quantum states, when a Schrödinger-wave packet of an ultra-cold neutron couples to the modu-

lation of a hard surface. The technique is related to Rabi spectroscopy usually used in atom optics, and the experiment has the potential to test the equivalence principle and Newton's gravity law at the micron scale, because Newtonian gravity and hypothetical fifth forces evolve with different phase information. Such forces can be mediated from gauge bosons propagating in a higher dimensional space and this experiment can therefore test speculations on large extra dimensions of sub-millimetre size of space-time or the origin of the cosmological constant in the universe, where effects are predicted in the interesting range of this experiment and might give a signal in an improved setup.