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qBOUNCE, and an acoustic Ramsey-type Gravity Resonance Spectrometer

Thursday 6 June 2019 14:30 (20 minutes)

This talk focuses on the control and understanding of a gravitationally interacting elementary quantum system using the techniques of resonance spectroscopy. It offers a new way of looking at gravitation at short distances based on quantum interference. The ultra-cold neutron reflects from a mirror in well-defined quantum states in the gravity potential of the earth allowing the application of gravity resonance spectroscopy (GRS). GRS relies on frequency measurements, which provide a spectacular sensitivity.
An acoustic Ramsey setup, currently under development, will set new standards in precision for the experiment qBOUNCE in many respects.
I also present a novel search strategy using GRS to differentiate between Einstein's cosmological constant and dark energy theories. This example show that questions of particle physics and cosmology at highest energies can be pursued at the other extreme of the energy scale, using neutrons at the lowest energies down to the pico-eV range.

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