Contribution ID: **204** Type: **Poster**

Realization of Ramsey-type Gravity Resonance Spectroscopy within qBounce

Tuesday 18 October 2016 18:05 (1 minute)

We present the status of gravity resonance spectroscopy (GRS): The neutron serves as a measuring tool and as an object for gravity research. We show that GRS allows to test Newton's inverse square law at short distances and to search for dark matter and dark energy candidates. We use a method based on frequency measurements which have shown spectacular sensitivity in the past. Our method also bypasses electromagnetic interactions like van der Waals or Casimir forces. Implementing a Ramsey-like setup, it is also possible to probe neutron's electric neutrality. Experimental data on transition frequencies of the quantum gravitational bound states of ultracold neutrons help to solve cosmological puzzles in terrestrial table top experiments.

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Session Classification: Poster Session