Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

Probing Planck-scale physics with opto-mechanical systems IGOR PIKOVSKI, ITAMP / Harvard University, MICHAEL VANNER, University of Queensland, MARKUS ASPELMEYER, University of Vienna, MYUNGSHIK KIM, Imperial College London, CASLAV BRUKNER, University of Vienna — The ability to manipulate and to control quantum systems in novel regimes provides new ways to test our current understanding of physics. Here we show that some phenomenological models of quantum gravity can be probed with pulsed opto-mechanical systems. We introduce a scheme in which possible modifications of the canonical commutation relation of the center of mass mode of a massive mechanical oscillator can be tested. Our protocol utilizes quantum optical control and readout of the mechanical system and can probe possible deviations from the quantum commutation relation even at the Planck scale. We show that the scheme is within reach of current technology and thus opens a feasible route for tabletop experiments to test possible quantum gravitational phenomena.

Igor Pikovski
ITAMP / Harvard University

Date submitted: 01 Feb 2015 Electronic form version 1.4