Macroscopic tests of quantum mechanics via Ramsey correlations measurements

Peter Rabl

Atominstitut
TU Wien
Vienna, Austria

In this talk I will describe a new set of protocols for testing quantum mechanical properties of massive objects, where a single two level system is used to probe the motion of a nanomechanical resonator via multiple Ramsey interference measurements. Under appropriate conditions the correlations between two subsequent measurement outcomes violate a Leggett-Garg type inequality and further I will show, how the measurement of three point correlation functions could be applied for tests of quantum contextuality. The proposed scheme can be implemented with different solid state or photonic qubit-resonator systems and provides unambiguous experimental signatures to distinguish the predictions of quantum mechanics from other realistic hidden variable theories at a macroscopic scale.