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Seminar über Quanten-, Atom- und Neutronenphysik (QUANTUM)

June 13, 2024 at 2 p.m. c.t.
IPH Lorentzraum 05-127

Prof. Eugene Polzik
University of Copenhagen, Denmark

CXLD Quantum Sensing with Macroscopic Objects

Studies of extreme cases within quantum mechanics have always been particularly attractive. How macroscopic can objects be and still demonstrate unique quantum features, such as entanglement? What are the real limits of measurement precision in quantum mechanics? I will review our experiments where macroscopic objects are driven deep into the quantum regime. Observation of a quantum trajectory of motion in a quantum reference frame with, in principle, unlimited accuracy will be presented. A concept of a reference frame with an effective negative mass required for such observation will be introduced. Generation of an entangled Einstein-Podolsky-Rosen state between distant mechanical and atomic oscillators and progress towards application of those ideas to gravitational wave detection will be reported. Finally, a recent demonstration of entanglement enhanced magnetic induction tomography for medical applications will be presented.

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