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[504] Cavity optomechanics implemented using levitating superconductors and Josephson microwave circuits

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Experimental investigation of quantum mechanics with heavy objects ($> m_{\text{planck}} \sim 20 \mu\text{g}$) has not been achieved. It requires the combination of decoupling the quantum object from environmental influences, while remaining high control of it, a challenge increasing with the mass of the object.

To achieve these, we implement the approach of superconducting microspheres in a magnetic field trap, allowing for a mass independent levitation. To reach sufficiently high coupling rates we inductively couple the mechanical motion to superconducting circuits to enable quantum states of motion in a completely new regime of masses.

In my talk I will discuss prospects and challenges of the envisioned approach along with the current status of our experiment.

Primary author: SCHMIDT, Philip (Austrian Academy of Science)

Co-authors: Prof. ASPELMEYER, Markus (University of Vienna); Mr HOFER, Joachim (University of Vienna); Dr HIGGINGS, Gerard (Chalmers University); Dr TRUPKE, Michael (University of Vienna); Dr MINIBERGER, Stefan (University of Vienna); Mr ILK, Dominik (University of Vienna)

Presenter: SCHMIDT, Philip (Austrian Academy of Science)

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