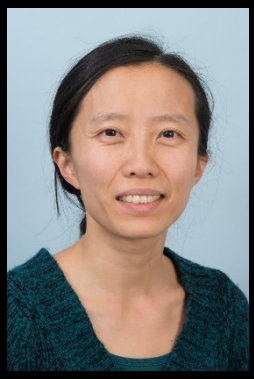
universität innsbruck

FWF Der Wissenschaftsfond

# Innsbruck Physics Colloquium



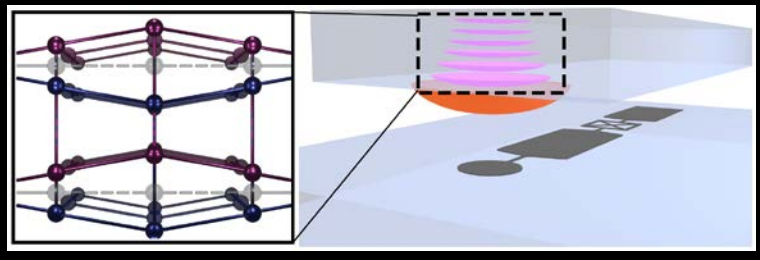
Schrödinger cat states of a
16-microgram mechanical oscillator


## Yiwen Chu

ETH Zürich, Dep. of Physics



One of the fundamental unanswered questions in quantum physics is why we do not observe macroscopic objects to be in superpositions of states that can be distinguished by some classical property. Various experiments have tried to explore this question by creating so-called "Schrödinger cat states" in systems ranging from SQUIDs to atom interferometers. I will present our recent work that demonstrates the preparation of a mechanical resonator with an effective mass of 16 micrograms in Schrodinger cat states of motion, where the constituent atoms oscillate in a superposition of two opposite phases. By using the resonant Jaynes-Cummings interaction between the resonator mode and a superconducting qubit, we are able to demonstrate the evolution of an initial mechanical coherent state into a superposition of distinct states in phase space. Our results may have applications in continuous variable quantum information processing and in fundamental investigations of quantum mechanics in massive systems.

**DK-ALM Pre-Talk:**
**Florian Goschin**
Optomechanics with levitated particles in ultra-high vacuum

**Time & Location: Tuesday, 27.06.2023, 16:30 h & 17.15 h HS C**
**Snacks will be provided in between the pre-talk and the colloquium.**

LAND TIROL

Innsbruck Physics Colloquium, Organisation: K. Erath-Dulitz, H.-C. Nägerl, T. Schrabback