universität ulm

Physikalisches Kolloquium — Physics Colloquium

Einladung — **Invitation**

Monday, 17 October 2022

Lecture Hall O25/H2, 16:15

Testing and Exploiting Macroscopic Quantum Physics

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Controlling the quantum dynamics of massive and complex objects, such as large molecules and nanoparticles, requires a detailed understanding of the interaction between their many interacting degrees of freedom and external control fields. In this talk, I will discuss how light scattering induces non-reciprocal interactions between co-levitated objects [1], how the rotational quantum interference of nanoparticles with embedded nitrogen-vacancy centres gives rise to novel quantum phenomena [2,3], and how diffraction of chiral molecules can prepare superpositions of molecular configurations [4]. These examples illustrate the potential of macro-mechanical quantum systems for novel force and torque sensing schemes and for high-mass tests of quantum physics.

[1] Rieser, Ciampini, Rudolph, Kiesel, Hornberger, Stickler, Aspelmeyer, and Delić, Tunable light-induced dipole-dipole interaction between optically levitated nanoparticles, Science 377, 987 (2022).

[2] Stickler, Hornberger, and Kim, Quantum rotations of nanoparticles, Nat. Rev. Phys. 3, 589 (2021).

[3] Rusconi, Perdriat, Hétet, Romero-Isart, and Stickler, Phys. Rev. Lett. 129, 093605 (2022).

[4] Stickler, Diekmann, Berger, Wang, Phys. Rev. X 11, 031056 (2021).

Host: Prof. Dr. Martin Plenio, Institute of Theoretical Physics

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