



Contribution ID: 12

Type: **Talk**

【546】 Cavity-Based 3D Cooling of a Levitated Nanoparticle via Coherent Scattering

Friday 30 August 2019 13:00 (15 minutes)

Levitodynamics, studying the dynamics of levitated massive particles in vacuum, is currently finding applications in high-end sensing. Within fundamental physics, investigating quantum mechanics or thermodynamics at the mesoscale are driving forces of the emerging field. All these areas of levitodynamics rely on tightest control over the center-of-mass (c.m.) motion of the particle.

Here, we experimentally realize \1 cavity cooling of all three c.m. motional degrees of freedom of a levitated nanoparticle in vacuum. The particle is trapped in an optical tweezer and is cooled by coherently scattering tweezer light into the cavity mode. We discuss \2 methods, limits, and opportunities of our approach.

\1 [Phys. Rev. Lett. 122, 123601 (2019)]¹

\2 [arXiv:1902.01282 (2019)]²

Authors: Mr WINDEY, Dominik (ETH Zürich); Dr GONZALEZ-BALLESTERO, Carlos (Innsbruck); Mr MAURER, Patrick (Innsbruck); Prof. NOVOTNY, Lukas (ETH Zürich); Prof. ROMERO-ISART, Oriol (Innsbruck); Dr REIMANN, Rene (ETH Zürich)

Presenter: Mr WINDEY, Dominik (ETH Zürich)

Session Classification: Quantum Science and Technology

Track Classification: Quantum Science and Technology