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Optomechanical applications of optically levitated nanoparticles[1]

LEVI NEUKIRCH, Department of Physics and Astronomy, University of Rochester, NICK VAMIVAKAS, Institute of Optics, University of Rochester — Optomechanics experiments performed in vacuum with optically levitated oscillators offer mechanical quality factors unmatched by clamped resonators. Single-beam gradient force traps have proven capable of stably levitating nanoscale dielectric spheres in high vacuum, and parametric modulation of the trap stiffness has been demonstrated as an efficient way to cool the center of mass motion. We present our optical levitation and cooling apparatus, and characterize its performance. We discuss several applications which extend control to degrees of freedom beyond the three-dimensional translational motion of the particle.

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