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Trapping of Silica Microspheres in Air and Vacuum using Counter-Propagating Optical Tweezers SIMON KHEIFETS, TONGCANG LI, DAVID MEDELLIN, MARK G. RAIZEN, University of Texas at Austin — We have used counter-propagating dual-beam optical tweezers to trap micron-scale Silica spheres in air and vacuum and observe their motion at microsecond and sub-Angstrom scales. This has allowed for detailed study of Brownian motion and precise measurements of fluid-particle interactions. There has been growing interest in cooling of mechanical modes of high Q resonators towards ground-state levels, which is usually limited by coupling of the resonator to a warmer thermal reservoir. When in vacuum, our bead is completely thermally isolated and represents an ideal candidate for ground-state cooling and ultimately for use as an ultra-sensitive detector operating at the quantum limit.

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