



Apr 17th, 9:00 AM - 10:00 AM

Studying the Dynamics of Micron-Sized Particles in Optical Traps

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Olaosebikan, Debo; Forster, Jason; Bulkley, Andrea; and Spalding, Faculty Advisor, Gabriel C., "Studying the Dynamics of Micron-Sized Particles in Optical Traps" (2004). *John Wesley Powell Student Research Conference*. 20.
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Poster Presentation P35

**STUDYING THE DYNAMICS OF MICRON-SIZED PARTICLES IN
OPTICAL TRAPS**

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Optical Tweezers utilize dipole forces to *overcome* both gravity and the radiation pressure exerted by coherent laser light. Coherence is not important for conventional optical tweezers, but plays an important role in the interferometric approaches to optical trapping that we are exploring. Moreover, the role played by radiation pressure (backward scattering) is not always deleterious, and must be treated carefully. Random, thermal (Brownian) forces have a strong influence upon micro-scale particles, as does hydrodynamics.

We will discuss modeling of the interaction with simple (spherical) particles with a 3D optical lattice, and the details of experimental design offering calibrated sensitivities at the picoNewton level. Such resolution is of great significance in the study of molecular motors and in unraveling properties of DNA. Key technologies detailed in this presentation include quad-photodiode for high-bandwidth detection of forward-scattered light, and acousto-optic deflectors for generation of time-shared traps generated from a single beam.