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Optical Trap Arrays with Enhanced Uniformity

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Oral Presentation O8.1

OPTICAL TRAP ARRAYS WITH ENHANCED UNIFORMITY

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Optical traps are concentrations of light that restrict the movement of physical objects by way of conservation of momentum. Acoustic-optic deflectors (AODs) can steer light far more rapidly than conventional mirrors, which are limited by the inertia of the material involved. AODs work by sending controlled sound waves through a transparent medium: one can set up a periodic variation in the optical index of refraction, thereby causing light transmitted through the material to be deflected to a degree that is set by the frequency of the acoustic wave. We have written software to provide control, calibration, and analysis for AOD-generated arrays of optical traps. This software compensates for changes in efficiency and in beam aberration as the beam is deflected, modifying the laser power so as to normalize trap strengths.