Abstract Submitted
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Computational Investigation of Dipole Traps Formed by the Projection of Diffraction Patterns from a Circular Aperture[1] GLEN D. GILLEN, KATHARINA GILLEN-CHRISTANDL, Physics Department, California Polytechnic State University, San Luis Obispo — Previously we have shown that laser light incident upon a circular diffracting aperture produces intensity distributions suitable for either red-detuned (RDT) or blue-detuned (BDT) optical dipole traps for cold neutral atoms [1]. Typically, the calculated traps are located within a millimeter of the diffracting aperture, which requires the aperture to be located inside of the vacuum chamber. Using a combination of scalar diffraction theory and beam propagation techniques, a mathematical model has been developed to project the diffraction pattern away from the aperture [2]. Projected intensity distributions allow for the diffracting aperture and optics to be located outside of the vacuum chamber. We will present calculations which show that the properties of the RDT and BDT sites are not only maintained through the projection, but also can be manipulated using a simple single-lens optical system.

[1] Gillen, et al., PRA 73, 013409 (2006)
[2] Gillen-Christandl and Gillen, PRA 82, 063420 (2010).

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Katharina Gillen-Christandl
Physics Dept, California Polytechnic State University, San Luis Obispo

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