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Observation of Carbon Nanotube Optical Bistability D. MILKIE, C. STAII, S. PAULSON, E. HINDMAN, A.T. JOHNSON, J.M. KIKKAWA, Department of Physics and Astronomy, University of Pennsylvania, Philadelphia, PA 19104 — We present scanning confocal microscopy studies of suspended carbon nanotubes grown by chemically-assisted vapor deposition across micron-sized apertures. Maps of the photoluminescence emission taken at the E11 peak show unusual 'holes' and 'rings' with subwavelength spatial features. These features result from abrupt $\sim$20 meV blue shifts in the emission energy due to small changes in the excitation position. Polarization and intensity dependent studies show that this switching behavior depends on the intensity of light absorbed into the nanotube, and additional spatial structure is seen by varying the excitation wavelength. Our findings suggest that the phenomenon represents a true bistability of the E11 transition, and perhaps a many-body effect, as no intermediate emission wavelengths are observed. This work was supported by DARPA/ONR N00015-01-1-0831, NSF DMR 00-79909, SENS, NSF IGERT DGE-0221664 and in part (SP and ATJ) by the Commonwealth of Pennsylvania's Ben Franklin Technology Development Authority through the Nanotechnology Institute. Authors SP and ATJ acknowledge financial support through the Nanotechnology Institute of the Commonwealth of Pennsylvania.

Daniel Milkie
Department of Physics and Astronomy, University of Pennsylvania
Philadelphia, PA 19104

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