Abstract Submitted
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Micron-scale ion trap to interface atoms and photons J.D. STERK, T.A. MANNING, L. LUO, P. MAUNZ, C. MONROE, Joint Quantum Institute, University of Maryland Department of Physics and National Institute of Standards and Technology, College Park, MD 20742 — Reflective optics placed near a trapped ion may potentially improve the success rate for probabilistic entangling schemes that rely on the collection and interference of single photons [1]. We successfully trapped an ytterbium ion at the focus of a 5mm spherical reflector using an optically open trap with moveable electrodes and measured characteristic trap parameters. We present progress towards observing an enhancement of ion fluorescence collection off the spherical mirror over that of free space [2, 3]. We discuss the possibility of placing the ion in an asymmetric, micron-scale optical cavity ($\mathcal{F} \approx 4500$) as well as describe various methods to generate ion-photon entanglement inside the cavity. This work is supported by IARPA under ARO contract, the NSF PIF Program, and the NSF Physics Frontier Center at JQI.

[1] D. L. Moehring, et al. *Nature* **449**, 68 (2007)
[2] N. Lindlen, et al. *Laser Physics* **17**,927 (2007)
[3] G. Shu, et al. *J. Phys. B* **42**, 154005 (2009); G. Shu, et al. ArXiv: 0911.4958

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