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Trapping Ions in a 2-pi Parabolic Mirror CHEN-KUAN CHOU, University of Washington, GANG SHU, Georgia Institute of Technology, THOMAS NOEL, JOHN WRIGHT, RICHARD GRAHAM, BORIS BLINOV, University of Washington, UNIVERSITY OF WASHINGTON TEAM — Single trapped ion qubit is an excellent candidate for quantum computation and information due to its low decoherence, ease of control and detection, and ability to couple to a photon, the flying qubit. Efficient coupling between ions and resonant photons is crucial for ion-photon and remote-ion entanglement protocols. We describe the operation of a RF ion trap in which a reflective parabolic surface serves as of the trap's electrodes. This parabolic mirror covers a solid angle of approximately 2 pi around the trapped ion, and allows precise ion placement at the focal point of the parabola. We measured approximately 39% fluorescence collection from a single ion with this mirror. With the advantage of producing a collimated photon beam, we expect to couple the ion fluorescence into a single-mode fiber in a straightforward way.

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