

Abstract Submitted  
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**Photon Collection from a Trapped Ion in a Cavity**<sup>1</sup> T. ANDREW MANNING, JONATHAN STERK, LE LUO, CHRIS MONROE, JQI, University of Maryland, PETER MAUNZ, ECE Department, Duke University, Durham, NC 27708 — A micron-scale ion trap is integrated with a 2 mm Fabry-Pérot cavity to enhance the spontaneous emission from a single trapped ytterbium ion. Exciting the atom from the side of the cavity with a near resonant laser beam, we measure the scattered emission rate from the fundamental, undriven cavity mode. We collect roughly 500 times more fluorescence compared to the expected free-space emission into the same solid angle subtended by the cavity mode. Progress towards a protocol for generating entanglement between the ion spin state and the output cavity photon polarization is presented, as well as a discussion of applying this method to improve the success probability of entangling remote ions [1,2].

[1] L.-M. Duan and C. Monroe, *Rev. Mod. Phys.* **82**, 1209 (2010)

[2]. J. D. Sterk, Ph.D. thesis, University of Michigan, Ann Arbor, Michigan (2011)

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