

Abstract Submitted
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Non-destructive photon detection using a single rare earth ion coupled to a photonic cavity¹ CHRIS O'BRIEN, Material Science, Lynntech, Inc., TIAN ZHONG, ANDREI FARAON, T.J. Watson Laboratory of Applied Physics, California Institute of Technology, CHRISTOPH SIMON, Institute for Quantum Science and Technology and Department of Physics and Astronomy, University of Calgary — We study the possibility of using single rare-earth ions coupled to a photonic cavity with high cooperativity for performing non-destructive measurements of photons, which would be useful for global quantum networks and photonic quantum computing. We calculate the achievable fidelity as a function of the parameters of the rare-earth ion and photonic cavity, which include the ion's optical and spin dephasing rates, the cavity linewidth, the single photon coupling to the cavity, and the detection efficiency. We suggest a promising experimental realization using current state of the art technology in Nd:YVO₄.

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