Abstract Submitted for the DAMOP13 Meeting of The American Physical Society

Heralded entanglement of two ions in an optical cavity TRACY E. NORTHUP, BERNARDO CASABONE, ANDREAS STUTE, BIRGIT BRANDSTÄTTER, KONSTANTIN FRIEBE, KLEMENS SCHÜPPERT, RAINER BLATT¹, University of Innsbruck — Optical cavities constitute a coherent interface between light and matter, while strings of addressable ions enable local quantum information processing. Coupling multiple, individually addressable ions to the mode of an optical cavity not only provides a framework for quantum network protocols but also can enhance the strength of the ion-cavity interface. Here, we demonstrate precise control of the coupling of each of two ions to the mode of an optical resonator. We then show ion-ion entanglement heralded by the detection of two orthogonally polarized cavity photons. Applications of this scheme to improve the effective ion-cavity coupling strength are discussed.

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Date submitted: 28 Jan 2013

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