Abstract Submitted
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**A collective ion-photon interface** L. KARPA, M. CETINA, A. BYLINSKII, D. GANGLOFF, K. BECK, Y. GE, A. GRIER, I. CHUANG, V. VULETIĆ, Center for Ultracold Atoms, Massachusetts Institute of Technology — We present a novel ion-photon interface implemented by combining a linear array of microfabricated radio-frequency ion traps with a medium-finesse ($\cong 4000$) optical resonator. We demonstrate deterministic loading of up to 10 array sites from an elongated ion crystal as well as their collective coupling to the optical cavity mode. Preliminary results show the capability of the system to store photonic information while providing single ion addressability. We anticipate applications in quantum information science, where photonically mediated information is mapped onto ion states that can subsequently be processed by manipulating the internal states or the collective motional modes of the trapped ions.

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