Abstract Submitted
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Entanglement of ions in a uniformly-spaced chain using individual addressing and pulse shaping[1] S. DEBNATH, T.A. MANNING, T. CHOI, B. FIELDS, C. MONROE, JQI and Department of Physics, University of Maryland, College Park, MD 20742 — We present progress towards entanglement of subsets of $^{171}Yb^{+}$ ions in a single uniformly-spaced chain using individual optical addressing and simple laser pulse shaping. A pulsed 355 nm laser drives Raman transitions to create a spin-dependent force on individual ions in the chain, where the collective ion motion facilitates the entanglement of the ions' spin states. By coupling to transverse phonon modes instead of axial modes, we will be less sensitive to thermal motion and ion heating, resulting in comparatively higher gate fidelities. Additionally, faster gate speeds are achievable by applying sequences of a few laser pulses at optimized intensities and detuning that couple to multiple modes of motion [1,2].

[1] G.-D. Lin, *et al. Europhys. Lett.* **86**, 60004 (2009)
[2] S-L Zhu, *et al.*, *Europhys. Lett.* **73**, 485-491 (2006)

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