Abstract Submitted
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Entangling gates in trapped ions using arbitrary individual addressing and pulse shaping[1] CAROLINE FIGGATT, SHANTANU DEBNATH, NORBERT LINKE, LENORE KOENIG, CHRISTOPHER MONROE, Joint Quantum Institute, University of Maryland Department of Physics and National Institute of Standards and Technology — We present progress towards quantum gates between arbitrary pairs of $^{171}Yb^{+}$ ions in a linear chain using individual optical addressing. A pulsed laser drives Raman transitions [1], using the beat note between frequency comb lines of counter-propagating Raman beams to couple the ion spins to the collective transverse modes of motion of the ion chain. Individual optical addressing of each ion with one Raman beam allows gates between arbitrary pairs of ions. A pulse shaping scheme is usedthat modulates the phase and amplitude of the Raman laser to drive high-fidelity entangling gates that are insensitive to detuning errors [2]. We can apply these gates programmatically to perform algorithms using concatenated operations.

[1] D. Hayes et. al., Phys. Rev. Lett. 104, 140501 (2010)
[2] T. Choi et al., Phys. Rev. Lett. 112, 19502 (2014)

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