

Abstract Submitted  
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**Ion trap quantum computing with transverse phonon modes** SHI-LIANG ZHU, CHRIS MONROE, LUMING DUAN, Department of Physics, Michigan University — We propose a scheme to use the transverse modes to implement conditional phase gates on two trapped ions immersed in a large linear crystal of ions, without the sideband addressing. Comparing with the conventional approach using the longitudinal modes, with the cost that the laser power is slightly stronger, the proposed gate operation can be well inside Lamb-Dicke region and the gate infidelity due to the fluctuation of the effective Rabi frequency as well as the fundamental limits of the cooling procedure are approximately two orders smaller.

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