

Abstract Submitted
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Trapped ion quantum computation with transverse phonon modes SHI-LIANG ZHU, CHRIS MONROE, L.-M. DUAN, Department of Physics, Michigan University — We propose a scheme to implement quantum gates on any pair of trapped ions immersed in a large linear crystal, using interaction mediated by the transverse phonon modes. Compared with the conventional approaches based on the longitudinal phonon modes, this scheme is much more insensitive to the ion heating and thermal motion outside of the Lamb-Dicke limit thanks to the stronger confinement in the transverse direction. The cost for such a gain is only a moderate increase of the laser power to achieve the same gate speed. We also show how to realize arbitrary-speed quantum gates with transverse phonon modes based on control of the laser pulses.

Shi-Liang Zhu
Department of Physics, Michigan University

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