

Abstract Submitted
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Frustrated spin-spin interactions between trapped ions using longitudinal and transverse phonon modes¹ YANLI ZHOU, College of Science, National University of Defense Technology — We present a scheme of quantum simulation of many-body interactions with trapped ions via the exchange of virtual phonons, where the motion from both the longitudinal and the transverse directions is considered. By tuning the detunings of Raman lasers, the long-range and locally tunable interaction is easily obtained between different spins. We show that the competing spin-spin couplings mediated by all motion modes can give rise to higher levels of frustration and richer phase transitions than the conventional approaches based on the longitudinal or the transverse phonon modes alone.

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