Abstract Submitted
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Progress towards dipole-phonon quantum logic with trapped ions[1] LU QI, EVAN REED, Department of Electrical and Computer Engineering, Duke University, WILL STAPLES, North Carolina School of Science and Mathematics, ZIYI WANG, Trinity College, Duke University, JYOTHI SARALADEVI, ERIC PRETZSCH, KENNETH BROWN, Department of Electrical and Computer Engineering, Duke University, WELSEY C. CAMPBELL, ERIC R. HUDSON, Department of Physics and Astronomy, University of California, Los Angeles , MICHAEL C. HEAVEN, Department of Chemistry, Emory University — Molecular ions are proposed to be promising candidates for high precision measurements of fundamental constants, cold chemistry dynamics control, and quantum information processing. Particularly with regards to quantum computer engineering, the rich internal structures and long range dipole-dipole interactions between molecular ions offer a means of potentially overcoming some of the current problems of atomic ion platforms. [2][3]. Here, we report our progress towards dipole-phonon interaction with molecular and atomic ions. A Calcium ion is cooled near its motional ground state and is used to excite a dipole transition of a co-trapped molecular ion by delicately controlling the phonons. Progress towards dipole-phonon logic gate is also presented.

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[2]E. Hudson and W. Campbell, 10.1103/PhysRevA.98.040302.
[3]W. Campbell and E. Hudson, arXiv:1909.02668.

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