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Trapped-ion spin-motion coupling with microwaves and a near-motional oscillating magnetic field gradient RAGHAVENDRA SRINIVAS, SHAUN C. BURD, National Institute of Standards and Technology, University of Colorado, Boulder, ROBERT T. SUTHERLAND, Lawrence Livermore National Laboratory, ANDREW C. WILSON, National Institute of Standards and Technology, Boulder, DAVID J. WINELAND, National Institute of Standards and Technology, University of Colorado, Boulder, University of Oregon, Eugene, DIETRICH LEIBFRIED, National Institute of Standards and Technology, Boulder, DAVID T. C ALLCOCK, National Institute of Standards and Technology, University of Colorado, Boulder, University of Oregon, Eugene, DANIEL H. SLICHTER, National Institute of Standards and Technology, Boulder — We present a new method of spin-motion coupling for trapped ions using microwaves and a magnetic field gradient oscillating close to the ions' motional frequency. We demonstrate and characterize this coupling experimentally in a surface-electrode trap that incorporates current-carrying electrodes to generate the microwave field and the oscillating magnetic field gradient. Using this method, we perform resolved-sideband cooling of a single motional mode to its ground state [1]. We also perform entangling gates between two ions and present initial results on gate fidelity.
[1] R. Srinivas *et al.* arXiv:1812.02098 (2018)

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