

Abstract Submitted
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Coupling a Spin Qubit in Diamond to the Motion of a Macroscopic Mechanical Cantilever SHIMON KOLKOWITZ, FRANK KOPPENS, Harvard University, ANIA BLESZYNSKI-JAYICH, Harvard and Yale University, PETER RABL, MIKHAIL LUKIN, Harvard University, JACK HARRIS, Yale University — Nano electro-mechanical systems (NEMS) can be used as quantum transducers for electronic spin qubits, where spins are coupled to the motion of magnetized mechanical resonators via magnetic field gradients [1]. Provided that the mechanical system is charged, the magnetic moments associated with spin qubits can be effectively amplified to enable a coherent spin-spin coupling over long distances via Coulomb forces. We describe experimental progress to achieve strong coupling between the spin state of a Nitrogen Vacancy (NV) Center in diamond with the motional state of a magnetized mechanical resonator.

[1] Rabl, *et al.*, “A quantum spin transducer based on nano electro-mechanical resonator arrays,” submitted to *Nature Physics* (2009). Pre-print available: arXiv:0908.0316

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