Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Coupling semiconductor qubits to phonons via a nanomechanical phoniton system CHARLES TAHAN, RUSKO RUSKOV, Laboratory for Physical Sciences — We explore the possibility of strongly coupling semiconductor qubit states to nanomechanical resonators (phonons) in silicon. These systems may be relevant to qubit transduction schemes, as supporting technology for quantum information processing, for qubit characterization, and for quantum-enabled devices. Specifically, we consider systems where cavity phonons can interact with suitable qubit states in the 1-10 GHz (and higher) regime (tunable using strain, electric and/or magnetic fields). These results may be useful for several solid-state devices as well as being of interest to the optomechanics community.

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Date submitted: 10 Nov 2011 Electronic form version 1.4