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.

Charles Tahan
Laboratory for Physical Sciences

Date submitted: 10 Nov 2011

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