Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Stark effect for Si:Li spin qubits LUKE PENDO, ERIN HANDBERG, South Dakota School of Mines and Technology, VADIM SMELYANSKIY, NASA Ames Research Center, ANDRE PETUKHOV, South Dakota School of Mines and Technology — We study the effect of a static electric field on lithium donors in silicon. Our treatment is based on a variational procedure utilizing a large set of basis functions similar to those used by Faulkner [1]. We take into account the valley-orbit splitting, arbitrary external stress and magnetic field as well as spin-orbit interaction. We believe that our variational method captures the effects of higher energy excited states as well as non-linear E-field contributions to the energy level splitting and the electrical dipole moment. The anisotropy of the effective mass in a single valley leads to an anisotropy of the quadratic Stark susceptibility. This anisotropy could be used to manipulate and control Si:Li spin qubits because it causes a nontrivial interplay of the Stark and Zeeman effects due to the unique inverted electronic structure of the Li donor in Si. [1] R.A. Faulkner, Phys. Rev. 184, 713 (1969).

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Date submitted: 19 Nov 2009 Electronic form version 1.4