Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

**Tight binding study of single ion magnetic anisotropy of $Mn^{2+}$ in Ga(Mn)As**[1] HEMACHANDER SUBRAMANIAN, JONG HAN, University at Buffalo, State University of New York — Bulk uni-axial magnetic anisotropy of Ga(Mn)As observed in experiments has not been well understood as much as cubic magnetic anisotropy in the same material. We propose that the uni-axial anisotropy arises due to the coupling of local lattice distortions around $Mn^{2+}$ impurity ion to its spin state through spin-orbit coupling of holes bound to the impurity ion. We model the coupling using nearest-neighbor tight-binding and many-body perturbation theory. The model includes intra-atomic Coulomb interaction inside $Mn^{2+}$ ion, spin-orbit interaction of holes at the $\Gamma$ point, $p-d$ hopping interaction between $Mn^{2+}$ ion $d$ orbitals and As ion $p$ orbitals, and strain due to local lattice distortions. We observe breaking of tetrahedral symmetry around the $Mn^{2+}$ ion when the system is paramagnetic. We explore the effect of this broken symmetry in stabilizing certain magnetization directions through spin-orbit coupling in the ferromagnetic regime.

[1]NSF DMR-0907150

Hemachander Subramanian
University at Buffalo, State University of New York

Date submitted: 11 Nov 2011 Electronic form version 1.4