Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Atomic scale gate electrode formed by a charged defect on GaAs(110) DONGHUN LEE, JAY GUPTA, Dept. of Physics, the Ohio State University — Electric-field control of spin-spin interactions at the atomic level is desirable for spintronics and spin-based quantum computation. Here we demonstrate the realization of an atomic-scale gate electrode formed by a single charged vacancy on the GaAs(110) surface[1]. A low temperature scanning tunneling microscope is used to position these vacancies with atomic precision. Tunneling spectroscopy suggests that the vacancies influence the in-gap resonance of Mn, Co and Zn acceptors via an interplay of quantum confinement, band bending and Coulomb electrostatics. We find that this electrostatic field can be used to tune the magnetic coupling between pairs of Mn acceptors. This suggests an avenue for controlling spin-spin interactions on the atomic scale. http://www.physics.ohio-state.edu/∼jgupta

[1] D. Lee and J.A. Gupta (in preparation)

Donghun Lee
Dept. of Physics, the Ohio State University

Date submitted: 07 Dec 2009 Electronic form version 1.4