Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

**Spin relaxation in InAs QDs**[1] ANDREAS RUSS, LARS SCHWEIDENBACK, MESUT YASAR, ATHOS PETROU, SUNY Buffalo, Buffalo, NY, GEORGE KIOSEOGLOU, University of Crete, Heraclion, Greece, CONNIE LI, BEREND JONKER, Naval Research Laboratoty Washington DC, MAREK KORKUSINSKI, Institute for Microstructural Sciences NRC, Ottawa — We have studied the circular polarization of the electroluminescence emitted from Fe spin-LEDs which incorporate a single layer of InAs QDs at the center of the device as function of magnetic field applied along the growth axis. The circular polarization below 50 K shows a dramatic drop around 5 tesla, indicating the presence of an efficient spin relaxation mechanism that is tuned by the externally applied magnetic field. Calculations indicate that such a mechanism exists at $B = 5$ tesla if the QDs are populated by 3 electron-hole pairs. The spin relaxation mechanism consists of a two step process. In the first step we have spin relaxation via spin-orbit interaction; in the second step we have energy relaxation via phonon emission. It is assumed that the QDs are anisotropic. This model was put to the test by studying a spin-LED which has a lower QD density and in which we can control the number of electron-hole pairs occupying each QD by changing the bias voltage. The predicted resonance was observed in this experiment verifying the proposed theoretical model.

[1]Work at SUNY was supported by ONR and NSF

Andreas Russ
SUNY Buffalo, Buffalo, NY

Date submitted: 20 Nov 2009 Electronic form version 1.4