Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Photoluminescence intensity oscillations with magnetic field in InGaAs quantum wells[1] LARS SCHWEIDENBACK, ANDREAS RUSS, TARIQ ALI, JOSEPH MURPHY, ALEXANDER CARTWRIGHT, ATHOS PETROU, SUNY Buffalo, ALEXANDER GOVOROV, Ohio University, CONNIE LI, AUBREY HANBICKI, BEREND JONKER, Naval Research Laboratory, GEORGE KIOSEOGLOU, University of Crete — We have observed magnetic field oscillations in the photoluminescence (PL) intensity from InGaAs quantum wells (QWs) with indium compositions of 5% and 15% with laser excitation close to the bandgap for temperatures < 20 K. For all samples the intensity maxima occur at 2.2 and 4.5 tesla when the magnetic field is applied perpendicular to the QW plane. Experiments in which the sample normal (z-axis) is tilted with respect to the applied magnetic field B show that the PL intensity maxima positions depend on the magnetic field component B_z. Time-resolved PL comparison with GaAs QWs yields much longer recombination times for the InGaAs QWs. Furthermore, cross sectional scanning tunneling microscopy studies indicate the formation of Indium rich InGaAs clusters in the InGaAs QWs. We interpret the observed oscillations in terms of the Aharonov-Bohm effect and quasi-indirect excitons with ring-like trajectories of carriers. The oscillation period corresponds to orbits with radius equal to 24 nm.

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

Andreas Russ
SUNY Buffalo

Date submitted: 18 Nov 2010 Electronic form version 1.4