Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Effect of negatively charged excitons on the phase coherent photorefractive effect in ZnSe quantum wells A. KABIR, H.P. WAGNER, Department of Physics, University of Cincinnati, Cincinnati, OH 45221, USA — We investigate the effect of negatively charged excitons (trions) on the efficiency and dephasing rate of the phase coherent photorefractive (PCP) effect in $ZnSe/Zn_{0.9}Mg_{0.1}Se$ single quantum wells using 90 fs light pulses. Intensity, temperature and spectrally dependent measurements are performed in a transient four-wave mixing configuration. In the presence of trions the PCP effect is composed of both a fast dephasing component that is caused by the formation of a trion grating and a slower decaying component caused by an exciton grating. With decreasing temperature the trion dephasing rate significantly increases while the exciton dephasing rate remains almost constant. The trion dephasing rate also increases with decreasing barrier width between the ZnSe quantum well (QW) and the GaAs substrate which is attributed to an enhanced electron density of captured substrate electrons in the QW. Model calculations based on the optical Bloch equations are in agreement with the experimentally observed PCP traces.

A. Kabir
Department of Physics, University of Cincinnati, Cincinnati, OH 45221, USA

Date submitted: 22 Nov 2008 Electronic form version 1.4