Abstract Submitted
for the MAS14 Meeting of
The American Physical Society

Coherent spectroscopy of excitons in strained bulk GaAs BRIAN WILMER, West Virginia University, ASHLEY BATESOLE, Ohio Northern University, DANIEL WEBBER, KIMBERLY HALL, Dalhousie University, EDWARD FLAGG, West Virginia University, RICHARD MIRIN, NIST - Boulder, ALAN BRISTOW, West Virginia University — Two-dimensional Fourier transform spectroscopy is used to measure bulk excitons in GaAs. The degeneracy of heavy and light hole excitons is lifted due to biaxial strain. This allows for observation of coherent coupling features between exciton resonances in rephasing spectra. This system differs from quantum wells, due to lack of inhomogeneity, and is a model system for isolating many-body interactions without quantum confinement. Low power and low temperature excitation reveals excitation-induced dephasing in the real-part of spectra. Excitation dependence shows an increase in spectral linewidths due to increasing excitation induced dephasing. Increasing temperature also increases dephasing, but reduces signal strength, due to increased interactions with the phonon bath. At low temperature there is also asymmetry in the strength of the off-diagonal coupling features, with downhill energy transfer being favored. The degree of asymmetry indicates that there are the same number of quantum pathways transferring spectral weight from the uphill coherence to the lower energy eigenstate and the higher energy eigenstate to the downhill coherence. At higher excitation density there is a swap in the strength of the coherences possibly due to saturation of the lower energy feature.

Brian Wilmer
West Virginia University

Date submitted: 29 Aug 2014 Electronic form version 1.4