Abstract Submitted
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Two quantum coherent spectroscopy of excitons in strained bulk GaAs[1] BRIAN WILMER, West Virginia University, DANIEL WEBBER, KIMBERLEY HALL, Dalhousie University, ALAN BRISTOW, West Virginia University, WEST VIRGINIA UNIVERSITY TEAM, DALHOUSIE UNIVERSITY COLLABORATION — Two-dimensional Fourier transform spectroscopy is used to measure the third order optical response from excitons in bulk GaAs. The degeneracy of the heavy and light hole excitons is lifted due to biaxial strain. This allows for the observation of coherent coupling features between the heavy and light hole resonances in spectra. This system differs from quantum wells, due to the lack in inhomogeneity, and is a model system for isolating many-body interactions without quantum confinement. Within the system, electrons and holes, requiring only one unit of excitation, can bind to form one quantum (1Q), excitonic states. With a second unit of excitation, the two quantum (2Q) excitation manifold can be accessed. While 1Q, rephasing spectra indeed have 2Q contributions, the peaks are crowded in single plot and difficult to resolve. 2Q scans have no 1Q contributions and allow for clear isolation of all coherences of that manifold. The sample exhibits states from bound heavy, light, and mixed (heavy and light)-hole biexcitons, as well as unbound yet correlated excitons, electron hole pairs, and scattering states. Polarization allows selection of certain states.

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