Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Temporal evolution of Trion-Exciton coupling in transition metal dichalcogenide[1] KHA TRAN, AKSHAY SINGH, Univ of Texas, Austin, GALAN MOODY, National Institute of Standards and Technology, SANFENG WU, JASON ROSS, XIAODONG XU, University of Washington, XIAOQIN LI, Univ of Texas, Austin — Transition Metal Dichalcogenides (TMD's), especially in the two-dimensional limit, show remarkable physical phenomena including large light absorption by single layers (up to 10%) and coherent many-body effects. Increased interactions in these two-dimensional materials have been attributed to reduced screening and these are reasoned to cause large binding energies of quasiparticles including excitons (coulomb bound electron-hole pairs) and trions (charged excitons). The coupling amongst these quasiparticles is an interesting fundamental problem relating to strength of electronic interactions as well as having applications in photo-detectors working beyond diffusive transport. We use two-color pump-probe spectroscopy to measure these quasiparticle interactions as a function of time. We concentrate on the special condition of pumping at the trion transition, which is lower in energy than the exciton, and probing the exciton transition. We observe an optical response with distinct temporal response compared to other excitation conditions. The observations are well explained by a phenomenological model incorporating Optical Bloch Equations which suggests many-body effects, including excitation induced shifts, are involved.

[1]We acknowledge NSF and AFOSR

Kha Tran
Univ of Texas, Austin

Date submitted: 14 Nov 2014 Electronic form version 1.4