Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Trion dynamics in Transition Metal Dichalcogenide Monolayers
AKSHAY SINGH, KHA TRAN, Univ of Texas, Austin, SANWENG WU, JASON ROSS, University of Washington, GALAN MOODY, National Institute of Standards and Technology, XIAODONG XU, University of Washington, ELAINE LI, Univ of Texas, Austin — Transition Metal Dichalcogenides (TMD's) in the monolayer limit, exhibit interesting phenomena including increased photoluminescence, spin-valley coupling and many-body effects. Excitons (bound electron-hole pairs) and trions (charged excitons) in these materials have unusually large binding energy and dominate the optical response near the band gap. In particular, trions can drift under application of an electric field and have higher spin lifetimes increasing applications in quantum spin models. We study the temporal dynamics of excitons and trions including their formation and lifetimes using time resolved two-color pump-probe spectroscopy on a monolayer TMD (MoSe2). Trions are observed to have vastly different temporal dynamics with much slower decay than excitons. We also observe rapid formation of trions when resonantly pumped while a slow rise (in temporal response) is seen for other excitation energies. We suggest that localization of trions needs to be taken into account to explain these observations.

Akshay Singh
Univ of Texas, Austin

Date submitted: 14 Nov 2014 Electronic form version 1.4