Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Transmission pump-probe spectroscopy on multilayer black phosphorus[1] RYAN J. SUESS, MOHAMMAD M. JADIDI, THOMAS E. MURPHY, MARTIN MITTENDORFF, University of Maryland-College Park, Institute for Research in Electronics and Applied Physics — Black phosphorus is a two-dimensional material that has recently attracted interest due to its high mobility and direct bandgap. In this work we examine the pump-induced change in optical transmission of mechanically exfoliated black phosphorus flakes using a two-color optical pump-probe measurement. The time-resolved data reveal a fast pump-induced transparency accompanied by a slower absorption that we attribute to Pauli blocking and free-carrier absorption, respectively. Polarization studies show that these effects are also highly anisotropic - underscoring the importance of crystal orientation in the design of optical devices based on this material. Ongoing work suggests that exploring the carrier density dependence of the pump-probe signals, which can be accessed experimentally via electrostatic gating, may allow for improved understanding of the optical response and carrier dynamics in the material.

[1]Supported by NSF and ONR-MURI

Ryan Suess
University of Maryland-College Park

Date submitted: 05 Nov 2015 Electronic form version 1.4