Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Weak Localization in Bulk Black Phosphorus and Few-Layer Phosphorene YUCHEN DU, ADAM NEAL, HONG ZHOU, PEIDE YE, Purdue University — Most of the recent experimental research on black phosphorus (BP) or phosphorene has been focused on device applications with few systematic studies on electrical transport properties of single-layer or few-layer phosphorene. Here, we report on the magnetotransport experiments on thick BP films and few-layer phosphorene at low temperatures. The observed weak localization is well fitted by the Hikami-Larkin-Nagaoka model where the temperature dependence of the phase coherence length has demonstrated to be a power-law behavior of $T^{-0.5}$. In addition, the temperature dependence of Hall mobility as a function of the film thickness is also examined to uncover the limitation of mobility in few-layer phosphorene with different mechanisms.

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Date submitted: 13 Nov 2014 Electronic form version 1.4