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Fabrication and transport studies of graphene-superconductor heterostructures JIUNING HU, TAILUNG WU, JIFA TIAN, YONG CHEN, Purdue University — Recently, graphene based stacked heterostructures, e.g., graphene and boron nitride (BN) multi-layers, have attracted much attention as a system to study novel interaction-driven physics (e.g., excitonic condensation) and perform interesting measurements (eg. Coulomb drag and tunneling). The realm of graphene-superconductor heterostructures remains less unexplored, while such a system offers various interesting prospects (effects of superconductor vortices lattices on over-layering graphene and quantum Hall states, where novel phenomena such as anionic excitations have been predicted). We have used polyvinyl alcohol (PVA) based carrier films and a micro-manipulator to transfer mechanically exfoliated flakes and fabricated graphene/BN/$NbSe_2$ structures to study the transport properties of graphene in close proximity to electrically isolated superconducting $NbSe_2$ films. The $NbSe_2$ film shows the superconducting transition temperature of $\sim$7 K and upper critical field of $\sim$3.5 T after device fabrication. We will present results from magneto-transport in graphene and graphene-$NbSe_2$ Coulomb drag and tunneling measurements.

Jiuning Hu
Purdue University

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