Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Andreev Reflections and Superconducting Proximity Effect in lateral BN/Graphene/$NbSe_2$ Heterostructures in the Integer Quantum Hall Regime DMITRI K. EFETOV, CLEVIN HANDSCHIN, CORY DEAN, LEI WANG, PHILIP KIM, Columbia University, KIM GROUP TEAM — Inducing Superconductivity (SC) via proximity effect into the topological edge states of a 2D conductor in the Quantum Hall Regime (QHE) has been a long standing proposition which has recently reinvigorated attention. Here the combination of SC and QHE has a wide range of predictions such as the appearance of additional edge-states in the integer QHE. With the recent development of high mobility graphene on h-BN with an extremely low onset of the QHE (0.5T) and its high compatibility with various superconductors the road to test these predictions is now open. In this study we present lateral magneto-transport and electronic spectroscopy measurements of BN/graphene/NbSe2 heterostructures. We find that the NbSe2/graphene superconductor-normal metal interface (SN) has a very high transparency with extremely low electrical resistances of R$\sim$100Ohm and gives rise to Andreev reflections and a strong SC proximity effect in graphene below the critical SC transition temperature Tc $\sim$ 7.2K. The high mobility of the graphene on h-BN and the relatively high SC upper critical magnetic field of NbSe2 Hc2 $\sim$ 5T allow for a wide magnetic field range of 1-5T in which the SC and the QHE coexist.

Dmitri K. Efetov
Columbia University

Date submitted: 27 Nov 2012 Electronic form version 1.4