Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

The extent of the Cooper pair insulator phase in amorphous $Pb_{0.9}Bi_{0.1}$ nanohoneycomb films[1] S.M. HOLLEN, J.C. JOY, A.H. BERG, Brown University, Department of Physics, G.E. FERNANDES, Brown University, Division of Engineering, J. SHAINLINE, Brown University, Department of Physics, J.M. XU, Brown University, Division of Engineering, J.M. VALLES, JR., Brown University, Department of Physics — Amorphous Bi nanohoneycomb (NHC) thin films, which contain a nanometer-scale array of holes and regular thickness undulations, exhibit an insulating phase made up of localized Cooper pairs (CPs) near their thickness-driven insulator to superconductor transition (IST). This Cooper pair insulator (CPI) phase includes a giant magnetoresistance peak, also observed in InO_x and TiN. We have now produced NHC films of a new material, $Pb_{0.9}Bi_{0.1}$, that show a qualitatively similar CPI phase. We will show the evolution of this CPI phase from deep in the insulating state to the IST using transport measurements. Throughout this regime, we will track the appearance, growth, and range of the magnetoresistance oscillations (which indicate CP transport) and giant magnetoresistance peak. Considering these observations, we will discuss the likely extent of CP transport in these insulators.

[1]This work is supported by the AAUW, the NSF through Grant No. DMR-0605797 and No. DMR-0907357, by the AFRL, and by the ONR.

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Date submitted: 12 Dec 2011 Electronic form version 1.4