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**Cooper pair islanding model of insulating nanohoneycomb films**

S.M. HOLLEN, E. RUDISAILE, J. SHAINLINE, Brown University, Department of Physics, J.M. XU, Brown University, Division of Engineering, J.M. VALLES, JR., Brown University, Department of Physics — Nanohoneycomb (NHC) amorphous Bi thin films, made by thermal evaporation onto substrates that contain a nanometer-scale array of holes and regular surface height variations, exhibit an insulating phase of localized Cooper pairs. Recently, we described how thickness variations induced by the substrate height variations can give rise to superconducting island formation.<sup>1</sup> Here, we will present an extension of this analysis to suggest how the island sizes evolve through the magnetic field-driven superconductor-insulator transition. Using this islanding picture, we will discuss the applicability of a granular array model to explain the appearance and behavior of the CPI phase in these films. Finally, we will discuss recent experimental tests of this proposal for thickness-undulation-driven Cooper pair localization.

<sup>1</sup>Hollen et. al., Phys. Rev. B, 84(6), August 2011. 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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