Abstract Submitted
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**Further Analysis of a Cooper Pair Insulator**[1] S.M. HOLLEN, H.Q. NGUYEN, M.D. STEWART, JR, J. SHAINLINE, Brown University Physics Department, AIJUN JIN, J.M. XU, Brown University Division of Engineering, J.M. VALLES, JR, Brown University Physics Department — Amorphous thin films of Bi deposited on a substrate with a Nano-Honeycomb (NHC) array of holes can exhibit a Cooper Pair Insulator (CPI) phase [1]. The transport in this state is dominated by the incoherent tunneling of Cooper Pairs between localized states. The resistivity is activated in temperature, and the magnetoresistance (MR) near the thickness-tuned Superconductor-Insulator Transition (SIT) exhibits a giant peak, as is found in thin films of $InO_x$ and TiN. In an effort to learn how the localization of pairs develops, we have investigated films deposited on substrates with different hole radii, order in the hole arrays, and surface roughness. We will present our latest findings on the common features describing the CPI phase, and how the above variations influence its properties and those of the thickness-tuned SIT in these amorphous films. [1] M. D. Stewart Jr., A. Yin, J. M. Xu, and J. M. Valles Jr., *Science* **318**, 1273 (2007).

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