

Abstract Submitted  
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**Comparison of the Superconductor to Insulator Transition in Nano-Perforated and Conventional Homogeneous Films**<sup>1</sup> M.D. STEWART, JR., JAMES M. VALLES, JR., Dept. of Physics, Brown University, AIJUN YIN, J.M. XU, Division of Engineering, Brown University — Near a critical resistance of 6.5 kOhms a quantum Superconductor to Insulator Transition (SIT) occurs in homogeneous ultra-thin films. We have measured this transition at dilution refrigerator temperatures in conventional Bi/Sb films as well as Bi/Sb films that are perforated by a regular array of holes. The perforations are separated by an amount ( $\sim 100\text{nm}$ ) that is much less than the penetration depth but on the same scale as the coherence length. We will compare these transitions to determine whether the macroscopic normal state sheet resistance (measured over many perforations) or the microscopic (characteristic of the links between holes) normal state sheet resistance determines whether a film is on the insulating or superconducting side of the transition. We will discuss how the results provide insight into the relative influences of vortex and quasiparticle fermionic degrees of freedom on the SIT.

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