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Superconductor-to-Insulator Transition in $BaPb_{1-x}Bi_xO_3$ PAULA GIRALDO-GALLO, Geballe Laboratory for Advanced Materials and Department of Physics, Stanford University, HAN-OH LEE, Geballe Laboratory for Advanced Materials, Stanford University and SLAC National Accelerator Laboratory, THEODORE GEBALLE, IAN FISHER, Geballe Laboratory for Advanced Materials and Department of Applied Physics, Stanford University — $BaBiO_3$ is a charge density wave (CDW) insulator. Hole doping with Pb, i.e. $BaPb_{1-x}Bi_xO_3$, eventually suppresses the CDW, leading to superconductivity, with a maximum critical temperature Tc of 10 to 13K for $x \approx 0.25$. The origin of the CDW state, its doping dependence, the nature of the pairing mechanism and the effects introduced by disorder remain open questions. Here we investigate the normal state properties in the vicinity of the metal-semiconductor transition. Single crystalline samples of the solid solution $BaPb_{1-x}Bi_xO_3$, with $0 < x < 0.35$ were grown using a flux technique, and studied via measurements of resistivity, magnetoresistance, magnetic susceptibility and heat capacity. For compositions near the optimal doping, the material exhibits a magnetic field tuned superconductor-to-insulator transition with a temperature independent crossing point in resistivity, scaling as $\rho(T,H) = \rho_c f(|H-H_{cross}|T^{-1/0.65})$ for fields around H_{cross}, the crossing point field. These results are discussed in the context of quantum phase transitions and compared to the results obtained in 2D disordered thin films of other novel materials.

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