Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

The superconductor-insulator transition: is there a new insulating state? MAOZ OVADIA, BENJAMIN SACEPE, DAN SHAHAR, Weizmann Institute, Israel — We present nonlinear conductivity measurements on the insulating side of the superconductor-insulator transition in amorphous indium oxide. The results agree with previous data[1,2], and show conductance jumps at well-defined voltage bias thresholds. The current in the sample changes by as much as a factor of 10^6 at the threshold, from our noise floor of $3\text{x}10^{-14}$A to over 10^{-8}A. The jumps disappear above a magnetic-field- dependent temperature T^*, which is 0.11K or lower. The threshold voltage changes from 20μV to over 0.2V (4 orders of magnitude) by application of a magnetic field. We ask whether a true zero conductance state exists in our samples. DC measurements reveal pseudo-exponential I-V characteristics, which can be extrapolated to find the high Ohmic resistance of these samples at low temperatures. The extrapolated R(T) curves typically show a sub-activated trend at low T. Our results suggest that our samples have zero conductance only at the absolute zero of temperature.

(1) Sambandamurthy et al. PRL 92, 107005
(2) Baturina et al. Nature Letters 452, p613

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Date submitted: 02 Dec 2008 Electronic form version 1.4