

Current bistability close to the superconductor-insulator transition

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Beyond a critical disorder, two-dimensional superconductors become insulating at the Superconductor-Insulator Transition (SIT) [1-2]. We present an experimental study on insulating $a\text{-Y}_x\text{Si}_{1-x}$ films in the vicinity of the SIT, as well as corresponding numerical simulations of the electrical conductivity [3]. At the lowest temperatures, electronic transport is activated.

On the insulating side, our results indicate a bistability in the current-voltage characteristics, with jumps in the current of several orders of magnitude [4,5] and which we analyze in terms of electron-phonon decoupling [6]. We extend the hot-electron model [7] to explain different features of the experimental results. We perform numerical simulations in which grains are at an effective temperature and electron jumps between them are due to the hopping term. These simulations can reproduce the most significant features of the experimental results.

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