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Nonlinear transport properties of La_2CuO_4/ $La_{2-x}Sr_x$ CuO_4 heterostructures in the resistive state[1] BO WEN, ROMAN YAKOBOV, M.P. SARACHIK, SERGEY VITKALOV, Physics Department, City College of the City University of New York, New York 10031, USA, A. BOLLINGER, I. BOZOVIC, Brookhaven National Laboratory, USA, A. SERGEEV, SUNY Research Foundation, SUNY at Buffalo, Buffalo, NY14226, USA — We report measurements of the nonlinear transport properties of oxide heterojunctions $La_2CuO_4/La_{2-x}Sr_xCuO_4$ in the vicinity of the superconducting transition. The transition occurs over a wide temperature range (7-15K) and shifts to lower temperatures in the presence of a magnetic field, as expected. Strongly nonlinear behavior is observed for the $V-I$characteristic. At low bias currents the nonlinearity has a non-thermal origin close to the transition temperature and is strongly sensitive to magnetic fields. Above the middle of the superconducting transition the nonlinear behavior is consistent instead with electron heating with a value of electron-phonon thermal conductance of $\sim 10^{-6}$ W/K per square micron, which is significantly smaller than the thermal conductance of Nb and NbN ultrathin superconducting films. Our results indicate that this novel low-dimensional superconducting material shows great promise for substantial enhancement of direct detection and wide band mixing of radiation.

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