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Intrinsic Josephson Junctions with Intermediate Damping[1] PAUL A. WARBURTON, SAJID SALEEM, JON C. FENTON, University College London, SUSIE SPELLER, CHRIS R.M. GROVENOR, University of Oxford — In cuprate superconductors, adjacent cuprate double-planes are intrinsically Josephson-coupled. For bias currents perpendicular to the planes, the current-voltage characteristics correspond to those of an array of underdamped Josephson junctions. We will discuss our experiments on sub-micron Tl-2212 intrinsic Josephson junctions (IJJs). The dynamics of the IJJs at the plasma frequency are moderately damped ($Q \approx 8$). This results in a number of counter-intuitive observations, including both a suppression of the effect of thermal fluctuations and a shift of the skewness of the switching current distributions from negative to positive as the temperature is increased. Simulations confirm that these phenomena result from repeated phase slips as the IJJ switches from the zero-voltage to the running state. We further show that increased dissipation counter-intuitively increases the maximum supercurrent in the intermediate damping regime (PRL vol. 103, art. no. 217002). We discuss the role of environmental dissipation on the dynamics and describe experiments with on-chip lumped-element passive components in order control the environment seen by the IJJs.

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