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Nanosecond, Transient Resistive State in Two-Dimensional Superconducting Stripes JENNIFER KITAYGORSKY, I. KOMISSAROV, A. JUKNA, ROMAN SOBOLEWSKI, University of Rochester, O. MINAEVA, N. KAUROVA, A. KORNEEV, B. VORONOV, I. MILOSTNAYA, GREGORY GOL'TSMAN, Moscow State Pedagogical University — We have observed, nanosecond-in-duration, transient voltage pulses, generated across two-dimensional (2-D) NbN stripes (width: 100–500 nm; thickness: 3.5–10 nm) of various lengths (1–500 μm), when the wires were completely isolated from the outside world, biased at currents close to the critical current, and kept at temperatures below the mean-field critical temperature T_{co}. In 2-D superconducting films, at temperatures below the Kosterlitz-Thouless transition, all vortices are bound and the resistance is zero. However, these vortices can get unbound when a large enough transport current is applied. The latter results in a transient resistive state, which manifests itself as spontaneous, 2.5–8-ns-long voltage pulses with the amplitude corresponding to the unbinding potential of a vortex pair. In our 100-nm-wide stripes, we have also observed the formation of phase slip centers (PSCs) at temperatures close to T_{co}, and a mixture of PSCs and unbound vortex-antivortex pairs at low temperatures.

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