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Probing Macroscopic Quantum Tunneling in Superconducting Nanowires by Varying the Critical Current THOMAS AREF, MATTHEW BRENNER, ALEXEY BEZRYADIN, University of Illinois at Urbana-Champaign — Macroscopic Quantum Tunneling (MQT) is a foremost example of a "Schrödinger cat" state, which is a quantum superposition of macroscopically distinct states. Here we detect MQT by measuring the dispersion of the switching current of thin superconducting wires. Using controlled application of high bias pulses, we are able to vary the critical current of a single nanowire. The resulting behavior rules out electromagnetic noise or inhomogeneity in the superconducting nanowires as being a source for the observed dispersion of the switching current. Thus we explain the observed dispersion in terms of MQT. We compare and contrast these experiments to the measured dispersions of the switching current in double-wire samples. In such nanowire-SQUIDs, the variation of the switching current is caused by the external magnetic field.

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