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Multiple fluxoid transitions in mesoscopic superconducting rings

HENDRIK BLUHM, NICHOLAS C. KOSHNICK, Stanford University, MARTIN E. HUBER, CU-Denver, KATHRYN A. MOLER, Stanford University — We report magnetic measurements of fluxoid transitions in mesoscopic, superconducting aluminum rings over nearly the whole superconducting temperature range. The transitions are induced by applying a flux to the ring so that the induced supercurrent approaches the critical current. Sufficiently close to T_c , the fluxoid number n always changes by ± 1 . Upon lowering the temperature, larger changes in n occur. Below approximately $0.3 T_c$, the final state after a transition is close to the ground state. The dynamics leading to this phenomenon are discussed in terms of the time dependent Ginzburg-Landau theory for gapless and gapped superconductors and a qualitative explanation based on the formation of a local hot spot.

Hendrik Bluhm
Stanford University

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