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Search for second-order Josephson tunneling in Superconductor-Ferromagnet-Superconductor junctions M.J.A. STOUTIMORE, D.J. VAN HARLINGEN, University of Illinois at Urbana-Champaign, S.M. FROLOV, University of British Columbia, V.V. BOLGINOV, V.A. OBOZNOV, V.V. RYAZANOV, Institute of Solid State Physics, Russian Academy of Sciences — We have fabricated Nb-CuNi-Nb SFS (Superconductor-Ferromagnet-Superconductor) π-Josephson junctions in a geometry that allows us to perform transport measurements to determine the uniformity of the sample and subsequent current-phase measurements to look for period doubling on the same junction. Junctions of this type exhibit transitions between the 0-junction and the π-junction state as a function of the ferromagnetic barrier thickness and temperature. Near the 0-π transition points, it is predicted that first-order tunneling will be suppressed and the second-order term, proportional to $\sin(2\phi)$, may dominate. The interpretation of past experiments to measure this term have been ambiguous due to concerns that non-uniformity in the ferromagnetic layer could mimic second-order Josephson behavior by producing half-integer Shapiro steps.

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