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Direct observation of a sin(2ϕ) component in the current-phase relation of superconductor-ferromagnet-superconductor (SFS) Josephson junctions M.J.A. STOUTIMORE, Department of Physics, University of Illinois at Urbana/Champaign, Urbana, IL USA, A.YU. RUSANOV, Laboratory of Superconductivity, ISSP-RAS, Chernogolovka, Russia, D.J. BAHR, V.A. OBOZNOV, V.V. BOLGINOV, A.N. ROSSOLENKO, V.V. RYAZANOV, D.J. VAN HARLINGEN — We present direct measurements of the current-phase relation (CPR) of SFS Josephson junctions in an rf-SQUID geometry. The junctions are fabricated from Nb-$Cu_{47}Ni_{53}$-Nb trilayers with a junction area of 2x2 μm^2 and a CuNi thickness of 7 nm. By measuring the magnetic flux through the rf-SQUID as a function of applied current, we observe transitions between an ordinary 0-Josephson junction state and a π-junction state characterized by a phase difference of π in the ground state occurring at temperatures between 1.5 K and 3.5 K. Near this temperature crossover, we observe period-doubling of the CPR indicating the existence of a term proportional to sin(2ϕ). Work is underway to determine if this signifies an intrinsic second-order tunneling mechanism or is the result of junction inhomogeneities.

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