

Abstract Submitted  
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**SFS Josephson Junctions using PdNi alloy** TRUPTI KHAIRE, WILLIAM P. PRATT, JR., NORMAN O. BIRGE, Department of Physics and Astronomy, Michigan State University, East Lansing, MI 48824 — We have studied the variation of critical current in Superconductor/Ferromagnet/Superconductor (S/F/S) Josephson Junctions as a function of ferromagnet thickness ( $d_F$ ) using a weakly ferromagnetic alloy, Pd<sub>82</sub>Ni<sub>12</sub>. The critical current density oscillates and decays over five orders of magnitude as  $d_F$  is increased from 32 to 100 nm. These oscillations are indicative of  $0-\pi$  transitions in S/F/S junctions. We find the characteristic length of oscillation ( $\xi_{F2}$ ) to be  $4.3 \pm 0.1$  nm and the characteristic length of decay ( $\xi_{F1}$ ) to be  $7.9 \pm 0.4$  nm. Earlier studies [1] using a similar PdNi alloy in S/I/F/S junctions found  $\xi_{F1} \approx \xi_{F2} \approx 2.8$  nm, however, those measurements were performed for  $d_F$  between 4.5 and 14 nm. In our experiment,  $\xi_{F1} > \xi_{F2}$ , indicating that our samples are in the regime  $E_{ex}\tau > \hbar$  [2, 3], where  $E_{ex}$  is the exchange energy and  $\tau$  is the mean free time between electron collisions in the ferromagnet. In spite of covering this wide range, we see no evidence of a crossover to a slower decay, which, if present, would be indicative of long-range spin triplet correlations [4]. [1] T. Kontos et al., Phys. Rev. Lett. 89, 137007 (2002). [2] F. S. Bergeret, et al., Phys. Rev. B, 64, 134506 (2001) [3] Kashuba, et al., Phys. Rev. B. 75, 132502 (2007). [4] F.S. Bergeret, et al., Rev. Mod. Phys. 77, 1321 (2005). [This work is supported by US-DOE grant, DE-FG02-06ER46341.]

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