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Defects and broken time-reversal symmetry in superconducting $\mathbf{Pr(Os,Ru)_4Sb_{12}}$[1] D.E. MACLAUGHLIN, LEI SHU, U. Calif., Riverside, A.D. HILLIER, ISIS, Rutherford Appleton Lab., O.O. BERNAL, Calif. State U., Los Angeles, Y. AOKI, D. KIKUCHI, H. SATO, Y. TUNASHIMA, Tokyo Metro. U., H. SUGAWARA, U. Tokushima, T.A. SAYLES, T. YANAGISAWA, W.M. YUHASZ, M.B. MAPLE, U. Calif., San Diego — Muon spin relaxation studies of a spontaneous local field H_μ, previously observed in the superconducting state of $PrOs_4Sb_{12}$ and attributed to broken time-reversal symmetry, have been extended to $Pr(Os_{1-x}Ru_x)_4Sb_{12}$ alloys. In flux-grown single crystals H_μ is strongly suppressed but remains observable for $x \leq 0.2$. In powder samples prepared by solid state reaction, however, no field is observed for $x = 0.1$ or 0.2. Muon spin relaxation due to dynamic ^{141}Pr nuclear spin fluctuations is also reduced in the powders. Both results can both be understood if the density of microscopic defects is smaller in the powders: defects increase muon spin relaxation by ^{141}Pr spins, and supercurrents associated with defects are theoretically predicted to create spontaneous fields in TRS-breaking superconductors. Our results are strong experimental evidence for this prediction.

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