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NQR Study of the Heavy-Fermion Pu-115 Superconductors
G. KOUTROULAKIS, H. YASUOKA, P.H. TOBASH, J.N. MITCHELL, E.D. BAUER, J.D. THOMPSON, Los Alamos National Laboratory — We present ^{115}In nuclear quadrupolar resonance (NQR) measurements on the heavy-fermion superconductors PuMIn$_5$ (M=Co, Rh; T_c=2.5K, 1.6K, respectively), in the temperature range 0.29K $\leq T \leq$ 100K. From the identified spectral lines, we deduce the quadrupolar parameters for the two inequivalent In sites, which are found to be qualitatively similar to those for other Ce- and Pu-115s. The quadrupolar frequency ν_Q varies with temperature in the normal state as per the empirical formula for conventional metals. As superconductivity develops, however, ν_Q exhibits a sharp, albeit small shift, which is a key prediction of the theory of composite superconducting (SC) pairing [1]. The temperature variation of the nuclear spin-lattice relaxation rate T_1^{-1} delineates distinctive regimes of dynamic behavior. An excess of strong in-plane antiferromagnetic spin fluctuations is observed in the vicinity of T_c, which are believed to be playing a central role in the formation of the SC condensate. Analysis of the T_1^{-1} data in the SC state suggests that these compounds are strong-coupling d-wave superconductors. [1]R. Flint, A. H. Nevidomskyy, and P. Coleman, Phys. Rev. B **84**, 064514 (2011).

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