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LOCAL MOMENT FLUCTUATIONS IN THE SUPERCONDUCTING STATE OF $U_{0.999}Gd_{0.001}Be_{13}$

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Abstract

We report measurements of the ^9Be spin-lattice relaxation rate $(1/T_1)$ in the superconducting state of $U_{0.999}Gd_{0.001}Be_{13}$ for temperatures below 0.2 K and magnetic fields in the range 1–15 kOe. Above 8 kOe the relaxation is governed by spin diffusion to the normal regions in the vortex cores of the flux lattice. For lower fields $1/T_1$ is dominated by longitudinal fluctuations of the Gd^{3+} moment. The relaxation data are analyzed on the basis of the usual model of nuclear spin diffusion to rapidly relaxing regions (paramagnetic centers or vortex cores), modified to include the low temperature regime. Our best fit to the data indicates a Gd^{3+} spin relaxation time of approximately $(2.8 \times 10^{-9} sK^3) T^{-3}$. This temperature dependence is the same as that reported earlier for the intrinsic nuclear spin-lattice relaxation rate in the superconducting state of undoped UBe_{13}, and is consistent with lines of zeros of the superconducting energy gap.