Coexistence of magnetic fluctuations and superconductivity in an unconventional superconductor Ce_2PdIn_8

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The heavy fermion Ce_2PdIn_8 has been found to exhibit an unconventional superconductivity below 0.7 K [1, 2]. In this contribution, we present the results of zero-field (ZF-), longitudinal-field (LF-) and transverse-field (TF-) muon relaxation/rotation (μSR) measurements, performed in the temperature range 0.05 - 4 K and in magnetic fields up to 50 mT on a polycrystalline sample of the superconducting Ce_2PdIn_8. The ZF-μSR data demonstrates slowing down of the Ce spin fluctuations when crossing T_c to lower temperature. The relaxation in the LF-μSR experiments is still observed at 5 mT, and it also becomes stronger with decreasing temperature down to 0.05 K. This finding suggests that the fluctuations are magnetic in origin and coexist with the superconductivity. The magnetic penetration depth, deduced from the TF-μSR rate, follows a power-law temperature dependence $\lambda^{-2}(T)/\lambda^{-2}(0) = 1 - (T/T_c)^{1.5}$, which is close to the linear temperature dependence of the quasiparticle excitations with line nodes in the gap structure. The $T = 0$ fit value $\lambda(0) = 800\pm90$ nm is large as for a heavy fermion superconductor.

1. D. Kaczorowski et. al, Phys. Rev. Lett. 103, 027003 (2009).
2. D. Kaczorowski et. al, Solid State Commun. 150, 41 (2010).