A 27Al NMR study of Actinides compounds at low Temperatures: AnPd5Al2 and AnAl2 systems

Abstract:
The recent increase of studies of actinides and specifically transuranium elements and compounds using microscopic probe techniques (EELS, RIX, XMCD, NQR-NMR) has shed a new light on our understanding of the basic properties of nuclear materials. These advances have been motivated also by the interest raised by the discovery of new superconductors based on transuranium compounds such as PuCoGa5 and NpPd5Al2 which stand for archetypes of 5f transuranium superconductors displaying exotic features. For instance, the unconventional nature of superconductivity in PuCoGa5 and NpPd5Al2 has been revealed by NQR experiments. Here we report a NMR study at low temperature of single crystals of CePd5Al2, the cerium counterpart of NpPd5Al2, presenting Kondo lattice features with two antiferromagnetic transitions at TN1 = 3.9 K and TN2 = 2.7 K, respectively. This compound becomes superconductor under pressure and displays a lot of similarities with PuPd5Al2, which is an antiferromagnet below TN = 5.1 K. We will report also a low temperature basic properties study of a ferromagnetic system presenting localised features, namely NpAl2.

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