

Abstract: NOVMA04, Dresden

Superconductivity of the Heavy Fermion Compounds UPd₂Al₃ and UNi₂Al₃

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The isostructural (hexagonal) Heavy Fermion compounds UPd₂Al₃ and UNi₂Al₃ both exhibit the coexistence of unconventional superconductivity and magnetic order at low temperatures. However, they display important differences concerning magnetic structure and the possibility of spin triplet pairing key to the understanding of the interplay between magnetism and superconductivity.

Recently we were able to prepare epitaxial superconducting UPd₂Al₃ and UNi₂Al₃ thin films which grow with the crystallographic a-axis perpendicular to the substrate. These samples allow special transport measurements and the preparation of tunneling junctions for the investigation of the superconducting order parameter. Evidence for multiband superconductivity in UNi₂Al₃ will be reported [1] based on the observation of a directional dependent critical temperature which was not observed investigating UPd₂Al₃ samples. First results of tunneling spectroscopy on UNi₂Al₃ will be presented and compared with our previous experiments on c-axis oriented UPd₂Al₃ thin films.

[1] M. Jourdan et al., Phys. Rev. Lett. 93, 097001 (2004)