Title: Ground state investigations of Ce and U intermetallic compounds

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Abstract: Rare earth and actinide intermetallic compounds offer a plethora of interesting physical properties due to the varied behavior of f-electrons together with numerous interactions these electrons are exposed to. In this thesis we address a broad spectrum of ground state investigations on $CePd_2X_3$ (X=Zn, Ga) and $(Ce,U)_n T In_{3n+2}$ (T=Rh, Ir) compounds. Single crystals of $CePd_2Zn_3$ and $CePd_2Ga_3$ compounds were synthesized for the first time using Bridgman method. $CePd_2Ga_3$ revealed a ferromagnetic transition with $T_C = 6.7$ K with a strong magnetocrystalline anisotropy. $CePd_2Zn_3$ orders antiferromagnetically below $T_N = 1.9$ K.
Results of magnetization measurements on Ce_2IrIn_8 revealed effective magnetic moment $\mu_{eff} = 2.45\mu_B/Ce^{3+}$ and a paramagnetic Curie temperature $\theta_P = -31$ K. Decomposition of Hall resistivity $\rho_{xy}(B)$ into NHE and AHE revealed a predominance of AHE in the temperature range from 60 K up to 100 K. Ce_2RhIn_8 was studied by means of magnetic field and angle dependent magnetization and heat capacity measurements. The resulting phase diagram reveals a complete unfolding and separation of the commensurate antiferromagnetic phase from the low temperature T_M phase.
Neutron diffraction experiments on $URhIn_5$ and U_2RhIn_8 single crystals revealed a commensurate magnetic structure with propagation vectors $\boldsymbol{k}$ = (0.5, 0.5, 0.5) and $\boldsymbol{k}$ = (0.5, 0.5, 0), respectively. The ordered magnetic moments are aligned along the c-axis in both compounds with respective values of 1.65 μ_B/U for $URhIn_5$ and 1.7 μ_B/U for U_2RhIn_8. dHvA measurements on $URhIn_5$ revealed a roughly spherical pocket β, with $F_\beta = 0.3$ kT, and a pillow-shaped closed surface, α, with $F_\alpha = 1.1$ kT. The measured cyclotron masses range from 1.9 m_e to 4.3 m_e.

Keywords: Rare earth and uranium intermetallic compounds, Magnetism, Magnetocrystalline anisotropy, Neutron diffraction, dHvA