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Magnetic and strong correlation effect in CeT2Al8 (T=Fe,Co)

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<p>We present specific heat, electrical resistivity, susceptibility, and thermopower measurements on the two novel intermetallic compounds CeFe₂Al₈ and CeCo₂Al₈. They form in an orthorhombic crystal structure of space group Pbam. In the unit cell representation Ce atom occupies only one lattice site,having Ce-Ce interatomic distance of 4.03Å. Magnetic susceptibility of CeFe₂Al₈ in the range of 1.9K - 400K yields an effective paramagnetic moment value of 3.89μ_B together with prevailing antiferromagnetic interaction through Weiss temperature Θ=-745.8K. The overall temperature dependence suggests valence instability in this compound and we model the appearance of broad peak around T=230K in the susceptibility to a T<sup>

2</sup>lnT dependence attributed to an intermediate valent state. On the other hand for CeCo₂Al₈ the local moment state is depicted through an effective moment close to the free Ce³⁺ ion value. No long-range magnetic ordering is found in either of the two compounds down to 1.9K. The magnetic contribution of electrical resistivity on CeFe₂Al₈ and CeCo₂Al₈ compounds follows −lnT behavior at intermediate temperatures which is typical of incoherent Kondo interactions between conduction electrons and magnetic Ce ions. A Fermi liquid behavior in resistivity measurement is observed in CeFe₂Al₈ compound towards the ground state,whereas clear deviations from standard Fermi liquid behavior are indicative of strong electronic correlation effects in CeCo₂Al₈. At 2K the electronic specific heat of this compound reaches γ =0.106J/mol-K²,and exhibits a −lnT divergence towards T⟶0. We explain this behavior in terms of quantum criticality that stems from low-lying magnetic ordering effects. In studies of the thermoelectric power,a maximum is reached at T=140K(S=24μV/K) and T=30K(S=23μV/K) for CeFe₂Al₈ and CeCo₂Al₈ compounds respectively. We propose a description for this behavior in terms of formation of fine structure in the electronic density of states near the Fermi energy(E_F).

Level (Hons, MSc,
   PhD, other)?

PhD Physics

Consider for a student
   award (Yes / No)?

yes

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

yes

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