Non-Fermi liquid behaviour in the heavy-fermion Kondo lattice $Ce_2Rh_3Al_9$

M. Falkowski and A. M. Strydom

Physics Department, University of Johannesburg, PO Box 524, Auckland Park 2006, South Africa

In the heavy-fermion class of strongly correlated electron systems, the Landau Fermi-liquid description of metals has become a rather fragile basis on which to formulate an understanding of their ground state. The proximity to cooperative phenomena such as magnetic order and superconductivity in heavy fermions, and the amenability of Ce- and Yb-based compounds to be tuned into quantum criticality have been found to have severe consequences on the $T \rightarrow 0$ thermal scaling of electronic and magnetic properties, and a collection of non-Fermi liquid scaling relations have been established as a consequence of the search for universality. These have proved to be a gateway towards new physics in condensed matter. 4f-electron systems with very low-lying phase magnetic transitions are suitably disposed towards studies of magnetic instabilities. Here we present results of low-temperature studies (magnetic susceptibility, electrical resistivity, and heat capacity) on the heavy-fermion Kondo lattice $Ce_2Rh_3Al_9$ and related compounds. This structure type is assumed also with d-electron elements such as Ir, and for instance with Ga instead of Al. The higher-temperature behaviour in $Ce_2T_3X_9$ compounds was shown[1] to vary in a perplexing manner between strong 4f-electron with conduction electron hybridization that gives way to an intermediate-valent state, and a more subtle hybridization that produces heavy-fermions in a Kondo lattice. Our studies explore the scaling relations and seek to determine whether magnetic ordering might be responsible for the anomalous low-temperature behaviour of $Ce_2Rh_3Al_9$.

1. Buschinger B. *et al.* , (1997) J. Alloys Comp. **260** 44, and Buschinger B. *et al.* , (1998) J. Alloys. Comp. **275-277** 633.

Section: OT - Other topics and model systems

Keywords: heavy fermions, non-Fermi liquid, cerium compounds