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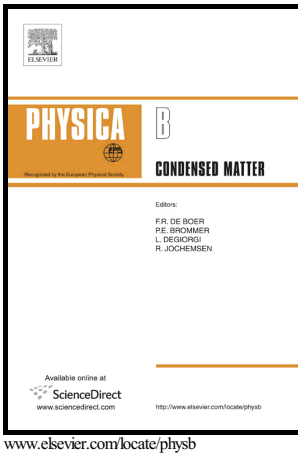

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Crystal field analysis of anisotropic magnetic susceptibility and magnetic specific heat of Yb_2Pt_2Pb

Tuli Chatterjee[1]

A comprehensive explanation of the observed thermal variation of the magnetic susceptibility and the magnetic heat capacity data has been carried out in the framework of one electron crystal field theory. The peaks at the Neel temperature T_N=2.07 K is due to magnetic order and cannot be explained by the crystal field theory. A check of the Stark energies reported for the system from the analysis of the data from inelastic neutron scattering experiment is looked forward to.

Keywords: crystal field, magnetic susceptibility, magnetic anisotropy, heat capacity, crystal field strength.

1. Introduction Ytterbium based intermetallic compounds with composition R_2T_2M (R= rare earths; T = transition metals; M = Pb, In, and Sn) has attracted much attention because the compounds in this series exhibit collective phenomena, such as ferromagnetic Kondo lattice, Kondo semiconductor, valence fluctuation, non-Fermi liquid, and heavy fermion behaviour etc.

From single crystal X-ray diffraction measurements it has been established that Yb_2Pt_2Pb crystallizes in the tetragonal U_2Pt_2Sn-type structure (space group $P4_2/mnm$) with lattice parameters of a =0.77651(6) and c =0.70207(7) nm [1, 2]. In Yb_2Pt_2Pb, the basal plane (ab planes) are occupied only by R elements and the alternate ab planes are occupied by T and M elements along c-axis. Thus the rare earth elements constitute a network of isosceles triangles, suggesting that one might expect a quasi-two-dimensional magnetic structure and anisotropic magnetic properties. This is a 4 f -localized magnetic system, and strong magnetic frustration may arise from the geometry of the Shastry-Sutherland lattice [2, 3]. The magnetic

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