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ANOMALOUS INELASTIC NEUTRON SPECTRA IN THE $\text{Ce}_3\text{Pt}_{23}\text{Si}_{11}$ FERROMAGNET

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In the search of new heavy fermion compounds in the ternary Ce-Pt-Si system, the new cubic ($Fm-3m$) compound $\text{Ce}_3\text{Pt}_{23}\text{Si}_{11}$ was synthesized [1]. Recently it was shown that a ferromagnetic order stabilizes at $T_c = 0.44$ K [2]. In order to get a further insight into its magnetic properties, the crystal electric field (CEF) scheme was investigated by inelastic neutron scattering. Measurements, performed at ILL on the IN4 spectrometer, reveal four inelastic structures at 8.5, 12, 15.8 and 19.6 meV on the $\text{Ce}_3\text{Pt}_{23}\text{Si}_{11}$ spectra (see figure 1). The comparison with the phonon spectra determined in the non-magnetic isomorphous compound, $\text{La}_3\text{Pt}_{23}\text{Si}_{11}$, unambiguously confirms the magnetic origin of excitations at 12 and 19.6 meV. A very similar feature was reported for the Kondo compound CeAl_2 and interpreted in terms of CEF-phonon bound state [4]. We present here a detailed analysis of this unexpected result for a Ce ion in cubic symmetry and conclude that the model for CeAl_2 can not be applied for $\text{Ce}_3\text{Pt}_{23}\text{Si}_{11}$.

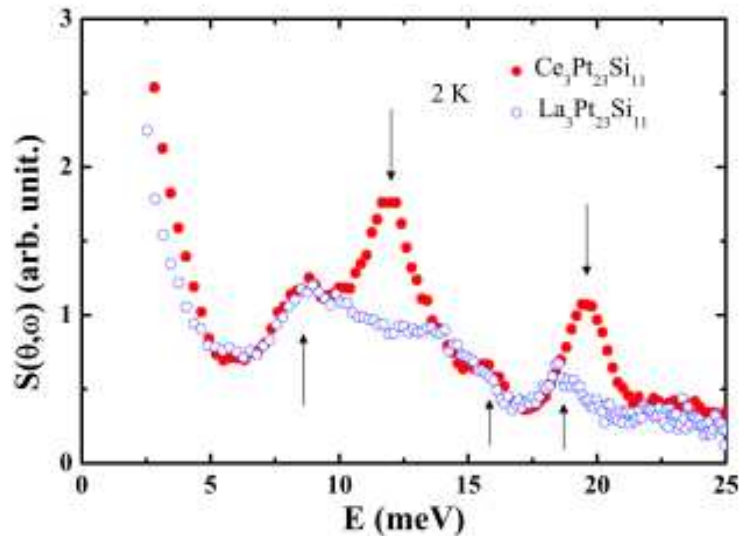


Figure 1: Inelastic spectra of $\text{Ce}_3\text{Pt}_{23}\text{Si}_{11}$ and $\text{La}_3\text{Pt}_{23}\text{Si}_{11}$ collected at 2 K ($E_i = 36.7$ meV).

References

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