Magnetic Excitations between the $^2F_{5/2}$ and $^2F_{7/2}$ multiplets in the Heavy Fermion Compound CeB_6

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Magnetic excitations in metallic heavy fermion systems are of particular interest because of the various interactions involved [1]. The heavy-fermion compound CeB_6 serves as a good test ground. This material has simple composition and structure yet complex phase diagram [2]: it undergoes a second-order phase transition from a high-temperature paramagnetic (PM) phase into an antiferroquadrupolar (AFQ) phase at T_Q=3.2K, before entering an antiferromagnetic (AFM) phase below T_N=2.3K. The Ce^{3+} ion contains one 4*f* electron which corresponds to low-energy $^2F_{5/2}$ and high-energy $^2F_{7/2}$ multiplets, the transition between which has been observed by inelastic neutron scattering (INS) [3] and angle-resolved photoemission spectroscopy (ARPES) [4]. We conducted polarization-resolved Raman scattering to investigate these magnetic excitations. Upon cooling, a transition at ~2100 cm^{-1} develops in pseudo-vector-like T_{1g} and quadrupole-like T_{2g} symmetry channels, which agrees with the splitting energy between the $^2F_{5/2}$ and $^2F_{7/2}$ multiplets measured by INS [3] and ARPES [4].

References:

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