THERMAL-EXPANSION EXPERIMENTS ON Sm_2IrIn_8

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Sm_2IrIn_8 is a tetragonal heavy fermion compound member of the $R_mM_nIn_{3m+2n}$ family (R=rare earth, M=Rh,Ir,Co, m=1,2, n=0,1). The Sm^{3+} ions order antiferromagnetically at 14.2 K. Unlike what is observed in other members of the family, the specific heat peak associated with the antiferromagnetic transition is very sharp and narrow, i.e., first order in nature. [1]

Regarding the possibility that the magnetic correlations are driving a structural transition, we have performed thermal-expansion experiments on Sm_2IrIn_8 single crystals. The experiments were performed in superconducting magnets at the NHMFL facilities in Tallahassee and Los Alamos, using two different dilatometers.

The linear thermal-expansion coefficient shows a large anisotropy between c-axis and the basal ab-plane. Both relevant crystallographic axes change discontinuously at 14.2 K. Interestingly, this change is negative along both directions, unlike what is observed in other antiferromagnets of the family like $CeRhIn_5$ [2] or Ce_2RhIn_8. [3] The transition is very robust under magnetic field, showing a negligible field dependence up to 18 T. Two more continuous features of unknown origin are observed around 11 K and 15 K.

Further spectroscopy experiments are being carried out to investigate the existence of a structural symmetry change.

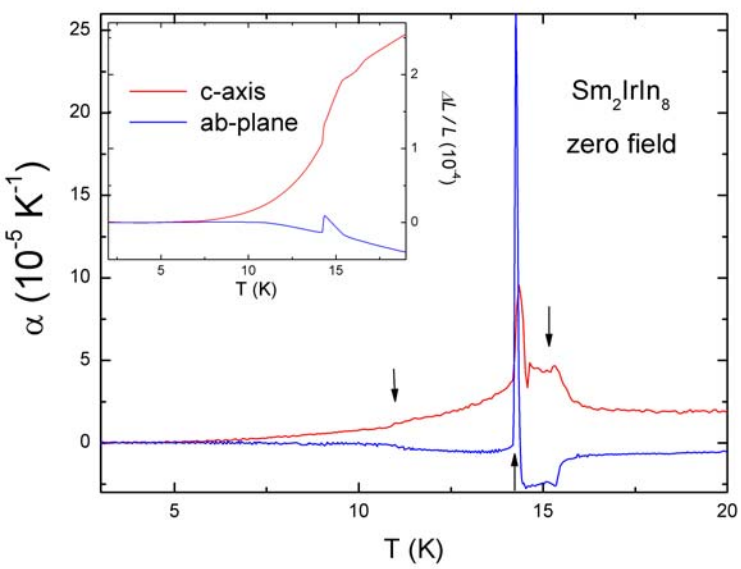

Figure 1. Thermal-expansion coefficient for both crystallographic axis versus temperature. The arrows show the different transitions. Inset: thermal expansivity versus temperature.

Acknowledgements

Work supported by the NSF, the State of Florida and the NNSA/DOE grant DE-FG52-03NA00066. P.G.P. acknowledges support from CNPq, FAPESP and ABTLuS in Brazil.

References

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