Contribution ID : **67** Type : **Poster**

Gapped Magnetic Excitations in 153EuMn2Ge2

Layered RT2X2 compounds (R = rare-earth, T = 3d, 4d transition metal, X = Si, Ge) of tetragonal body centred ThCr2Si2 –type structure (I4/mmm) are among the most widely studied systems in condensed matter science [e.g. 1]. Yb- and Eu-based intermetallics are of particular interest due to their intermediate valence character and unusual physical and magnetic properties [e.g. 2, 3]. While EuMn2Si2 exhibits lattice behaviour at room temperature characteristic of a trivalent state, EuMn2Ge2 indicates a divalent state [4, 5]. Previously we established that the Mn sublattice of EuMn2Ge2 has an axial antiferromagnetic structure of space group I4′/m′m′m below the Néel temperature TN ~ 667(9) K of Mn moment μ(0) = 3.43(4) μB [4] while Ryan et al. [5] established that the Eu sublattice orders below 9.8(1) K.

Our recent inelastic neutron scattering measurements of isotopically enriched 153EuMn2Ge2 (~1.5 – 50 K; PELICAN) have confirmed magnetic order in the Eu sublattice below ~ 10 K with the associated spin waves revealing that a gap opens in the excitation spectrum. Aided by a prospective neutron diffraction measurement at ~1.8 K on ECHIDNA, we present an overview of the fascinating magnetic behaviour exhibited by EuMn2Ge2 with particular emphasis on modelling the spin wave spectrum and related gap. Such a gap could be the origin of the unusual temperature dependence reported for magnetic ordering of the Eu sublattice in EuMn2Ge2 [5].

[1] A. Szytula and J. Leciejewicz, Handbook of Crystal Structures and Magnetic Properties of Rare Earth Intermetallics (CRC Press, Boca Raton, 1994)
[2] K. Kummer, Yu. Kucherenko, S. Danzenbächer, C. Krellner, C. Geibel, M. G. Holder, L. V. Bekenov, T. Muro, Y. Kato, T. Kinoshita, S. Huotari, L. Simonelli, S. L. Molodtsov, C. Laubschat, and D. V. Vyalikh, Phys Rev B 84, 245114 (2011)
[3] R.A. Mole, M. Hofmann, D.T. Adroja, O. Moze, S.J. Campbell, J Magn Magn Mater, 347, 86 (2013)
[4] M. Hofmann, S.J. Campbell and A.V.J. Edge, Phys. Rev. B 69, 174432 (2004)
[5] D. H. Ryan, Rasa Rjali, J.M. Cadogan, R. Flacau and C. D. Boyer. J. Phys.: Condens. Matter 28, 166003 (2016)

Topic

Physics

Primary author(s) : Dr MOLE, Richard (Australian Nuclear Science and Technology Organisation); Dr HOFFMANN, Michael (Heinz Maier Leibnitz Zentrum (MLZ), Technishe Universitaet Muenchen); Dr WANG, Jianli (Institute for Superconductivity and Electronic Materials, University of Wollongong); Dr YU, Dehong (Australian Nuclear Science and Technology Organisation); Dr AVDEEV, Max (Australian Nuclear Science and Technology Organisation); Prof. CAMPBELL, Stewart (UNSW Canberra at the Australian Defence Force Academy)

Presenter(s) : Prof. CAMPBELL, Stewart (UNSW Canberra at the Australian Defence Force Academy)

Session Classification : Poster Session

Track Classification : Physics