Contribution ID : **73** Type : **Poster**

Investigations into the Magnetic and Crystal Field Excitations of the Orthorhombically Distorted Perovskites TbVO3 and CeVO3

Inelastic neutron scattering experiments have been performed on a series of vanadates, in particular TbVO3 and CeVO3, to categorise the crystal field and magnetic excitations. The vanadates possess a configuration with corner sharing, distorted VO6 octahedra (space group Pbnm) with a collinear C-type antiferromagnetic structure occurring below Néel temperatures of TN = 110 K and 124 K respectively [1-4]. Data from neutron scattering experiments reveal a hitherto unobserved shift of crystal field excitation energy in TbVO3 and CeVO3. Point-charge model calculations have confirmed this shift by theoretically calculating the crystal field excitation spectrum. We propose that the mechanism behind the effect is the onset of local magnetism caused by the ordering of the vanadium sublattice at the magnetic phase transition. This magnetic exchange field from the vanadium ions polarises the spins of the rare-earth ions located at the centre of the unit cell. This results in a Zeeman-like splitting of crystal field energy levels. As a result, crystal field transition energies demonstrate a linear shift as a function of internal magnetic field strength.

[1] S. Miyasaka et al., Phys. Rev. B 68, 100406 (2003).
[2] J. Fujioka et al., Phys. Rev. B 82, 144425 (2010).
[3] M. Reehuis, et al., Phys. Rev. B 83, 064404 (2011).
[4] M. Reehuis, et al., Eur. Phys. J. B 64, 27–34 (2008).

Topic

Physics

Primary author(s) : O'BRIEN, Joel (School of Physics, University of New South Wales, Sydney NSW 2052, Australia); REYNOLDS, M. (School of Physics, University of New South Wales, Sydney NSW 2052, Australia); ROVILLAIN, P. (School of Physics, University of New South Wales, Sydney NSW 2052, Australia;ACNS, ANSTO, Lucas Heights, NSW 2234, Australia); Dr DANILKIN, S.A. (ACNS, ANSTO, Lucas Heights, NSW 2234, Australia); SCHMALZL, K. (Institut Laue Langevin, BP 156, 38042 Grenoble Cedex 9, France); REEHUIS, M. (Helmholtz-Zentrum for Materials and Energy Berlin, Germany); MOLE, R. (ACNS, ANSTO, Lucas Heights, NSW 2234, Australia); MIYASAKA, S. (Department of Applied Physics, University of Tokyo, Tokyo 113-8656, Japan); FUJIOKA, F. (eDepartment of Applied Physics, University of Tokyo, Tokyo 113-8656, Japan); TOKURA, Y. (eDepartment of Applied Physics, University of Tokyo, Tokyo 113-8656, Japan); KEIMER, B. (Max-Planck-Institute for Solid State Research Stuttgart, Germany); MCINTYRE, G. (ACNS, ANSTO, Lucas Heights, NSW 2234, Australia); ULRICH, C. (School of Physics, University of New South Wales, Sydney NSW 2052, Australia; ACNS, ANSTO, Lucas Heights, NSW 2234, Australia)

Presenter(s) : O'BRIEN, Joel (School of Physics, University of New South Wales, Sydney NSW 2052, Australia)

Session Classification : Poster Session

Track Classification : Physics