Abstract Submitted
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Novel Thermodynamics in $Dy_2Ti_2O_7$ Spin Ice: Two experimental case studies[1] LAURA BOVO, London Center for Nanotechnology; Department of Physics & Astronomy, UCL, LUDOVIC D.C. JAUBERT, OIST, Okinawa, PETER C.W. HOLDSWORTH, École Normale Supérieure de Lyon, CNRS, STEVE T. BRAMWELL, UCL — Spin-ice systems[1,2] can be described by a network of corner-shared tetrahedra of localised magnetic moments: geometrical spin frustration arises. This problem is topologically equivalent to proton ordering in water ice: to minimise the energy the spins obey the 'ice-rule'. Emergent magnetic monopoles[3,4] have been modelled as deconfined excitations carrying a magnetic Coulomb charge which are associated with violations of the ice rule. Spin ices show a variety of properties some of which are better described by spins, other by monopoles. Magnetic susceptibility is a spin property and it shows a peculiar crossover[5]. Here[6] we present a careful experimental observation for spherical crystals. The magnetic entropy[2] is another signature that can be described in terms of magnetic monopoles. Here[7] we show an alternative method based on Maxwell's thermodynamic equations that can yield to the magnetic entropy on an absolute scale.

[1] Harris M.J. et al. PRL 79, 2554(1997) [2] Ramirez A. P.et al. Nature 399, 333(1999) [3] Ryzhkin I.A. J. Exp. and Theor. Phys. 101, 481(2005) [4] Castelnovo C. et al. Nature 451, 42(2008) [5] Jaubert L.D.C. et al. Phys. Rev. X 3, 011014(2013) [6] Bovo L. et al. JPCM 25, 386002(2013) [7] Bovo L.et al. JPCM 25, 356003(2013)

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