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Long-Range Anti-ferromagnetic Order in $Sm_2Ti_2O_7$[1] COLE MAUWS, University of Manitoba, PAUL SARTE, University of Edinburg, ALANNAH HALLAS, McMaster University, ANDREW WILDES, Institut Laue-Langevin, JEFFREY QUILLIAM, Universite de Sherbrooke, GRAEME LUKE, BRUCE GAULIN, McMaster University, CHRISTOPHER WIEBE, University of Winnipeg
— The spin ice state has been a key topic in frustrated magnetism for decades. Largely due to the presence of monopole-like excitations, leading to interesting physics. There has been a consistent effort in the field at synthesising new spin ice phases that possess smaller moments in the hopes of increasing the density of magnetic monopoles. As well as investigating the phase when quantum fluctuations dominate over dipolar interactions. Initially $Sm_2Ti_2O_7$ was thought to be a candidate for a quantum spin ice, possessing a low moment of 1.5 μ_B in the high-spin case and crystal fields may reduce it to a true spin-1/2 system. However antiferromagnetic interactions as well as a lambda-like heat capacity anomaly pointed towards long-range antiferromagnetic order. An isotopically enriched samarium-154 single crystal was taken to the D7 polarized diffuse scattering spectrometer at the ILL. Long-range antiferromagnetic order was observed and indexed onto the all-in all-out structure. This agrees with theoretical predictions of Ising pyrochlore systems with sufficiently large anti-ferromagnetic coupling.

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