Experimental report

18/09/2019

Proposal: 5-32-870 **Council:** 10/2018

Title: The spin glass phase of Mn0.5Fe0.5PS3

Research area: Physics

This proposal is a new proposal

Main proposer: Andrew WILDES

Experimental team: Andrew WILDES
Jennifer GRAHAM
Matthew COAK

Local contacts: Andrew WILDES

Samples: Mn0.5Fe0.5PS3

Instrument	Requested days	Allocated days	From	To
D7	8	8	11/09/2019	19/09/2019
IN3	3	3	09/09/2019	11/09/2019

Abstract:

The transition metal-PS3 compounds are largely a family of 2D antiferromagnets with a honeycomb lattice. The mixed compound (Mn0.5Fe0.5)PS3, however, does not appear to have long-ranged order and instead shows a spin glass phase. We wish to use D7 to study the magnetic and atomic short-ranged order in single crystals of Mn0.5Fe0.5PS3

Experimental report - 5-32-870 on IN3, Sept 2019

The spin-glass phase of $Mn_{0.5}Fe_{0.5}PS_3$

M. Coak, Sept 2019

This experiment was to coalign single crystals for experiment number 5-32-870 on D7. Three crystals had already been coaligned with a nominal scattering plane of [0 k 0], [0 0 l] and we were able to check and verify the alignment of these. We then lined up two crystals (wrapped in aluminium foil packages) perpendicular to these, with the nominal *a* and *b* axes in the scattering planes, giving [0 k 0] and [3k 0 -h] (photo below). These two setups give us access to two significant scattering planes.

Crude alignment of the crystals is straightforward, as they are of layered materials and hence plate-like, and additionally had already been measured with x-ray Laue and photographed in the intended alignment. Rotational 'omega' scans were able to get the horizontal rotational axes of the 2 crystals, glued onto thin aluminium plates with GE varnish within their foil packages, matched, then tilting the two goniometer axes allowed bending of these plates with respect to the vertical mounting pins to control their tilt angles.

Both sets of crystals were successfully aligned ready for the D7 experiments.