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Magnetic structure and spin flip transition of MnSb4Te7

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The family of materials $(Mn(Sb,Bi)_2Te_4)((Sb,Bi)_2Te_3)_m$ offer a smörgåsbord of topological electronic states and magnetic phenomena [1-3]. The hexagonal $MnSb_4Te_7$ is one such van der Waals material. The unit cell can be described by the $P\bar{3}m1$ space group, where the Sb_2Te_3 topological layers are sandwiched between magnetic $MnSb_2Te_4$ septuple layers. Theoretical calculations indicate that different spin arrangements of the Mn magnetic sublattice can strongly influence the topology of the charge carriers in the Sb2Te3 quintuple layers [1]. Symmetry analysis and theoretical calculations indicate that the axion insulator state usually associated with A-type AFM order will in fact persist even when the material becomes FM ordered in the presence of an external magnetic field along the c axis [1]. We have conduct-ed neutron diffraction on a single crystal of $MnSb_4Te_7$ at the D10 instrument at the ILL. Our zero field measurements are consistent with A-type AFM order as seen in the Bi equivalent compound [2,3]. With increasing field along the c axis, we find evidence for a spin flip transition occurring at $\sim$0.15 T. The magnetic structure as a function of both temperature and external field will be discussed. We also comment on implications for the dimensionality of the magnetism. Finally we compare the magnitude and site mixing of Mn^{2+} moments to those of the Bi analogue compound.
References
[1] Huan, S. et al. Physical Review Letters 126, 246601 (2021).
[2] Ding, L. et al. Journal of Physics D: Applied Physics 54, 174003 (2021)
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