Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Magnetic phase transitions in the chiral helimagnet $Cr_{1/3}NbS_2$[1]

NIRMAL GHIMIRE, The University of Tennessee/Oak Ridge National Laboratory, MICHAEL MCGUIRE, BRIAN SALES, LISA DEBEER-SCHMITT, HUIBO CAO, BRYAN CHAKOUMAKOS, ADAM ACZEL, BALAZS SIPOS, Oak Ridge National Laboratory, SIWEI TANG, YUEN YIU, JIAQIANG YAN, The University of Tennessee, STEPHEN NAGLER, Oak Ridge National Laboratory/The University of Tennessee, DAVID MANDRUS, The University of Tennessee/Oak Ridge National Laboratory — $Cr_{1/3}NbS_2$ is a long period chiral helimagnet crystallizing in the non-centrosymmetric, hexagonal space group $P6_322$. Helimagnetic ordering along the c-axis is attributed to the competition between the symmetric exchange interaction, favoring parallel moments, and the anti-symmetric Dzyaloshinsky-Moriya interaction, favoring perpendicular moments. Recently, the ground state helical ordering is found to be destabilized by a magnetic field applied perpendicular to c, forming a chiral soliton lattice phase, and, above a critical field, a commensurate ferromagnetic state. Thermal and transport properties also show interesting behaviors in the vicinity of the transition temperature. Here we present magnetic, thermal and transport properties of $Cr_{1/3}NbS_2$ measured on single crystals, along with recent results from neutron scattering experiments conducted on the four circle single crystal diffractometer and general purpose SANS at the High Flux Isotope Reactor, ORNL.

[1]Research supported by DOE office of Science, Division of Materials Science and Engineering and Scientific User Facilities Division. Research at ORNL's HFIR sponsored by the Scientific User Facilities Division.

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Date submitted: 13 Nov 2012 Electronic form version 1.4