Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Is the black phase of SmS a topological Kondo insulator? ERIC BAUER, N. J. GHIMIRE, F. RONNING, C. BATISTA, D. BYLER, J. D. THOMPSON, Los Alamos National Laboratory, A. RAHMANISISAN, University of British Columbia, Z. FISK, University of California, Irvine — SmS is a prototypical Kondo insulator where electronic correlations drive a system insulating that would otherwise be metallic. Whether or not such a system is also a topological insulator that hosts a protected metallic surface state, depends on the parity of the wavefunction of the occupied states. However, unlike weakly correlated materials, it is unclear whether state-of-the-art electronic structure calculations accurately predict the parity of the occupied wavefunctions of correlated insulators. Nevertheless, Dzero and collaborators suggest that Kondo insulators such as SmB6 can be topological. Like SmB6, Cubic SmS is a non-magnetic semiconductor with an insulating behavior at ambient pressure and low temperatures driven by hybridization with the Sm f-electrons. At 6 kbar, SmS undergoes a phase transition into a valance fluctuating phase accompanied by a visible color change from black to gold. It then undergoes a second phase transition at about 20 kbar to an antiferromagnetic order at low temperatures. We will discuss whether electronic structure calculations indicate a topological state of SmS at P=0. We will also discuss whether or not the magnetic, thermal and transport properties of the black phase of SmS are consistent with the existence of a topological protected surface state.

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Date submitted: 14 Nov 2014 Electronic form version 1.4