Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Absence of localized-spin magnetic scattering in the narrow-gap semiconductor $FeSb_2$[1] ANDREI SAVICI, Johns Hopkins University, IGOR ZALIZNYAK, Brookhaven National Laboratory, OVIDIU GARLEA, Oak Ridge National Laboratory, RONGWEI HU, CEDOMIR PETROVIC, Brookhaven National Laboratory — We report inelastic neutron scattering measurements aimed at investigating the origin of the temperature-induced paramagnetism in the narrow-gap semiconductor $FeSb_2$. We find that inelastic response for energies up to 60 meV and at temperatures $\approx$ 4.2 K, $\approx$ 300 K and $\approx$ 550 K is consistent with scattering by the lattice phonon excitations. Hence, we observe no evidence for a well-defined magnetic excitation corresponding to transitions between the non-magnetic ground state and states of magnetic multiplet in the localized spin picture. However, a broad magnetic scattering continuum in the 15 meV to 35 meV energy range is not ruled out by our data. Our findings make description in terms of the localized Fe magnetic states unlikely and suggest that paramagnetic susceptibility of itinerant electrons is at the origin of the temperature-induced magnetism in $FeSb_2$.

[1]Funding provided by NSF DMR-0603126, DOE DE-AC02-98CH10886. Work at HFIR was sponsored by the Scientific User Facilities Division, Office of Basic Energy Sciences, U. S. Department of Energy.

Andrei Savici
Johns Hopkins University

Date submitted: 11 Dec 2009 Electronic form version 1.4