

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

X-ray scattering study of the magnetic phase transitions in GdFe₃(BO₃)₄ H. MO, C.S. NELSON, Brookhaven National Laboratory, Upton, NY 11973, L.N. BEZMATERNYKH, V.L. TEMEROV, Kirenskiy Institute of Physics, Russian Academy of Science, Akademgorodok, Krasnoyarsk, 660036 Russia — The rare earth iron borates have interesting magnetic properties due to the subtle interactions between the rare earth and the iron moments. Among these materials, GdFe₃(BO₃)₄ has the most complex phase diagram as suggested by previous studies. [1,2] These studies suggest that iron moments order antiferromagnetically below $T_N \sim 36$ K and that there are several additional magnetic phase transitions below T_N . Yet whether and at what temperature the Gd moments order and the nature of the additional transitions, remain largely unknown. Using x-ray magnetic scattering, we have verified that the moments order antiferromagnetically with a propagation vector $(0\ 0\ 3/2)$. Large resonant scattering enhancements at the Gd L_{II} and L_{III} edges show unambiguously that Gd moments order at T_N . Both resonant and nonresonant scattering data exhibit a splitting of the magnetic peak along c^* above ~ 10 K which indicates an incommensurate phase transition, with the incommensurability δ increasing continuously as a function of temperature ($\delta \sim .0038$ near T_N). Use of the NSLS/BNL is supported by the U. S. DOE under Contract no. DE-AC02-98CH10886. [1] F. Yen et. al, PRB 73, 54435 (2006) [2] A. I. Pankrats et. al, JETP 99, 766 (2004)

H. Mo
Brookhaven National Laboratory, Upton, NY 11973

Date submitted: 29 Nov 2007

Electronic form version 1.4