

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Three dimensional magnetic correlations in LuFe_2O_4 M.D. LUMSDEN, A.D. CHRISTIANSON, M. ANGST, Oak Ridge National Laboratory, Oak Ridge TN 37831, Z. YAMANI, Canadian Neutron Beam Centre, NRC, Chalk River, Canada, W. TIAN, R. JIN, S.E. NAGLER, B.C. SALES, D. MANDRUS, Oak Ridge National Laboratory, Oak Ridge TN 37831 — LuFe_2O_4 has recently attracted much attention due to a novel electronically driven ferroelectric transition and concomitant indications of coupling between magnetic degrees of freedom and a large spontaneous polarization. To examine the behavior of LuFe_2O_4 in further detail, we have performed extensive polarized and unpolarized neutron diffraction experiments on high quality single crystal specimens. These measurements reveal two phase transitions involving magnetic degrees of freedom below 300 K. At 240 K we find the onset of three dimensional ferrimagnetic order. The refined ferrimagnetic spin structure is a symmetry allowed magnetic structure of the parent R-3m space group with a propagation vector of $(1/3\ 1/3\ 0)$. Below 175 K many of the magnetic Bragg peaks become significantly broadened and a broad diffuse component to the magnetic scattering becomes evident. In addition, a new set of satellites is observed indexed as $(1/3\pm\delta\ 1/3\pm\delta\ 3L/2)$ where $\delta \sim 0.027$. Polarized neutron diffraction measurements indicate that these satellites have a substantial magnetic component.

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Date submitted: 27 Nov 2007

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