Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Checkerboard to Stripe Charge Ordering Transition in $TbBaFe_2O_5$ DANIEL PRATT, SUNG CHANG, NIST Center for Neutron Research, National Institute of Standards and Technology, Gaithersburg, Maryland 20899, USA, WEI TIAN, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831, USA, ALEXEY TASKIN, YOICHI ANDO, Department of Frontier Materials Creation, Osaka University, Osaka Japan, JEREL ZARESTKY, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831, USA, ANDREAS KREYSSIG, ALAN GOLDMAN, ROBERT MCQUEENEY, Ames Laboratory, US DOE, Iowa State University, Ames, IA 50011, USA — A combined neutron and x-ray diffraction study of $TbBaFe_2O_5$ reveals a rare checkerboard to charge ordering transition. $TbBaFe_2O_5$ is a mixed valent compound where Fe^{2+}/Fe^{3+} ions are known to arrange into a stripe charge-ordered state below $T_V = 291$ K, that consists of alternating Fe^{2+}/Fe^{3+} stripes in the basal plane running along the $\boldsymbol{b}$ direction. Our measurements reveal that the stripe charge-ordering is preceded by a checkerboard charge-ordered phase between $T_V < T < T^* = 308$ K. The checkerboard ordering is stabilized by inter-site coulomb interactions which give way to a stripe state stabilized by orbital ordering.

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Date submitted: 06 Nov 2012 Electronic form version 1.4