Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

High Pressure and High Resolution Magnetization of $GdBaCo_2O_{5.5}$ R. P. GUERTIN, Tufts Univ., Medford, MA 02155, E. S. CHOI, P. SCHLOTTMANN, NHMFL/Florida State Univ., Tallahassee, FL 32310, Z. X. ZHOU, ORNL, Oak Ridge, TN 37830 — We present the results of two rather diverse experiments designed to reveal new features of the complex magnetic properties of $GdBaCo_2O_{5.5}$ and, in particular, lanthanide/transition metal coupling in oxide materials. First, high resolution magnetization, M (H,T), measurements on an untwinned single crystal show a small but non-zero coupling between the 3d-shell Co-based magnetic order and the 4f shell Gd paramagnetism. Second, high pressure magnetization measurements on a polycrystalline sample suggest a weakening of the ferromagnetic interplane coupling at the expense of a strengthening of the antiferromagnetic interplane coupling. In the measured pressure range, however, no unambiguous pressure-induced spin transition was observed. Finally, low temperature isothermal magnetization measurements under pressure indicate a slight weakening of the effective Co-generated molecular field, affecting the Gd paramagnetism. The totality of data contained in this work suggests that there is a small but definitive molecular field effect at the Gd sites, which is a function of the strength of transition metal magnetism ordering at higher temperatures.

R. P. Guertin

Date submitted: 30 Nov 2005 Electronic form version 1.4