

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

THz magneto-optical study of multiferroic compound TbMnO₃¹

URMAS NAGEL, D. HÜVONEN, T. RÕÕM, NICPB, Akadeemia tee 23, 12618 Tallinn, S.B. KIM, C.L. ZHANG, S.-W. CHEONG, Rutgers Center for Emergent Materials & Department of Physics and Astronomy, Rutgers University, NJ — We present results of magneto-optical absorption measurements in the THz region on multiferroic TbMnO₃ in magnetic fields up to 12 T. The temperature range of our studies covers the paramagnetic phase ($T > 42$ K), the collinear incommensurate spin density wave phase of Mn³⁺ $S = 2$ spins (28 K < 42 K), the ferro-electric phase with incommensurate elliptic spin order ($T < 28$ K) and the phase where the magnetic moments of Tb are ordered, $T < 7$ K. It is known that in the FE phase the magnetic field $\mathbf{B}_0 \parallel \mathbf{a}$ equal to 10.5 T flops the electric polarization from $\mathbf{P} \parallel \mathbf{c}$ to $\mathbf{P} \parallel \mathbf{a}$. The polarization \mathbf{P} is in the plane of elliptical spiral and perpendicular to spiral order vector, $\mathbf{k} \parallel \mathbf{b}$ in TbMnO₃. It is expected that the selection rule for the electric-dipole active spin excitation in the spiral phase changes from $\mathbf{E}_1 \parallel \mathbf{a}$ to $\mathbf{E}_1 \parallel \mathbf{c}$. Polarization-sensitive absorption measurements are performed to distinguish between magnetic- or electric-dipole active spin excitations, i.e. magnons or electromagnons, respectively, in the whole temperature and magnetic field range.

¹The support by the EstSF grants 6138 and 7011 is acknowledged.

Urmaz Nagel
NICPB, Akadeemia tee 23, 12618 Tallinn

Date submitted: 25 Nov 2008

Electronic form version 1.4