Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Hybrid quasiparticles within the orthorhombic or hexagonal topology of RMO_3 (R=Nd,Pr,Tm,Er; M=Mn,Cr) under strong magnetic fields R. SOPRACASE, GREMAN, Tours, France, K. HOLLDACK, HZB, BESSY II, Berlin, Germany, L. DEL CAMPO, CNRS-CEMHTI, Orléans, France, N.E. MASSA, LANAIS EFO-CEQUINOR, UNLP, La Plata, Argentina, M.J. MARTÍNEZ-LOPE, J.A. ALONSO, ICMM-CSIC, Madrid, Spain — We report on magnetoelectric quasiparticles that originate from electronic Coulomb and exchange correlations using a Bruker IFS125-HR interferometer at 0.5 cm^{-1} resolution in the THz beamline of the electron storage ring BESSYII in Berlin. Orthorhombic $NdMnO_3$ and hexagonal $TmMnO_3$ have quasiparticles at energies of zone center magnons. In both cases, increasing the applied field, the $\sim$ 20 cm^{-1} line matching the lowest energy magnon, has its intensity reduced sharply while bands associated in $TmMnO_3$ to magnon–acoustical phonon dispersion crossing and gap opening behave differently. The line at $\sim$ 48 cm^{-1}, the higher branch of the phonon gap, shows a Zeeman splitting-like behavior, while the lower branch at $\sim$ 31 cm^{-1} has weak field dependences. The asymmetric envelope peaking at $\sim$ 35 cm^{-1} in $NdMnO_3$ weakens, softens, and evolves at 8 T into two unresolved bands suggesting field induced TA+magnon coupling materializing a condition for a multiferroic state. Metastable orthorhombic $ErMnO_3$ has two bands at 5 K which resembles those of $NdMnO_3$. A remarkable 35 cm^{-1} Zeeman splitting at 5 K in $PrCrO_3$ is tentatively associated to Cr^{3+} electrons in a distorted polarizable p-d bond. $ErCrO_3$ shows such a feature at 50 cm^{-1} as well additional zero field splitting at 8 and 9 cm^{-1} in the spin reorientation phase.

N. E. Massa
LANAIS EFO-CEQUINOR, UNLP, La Plata, Argentina

Date submitted: 13 Nov 2013 Electronic form version 1.4