Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

**Far-IR spectra of magnons, crystal field transitions, and phonons in hexagonal *RE*$MnO_3$ (*RE*=Er, Tm, Yb, Lu) single crystals**[1] E.C. STANDARD, T.N. STANISLAVCHUK, R. BASISTYY, A.A. SIRENKO, Dept of Phys, NJIT, Newark NJ, USA, T.D. KANG, ReCFI, Dept of Phys and Astronomy, Seoul National U., Seoul, Korea, N. LEE, S-W. CHEONG, Rutgers Center for Emergent Materials and Dept of Phys and Astronomy, Rutgers U., NJ, USA — Far-IR spectra of hexagonal *RE*$MnO_3$ (*RE*=Er, Tm, Yb, Lu) single crystals have been studied between $T$=1.6 K and 300 K using transmission in high magnetic field and rotating analyzer ellipsometry. The symmetry of the IR optical phonons and their oscillator strengths were determined for compounds with different *RE* ions. The temperature dependence of the phonon frequencies revealed a strong spin-phonon interaction in the temperature range below $T_N$ ∼70 K. The effective g-factors have been determined for the AFM resonances and crystal field transitions using external magnetic fields up to 10 T. The frequency of the AFM resonances around 50 $cm^{-1}$ increases systematically with a decrease of the *RE* ion radius. The observed effects are analyzed taking into account main magnetic interactions in the system including exchange of the $Mn^{3+}$ spins with $RE^{3+}$ paramagnetic moments. The magnetic ordering of *RE* ions was observed at low temperatures $T$ <3.5 K and in strong magnetic fields.

[1]Work at NJIT and Rutgers was supported by DOE DE-FG02-07ER46382. Use of NSLS-BNL was supported by DOE DE-AC02-98CH10886.

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Date submitted: 10 Nov 2011 Electronic form version 1.4