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Reentrant electromagnons in multiferroic $\text{Eu}_{0.75}\text{Y}_{0.25}\text{MnO}_3$ in the H-T phase diagram¹ ROLANDO VALDES AGUILAR, A.B. SUSHKOV, H.D. DREW, MRSEC, Department of Physics. University of Maryland, College Park, MD 20742, Y.J. CHOI, C. ZHANG, S-W. CHEONG, Rutgers University, Piscataway, NJ 08854 — The electromagnon spectra of $\text{Eu}_{0.75}\text{Y}_{0.25}\text{MnO}_3$ has been measured as a function of magnetic field $H\parallel c$ up to 8 T and temperature between 5 and 300 K. Three magnetic induced electric dipole features reported earlier² are observed to weaken simultaneously but not shift for increasing field. These electromagnon features all show reentrant behavior as a function of temperature for $H > 6$ T, and track with the anomalies in the static dielectric constant, confirming their electromagnon origin. While the magnetic structure of $\text{Eu}_{0.75}\text{Y}_{0.25}\text{MnO}_3$ is unknown, it is assumed that it is a cycloidal magnet where the spins lie in the crystallographic a - b plane, based on the behavior of the magnetic susceptibility and the direction of static polarization \mathbf{P} . Therefore, it appears that the electromagnon selection rule, $e\parallel a$, in all the multiferroic $RMnO_3$ manganites is independent of the spin plane and polarization direction. We will compare the phase diagrams of $\text{Eu}_{0.75}\text{Y}_{0.25}\text{MnO}_3$ and TbMnO_3 where similar anomalies are observed.

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²Valdes Aguilar, et al. PRB **76**, 060404(R) (2007)

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