

Abstract Submitted  
for the MAR09 Meeting of  
The American Physical Society

**Competing Magnetic Interactions in Magnetoelectric YbMnO<sub>3</sub>**  
SHISHIR RAY, YING ZOU, MARK WILLIAMSEN, SOMADITYA SEN,  
LARRY BUROKER, PRASENJIT GUPTASARMA<sup>1</sup>, Physics Dept, University of  
Wisconsin-Milwaukee, USA — The (*RE*)MnO<sub>3</sub> (*RE* = *Rare Earth*) series of mag-  
netoelectrics exist as both hexagonal and orthorhombic lattice structures. These  
have recently attracted much attention due to possible applications in spintronics,  
in switching, and as media with negative refractive index. YbMnO<sub>3</sub> is hexagonal  
with ferroelectricity ( $T_c \sim 970\text{K}$ ) and antiferromagnetism ( $T_N$ : Mn $\sim 80\text{K}$ , Yb $\sim 5\text{K}$ )  
in the same phase. Here, we report detailed studies of the H-T phase diagram using  
a high-quality single crystal of YbMnO<sub>3</sub> grown by floating zone. We examine the  
magnetically ordered phases of Yb: Yb<sup>3+</sup> (*2a*) via Yb-Yb, and Yb<sup>3+</sup> (*4b*) via Yb-  
Mn interactions within the hexagonal YbMnO<sub>3</sub> structure, and report several new  
features in the magnetic phase diagram. Contrary to recent reports, we observe  
that the magnetic moment of Yb does not become fully suppressed with external  
magnetic field, but rather directly transitions from the A<sub>1</sub> order into the A<sub>2</sub> order at  
low temperature.

<sup>1</sup>Corresponding author

Shishir Ray  
Physics Dept, University of Wisconsin-Milwaukee, USA

Date submitted: 17 Dec 2008

Electronic form version 1.4