

# Polarization flop by a field induced magneto-structural transition in multiferroic TbMnO<sub>3</sub>

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*N. Aliouane<sup>1</sup>, Jörg Stropfer<sup>2</sup>, Ioannis Zegkinoglou<sup>2</sup>,  
D. N. Argyriou<sup>1</sup>, M. von Zimmermann<sup>3</sup>*

<sup>1</sup>*Hahn-Meitner-Institut, Glienicker Str. 100, Berlin D-14109, Germany*

<sup>2</sup>*Max-Planck-Institut für Festkörperforschung, Heisenbergstraße 1,  
70569 Stuttgart, Germany*

<sup>3</sup>*HASYLAB at DESY, Notkestr. 85, 22605 Hamburg, Germany*

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Multiferroics are materials where magnetism and ferroelectricity are strongly coupled. These hold the promise for applications in nonvolatile data storage where information may be recorded by controlling the direction of the electric polarization by an applied magnetic field. One candidate material for such a multiferroic device is TbMnO<sub>3</sub> because it exhibits a novel flop of the electric polarization  $P$  with magnetic field. In this material ferroelectricity arises as a secondary effect due to a magnetoelastic coupling below the Néel temperature ( $T_N$ ) at the lockin of a sinusoidal modulation of the crystal and magnetic structure. Here we show that this polarization flop is driven by a discontinuous magneto-structural incommensurate (IC) to commensurate (C) transition with applied magnetic field. Our measurements further show that the character of the ferroelectric transition changes under magnetic field in which the lattice distortion becomes a primary order parameter.