ESRF	**Experiment title:** Field dependence of magnetic and charge correlations in multiferroic TbMnO3	**Experiment number**: HE2172
Beamline:	**Date of experiment**: from: 26/4/2006 to: 2/5/2006	**Date of report**: 28/2/08
Shifts:	**Local contact(s)**: Stuart Wilkins	*Received at ESRF:*

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Andrew Boothroyd	University of Oxford
Danny Mannix	ESRF

Report:

Data from this experiment were key to the following paper:

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X-ray scattering study of the order parameters in multiferroic $TbMnO_3$

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In particular azimuthal data taken at one of the XRS refeclections (shown below) provides evidence in support of the notion that a contribution from a multipole of anapolar character appears in the multiferroic state.

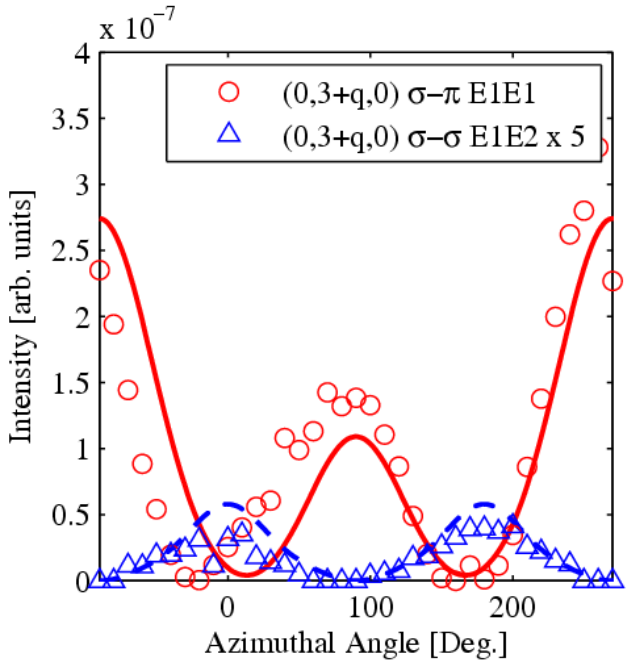

FIG. 20. (Color online) Azimuthal dependence of XRS at the $(0,3-q_{\mathrm{Mn}},0)$ satellite in the vicinity of the Tb L_3 edge recorded on ID20. The σ-π data were taken at an energy corresponding to an $E1$-$E1$ event around 7.520 keV, while the σ-σ data were taken 7 eV below this energy. The lines have been calculated using the FDMNES package. In the unrotated channel, the main contribution is calculated to be from $E1$-$E1$ XRMS associated with a splitting of the Tb $5d$ bands induced by the cycloidal order on the Mn sublattice. For the unrotated channel, the weak preedge peak is calculated to be $E1$-$E2$, arising from an anapole, i.e., a multipole which is odd with respect to both time and parity. The data in the unrotated channel have been multiplied by a factor of 5.