EUROPEAN **S**YNCHROTRON **R**ADIATION **F**ACILITY

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Experiment Report Form

The double page inside this form is to be filled in by all users or groups of users who have had access to beam time for measurements at the ESRF.

Once completed, the report should be submitted electronically to the User Office using the **Electronic Report Submission Application:**

http://193.49.43.2:8080/smis/servlet/UserUtils?start

Reports supporting requests for additional beam time

Reports can now be submitted independently of new proposals – it is necessary simply to indicate the number of the report(s) supporting a new proposal on the proposal form.

The Review Committees reserve the right to reject new proposals from groups who have not reported on the use of beam time allocated previously.

Reports on experiments relating to long term projects

Proposers awarded beam time for a long term project are required to submit an interim report at the end of each year, irrespective of the number of shifts of beam time they have used.

Published papers

All users must give proper credit to ESRF staff members and proper mention to ESRF facilities which were essential for the results described in any ensuing publication. Further, they are obliged to send to the Joint ESRF/ ILL library the complete reference and the abstract of all papers appearing in print, and resulting from the use of the ESRF.

Should you wish to make more general comments on the experiment, please note them on the User Evaluation Form, and send both the Report and the Evaluation Form to the User Office.

Deadlines for submission of Experimental Reports

- 1st March for experiments carried out up until June of the previous year;
- 1st September for experiments carried out up until January of the same year.

Instructions for preparing your Report

- fill in a separate form for each project or series of measurements.
- type your report, in English.
- include the reference number of the proposal to which the report refers.
- make sure that the text, tables and figures fit into the space available.
- if your work is published or is in press, you may prefer to paste in the abstract, and add full reference details. If the abstract is in a language other than English, please include an English translation.

ESRF	**Experiment title:** Eectric field tuning of magnetism in frustrated HoMnO3	**Experiment number**: HE1937
Beamline:	**Date of experiment**: from: 29/6/05 to: 5/7/05	**Date of report**: 5/7/05
Shifts:	**Local contact(s)**: Blanka Janousova	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

Des McMorrow **University College London**

Carsten Detlefs ESRF

Andrew Boothroyd University of Oxford

Report:

There is great current interest in the RMnO3 such as HoMnO3 and TbMnO3. This follows from the discovery of giant magnetoelectric effects in these materials (see, for example, Lottermoser et al., Nature, 430 541 (2004).)

This experiment was the first part of what we expect to be a major research project on the RMnO3 and RMn2O5 compounds.

The aim was to investigate the magnetic structure in HoMnO3 in zero applied field – it has never, as far as we know, been investigated with resonant scattering methods – and then to apply an electric field to understand how the antiferromagnetic order of the Mn and Ho sublattices is destroyed by an electric field.

We were unfortunately unable to find any magnetic scattering in HoMnO3 at the antiferromagnetic positions. The reason for this is unknown.

Faced with this, and with the agreement of the local contact, we decided to do a preliminary experiment on TbMnO3, for which we have been time pending on Xmas for a zero field experiment.

This experiment was highly successful, and produced some very interesting results.

In the figure below we show the scattering along [0 K 0] as a function of temperature. The sharp peak near K=3.72 is associated with the ordering of the Mn moments, while the broad peak near K=3.58 comes from the Tb sublattice. The detailed energy, polarization, and temperature depdendence of these peaks were investigated.

This experiment, as well as providing new information on the magnetism and structure of TbMnO3, shows that it will be feasible to study this system on ID20 using a combination of the new 10T magnet and applied electric fields. Such experiments will be the first of their kind and will give unique information on the origin of unusual magnetoelectric coupling in the RMnO3 compounds.