# Experimental report

30/09/2025

**Proposal:** 5-31-2854 **Council:** 4/2021

**Title:** Nuclear and magnetic diffraction study of monoclinic TbTaO4

**Research area:** Physics

**This proposal is a new proposal**


**Main proposer:** Nicola KELLY

**Experimental team:** Emmanuelle SUARD
Ines PUENTE ORENCH

**Local contacts:** Emmanuelle SUARD
Ines PUENTE ORENCH
Vivian NASSIF
Claire COLIN


**Samples:** TbTaO4

| Instrument | Requested days | Allocated days | From | To |
|---|---|---|---|---|
| D2B | 1 | 1 | 01/09/2021 | 02/09/2021 |
| D1B | 1 | 1 | 05/09/2021 | 06/09/2021 |


**Abstract:**

TbTaO4 is a member of the family of rare-earth tantalates which have recently been investigated for their dielectric, luminescent and ion-conducting properties. Furthermore, they have an unusual 'stretched diamond' lattice of rare-earth ions, which is expected to display magnetic frustration as in LiYbO2 and NaCeO2 with the same rare-earth lattice. Our initial study of eight monoclinic LnTaO4 compounds (Ln = Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er) reveals Curie-Weiss behaviour with no magnetic ordering above 1.8 K except in the case of TbTaO4, which has an antiferromagnetic transition in the specific heat (Cmag/T) at 2.25 K. We propose a nuclear and magnetic neutron diffraction study at variable temperatures from 1.5 to 300 K in order to confirm the crystal structure and determine the magnetic structure of TbTaO4.

**Experimental Report**

**5-31-2854**

**D1B & D2B**

**Local Contacts: Inés PUENTE ORENCH, Emmanuelle SUARD**

**Experiment date: September 2021**

This experiment was conducted by the local contacts without any members of the experimental team on site, owing to the COVID-19 pandemic.

Powder neutron diffraction measurements were carried out on *M*-phase $TbTaO_4$ on both beamlines using an Orange cryostat.

D1B: wavelength = 2.52 Å (2 K < $T \leq$ 300 K) and 1.28 Å (300 K only).

D2B: wavelength = 1.59 Å (1.5 K and 30 K).

The results were published in Phys. Rev. Materials **6**, 044410 (2022)

https://doi.org/10.1103/PhysRevMaterials.6.044410

Sorry that the report was not completed until now (a reminder was just provided by the MyScience portal).

Nicola KELLY

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