Experimental report

28/05/2024

Proposal: 5-15-639 **Council:** 4/2024

Title: Changes induced by Pressure in thenuclear and magnetic structure of FeWO4

Research area: Materials

This proposal is a new proposal

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Samples: FeWO4

Instrument	Requested days	Allocated days	From	To
XTREMED	2	2	15/05/2024	17/05/2024

Abstract:

The wolframite-type MWO4 compounds, including FeWO4, exhibit intriguing properties such as magnetism and multiferroicity. FeWO4, characterized by a monoclinic crystal structure at room temperature (P2/c), displays antiferromagnetic behaviour with a Ne¿el temperature (TN) of 75 K under ambient pressure, attributed to superexchange interactions between Fe ions. Despite the known anisotropic compressibility of wolframites, the influence of pressure on the magnetism behaviour remains unexplored. FeWO4, present a commensurate propagation vector, (k=1/2 0 0), at ambient pressure. Ferromagnetic interactions among iron ions can be induced by pressure, according by DFT calculations, therefore this system is an ideal candidate for study the effects of high pressure. We request 2 days of beam time on XtremD operated at 10 GPa and 30 K to investigate the pressure-induced structural modifications leading to changes in the magnetic structure of FeWO4.

Experimental Report

Nº EXPERIMENT: 5 – 15 – 639

DATES: 15-17/05/2024

The sample (FeWO4) was placed into Paris-Edimburg cell at RT conditions and the pressure was increased up to 8GPa Fig 1). At this pressure, a gamma scan was executed for 3 hours but in this period something strange was observed (Fig 2) and finally it was determined that the HP cell could not withstand This pressure and broke.

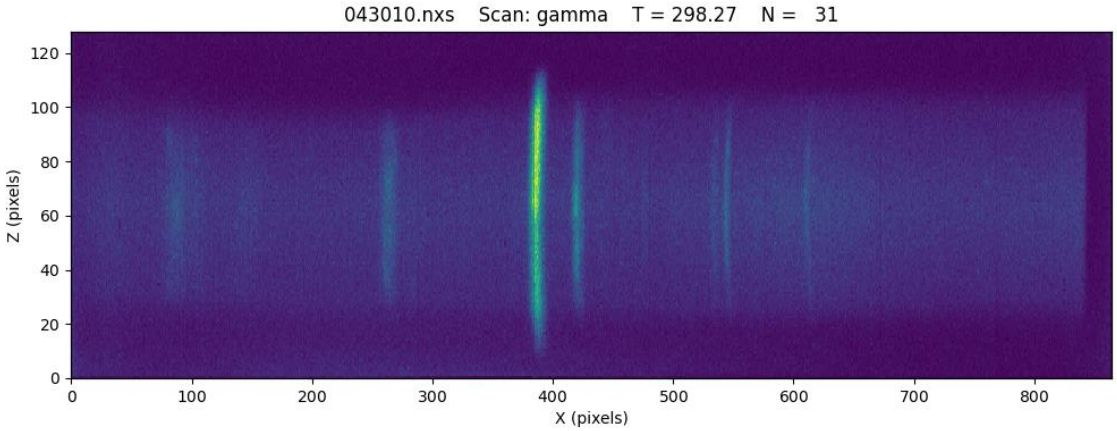

Figure 1

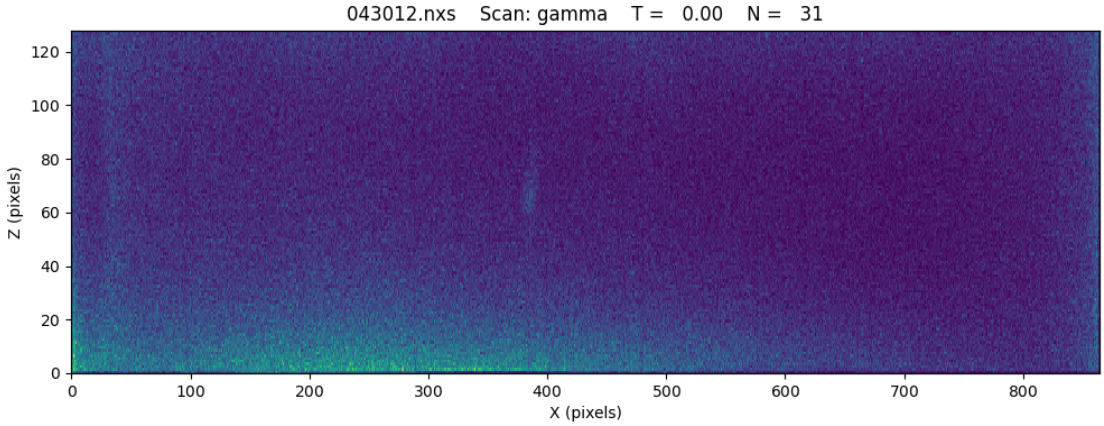

Figure 2

Therefore we had to restart the procedure. A new preparation was done, the pressure was increased to 8GPa and began to be lowered to 30K. ***Unfortunately, during the temperature drop again the HP cell broke again.***

Once again, we had to start over and for This operation we also had to wait for the system to reach a temperatura close to 280K to be able to resume the experimental procedure.

Our last attempt was to work at a lower pressure (7.5GPa) and we were able to measure three diffractograms at RT, 30K and 85K thsi time without apparent problems.

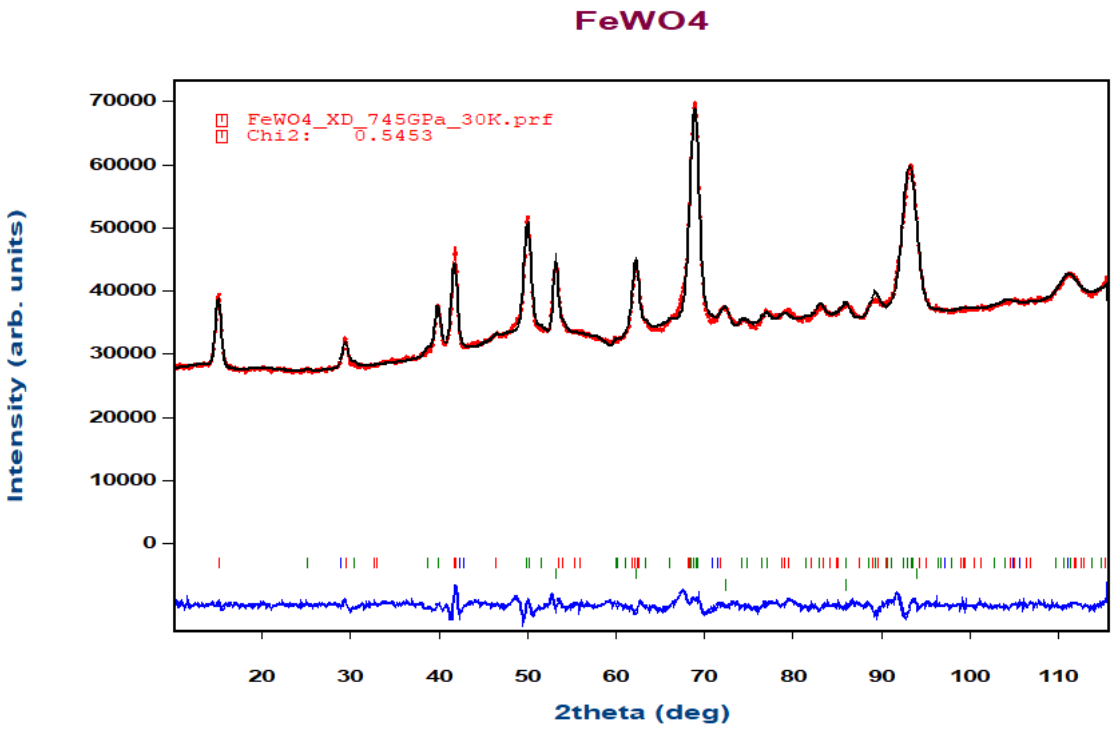

Figure 3