Experimental report

21/12/2022

Proposal: CRG-2478 **Council:** 4/2017

Title: Magnetic order evolution in LnBa(Cu,M)FeO5 high-TC spiral

Research area:

This proposal is a new proposal

Main proposer: Jose Luis GARCIA MUNOZ

Experimental team: XIAODONG ZHANG
Jose Luis GARCIA MUNOZ
Arnau ROMAGUERA CAMPS
Francois FAUTH

Local contacts: Oscar Ramon FABELO ROSA

Samples: (Y1-xLnx)Ba(Cu,M)FeO5

Instrument	Requested days	Allocated days	From	To
D1B	3	3	27/03/2018	29/03/2018
			25/06/2018	26/06/2018

Abstract:

Experimental report D1b CRG-2478

CRG-D1B-17-344

In total, 7 samples with doble-perovskite structure were measured: YBaCuFe(1-x)Cr(x)O5 (x=1, 10, 20 %) , TbBaCuFeO5, Tb2MnNiO6, PrBaCuFeO5 and NdBaCuFeO5. All measurements were done within the temperature range [1.5K – 500K], depending on the sample.

At present, only part of the results from these measurements has been published. The results from this experiment already published can be found in the following article:

* *Magnetic inversion symmetry breaking and spin reorientation in Tb_2MnNiO_6 : a polar strong ferromagnet*
Jose Luis García-Muñoz, Javier Blasco, Xiaodong Zhang and Oscar Fabelo
Physical Review B 99, 184444 [9pp] (2019)

DOI: 10.1103/PhysRevB.99.184444

https://doi.org/10.1103/PhysRevB.99.184444

Magnetic inversion symmetry breaking and spin reorientation in Tb_2MnNiO_6: A polar strong ferromagnet

Jose Luis García-Muñoz,[1,*] Javier Blasco,[2] Xiaodong Zhang,[1] and Oscar Fabelo[3]
[1]*Institut de Ciència de Materials de Barcelona, ICMAB-CSIC, Campus Universitario de Bellaterra, E-08193 Bellaterra, Spain*
[2]*Instituto de Ciencia de Materiales de Aragón, Departamento de Física de la Materia Condensada, Consejo Superior de Investigaciones Científicas (CSIC)—Universidad de Zaragoza, E-50009 Zaragoza, Spain*
[3]*ILL-Institut Laue Langevin, 71, Avenue des Martyrs, 38042 Grenoble Cedex, France*

(Received 3 March 2019; revised manuscript received 5 May 2019; published 29 May 2019)

A second paper based on the neutron results for LnBaCuFeO5 is currently under preparation .

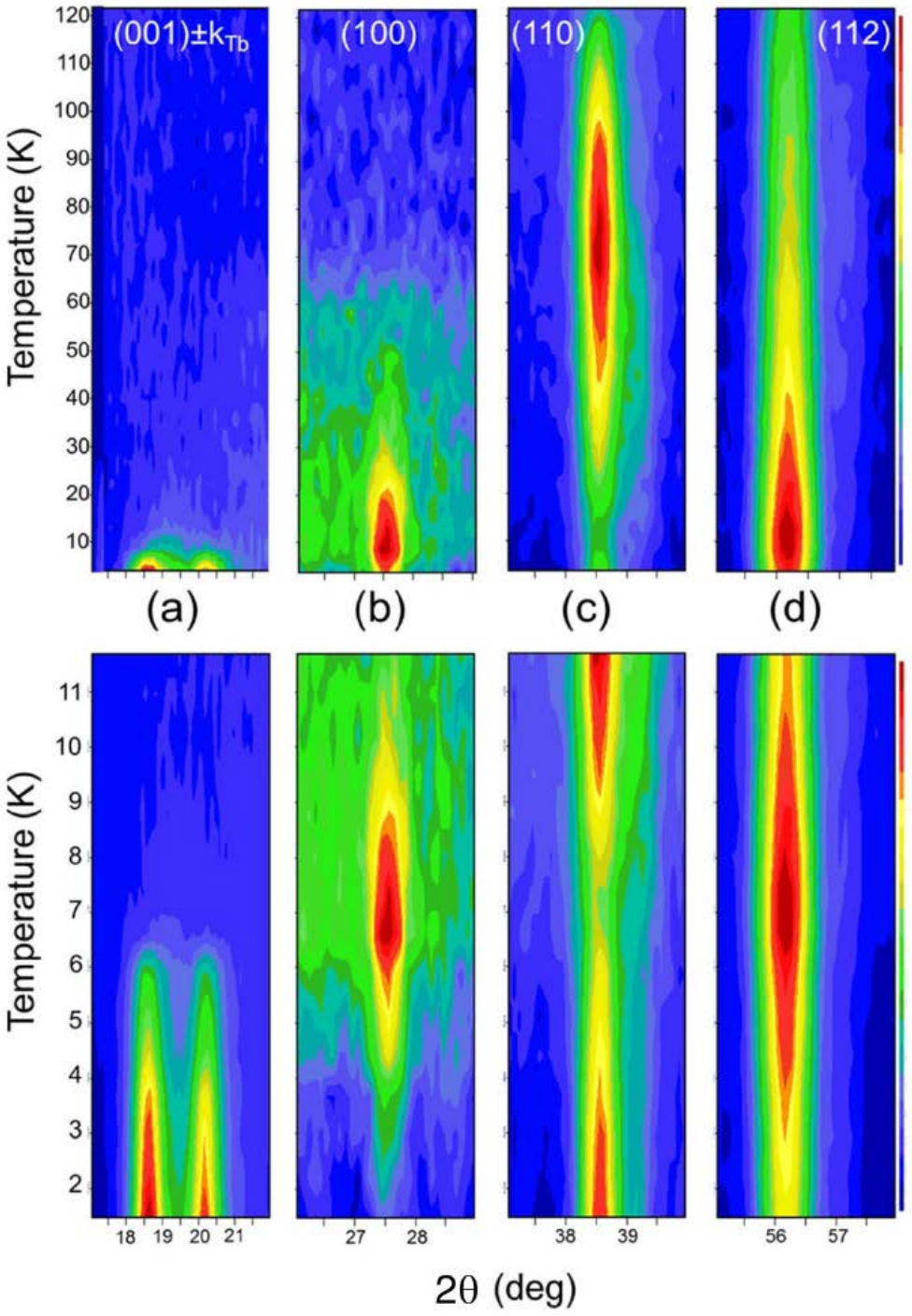

FIG. 3. Temperature evolution below 120 K of the NPD intensities (D1B) in four selected angular ranges around the magnetic reflections (a) (001) $\pm$ k_{Tb}, (b) (100), (c) (110), and (d) (112). Top: interval 120–5 K. Bottom: interval 12–1.5 K.

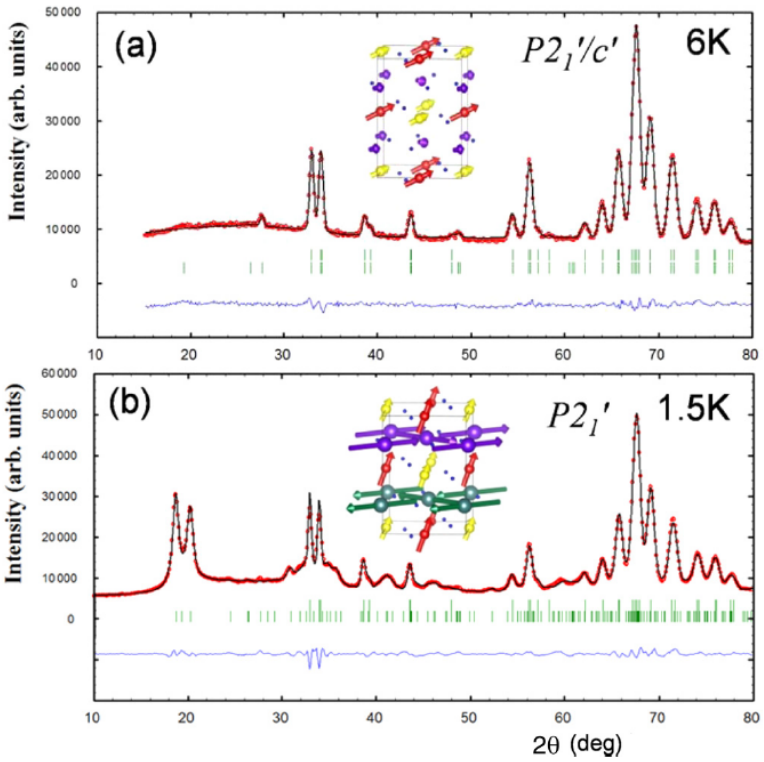

FIG. 7. Rietveld refinement (solid line) of the neutron patterns for Tb_2MnNiO_6 collected on D1B at (a) 6 K (FM3 phase), and (b) 1.5 K (FM4 phase), using, respectively, the $P2_1'/c'$ and $P2_1'$ MSGs.

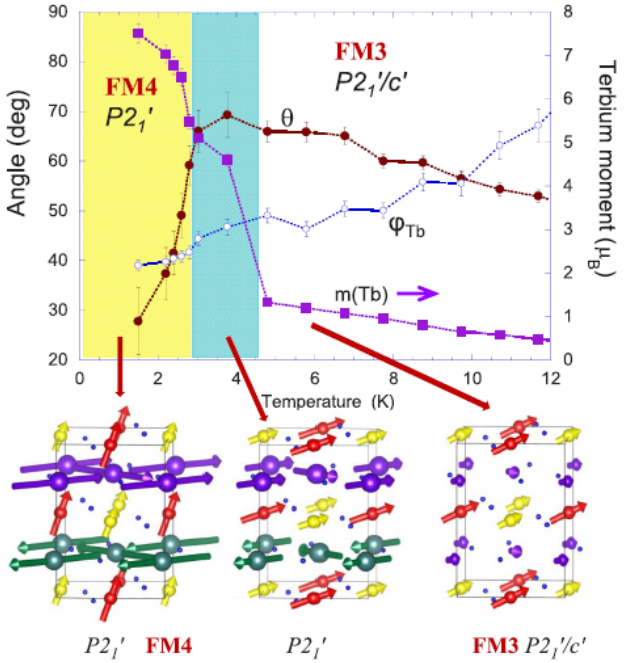

FIG. 8. Evolution of the magnetic order at A and B sites in the low-temperature range for Tb_2MnNiO_6. Evolution down to 1.5 K of the tilting angle θ of the metals (filled circles, left axis), the refined moment in Tb atoms (filled squares, right axis), and the deviation φ_{Tb} of Tb moments with respect to the a axis (unfilled circles, left axis). Lines are guides to the eye. Mn and Ni moments are fully ordered in this temperature range. A schematic view of the successive magnetic structures is also shown.