MS24-04 | Magnetic Inversion Symmetry Breaking and Spin Reorientation in Tb_2MnNiO_6: A Polar Strong Ferromagnet

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We present a description and comprehensive study on four successive magnetic transitions in ferromagnetic Tb_2MnNiO_6 double perovskite, investigated by neutron diffraction. In the ground state ($P2_1'$), the moments of magnetic A and B sites order according to different non-polar magnetic modes (*irreps)* of the paramagnetic phase. But the coupling between them generates an overall polar symmetry which makes this oxide potentially multiferroic (and therefore ferromagnetic and ferroelectric) in its ground state. Its macroscopic magnetization is large (5 μ_B/f.u) and not related to a weak ferromagnetic (wFM) component induced by Dzyaloshinskii–Moriya (DM) interaction. In addition, a sharp and severe spin reorientation of the ferromagnetic transition-metal moments has been observed which opens the door to the magnetic switching of the ferroelectric state in this perovskite, and conversely to the control of the magnetization direction by electrical fields applied parallel to *b*. We also anticipate that in this material the direction of the magnetization (towards *c* / *a*) could be used as the key to switch the polar/non-polar (ferroelectric/antiferroelectric) transformation.

Acknowledgments:. This work was financially supported by Spanish MINECO (MAT2015-68760-C2-2 and SEV- 2015-0496).

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