



Contribution ID: 142

Type: **Invited talk**

On the Dzyaloshinsky-Moria interaction in RMn_2O_5 multiferroics

Tuesday, 10 December 2019 17:00 (30 minutes)

Manganite oxides family RMn_2O_5 (R – rare-earth element) represents prominent example of a multiferroics with extremely interesting and close relationship between magnetism and ferroelectricity. The understanding of the microscopic mechanisms responsible for spin-driven ferroelectricity in these compounds considered to be the actual and intriguing issue in the studies of multiferroicity of magnetic origin. In order to make a new approach to clarifying those mechanisms we performed the detailed investigations of the magnetic ordering in single crystals of multiferroics $\text{Nd}_{1-x}\text{Tb}_x\text{Mn}_2\text{O}_5$ ($x = 0, 0.2, 1$) using both non-polarized and polarized neutron diffraction techniques.

We show that in all the crystals the chiral scattering originated from the difference between the population of right- and left-handedness chiral domains was observed. This difference can be controlled by the external electric field of few kV/cm revealing strong magnetoelectric coupling. The results are considered within the frames of antisymmetric super-exchange model for Dzyaloshinsky-Moria interaction.

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Session Classification: Structure Research

Track Classification: Structure Research