ESRF	**Experiment title:** The probe of magnetoelastic effect in the Holmium-Yttrium multilayers by the diffraction method in-situ as a function of an applied magnetic field and temperature	**Experiment number**: HC-2142
Beamline: BM01A	**Date of experiment**: from: 29/06/16 to: 01/07/16	**Date of report**: 03/12/16
Shifts: 9	**Local contact(s)**: Dmitry Chernyshov	*Received at ESRF:*

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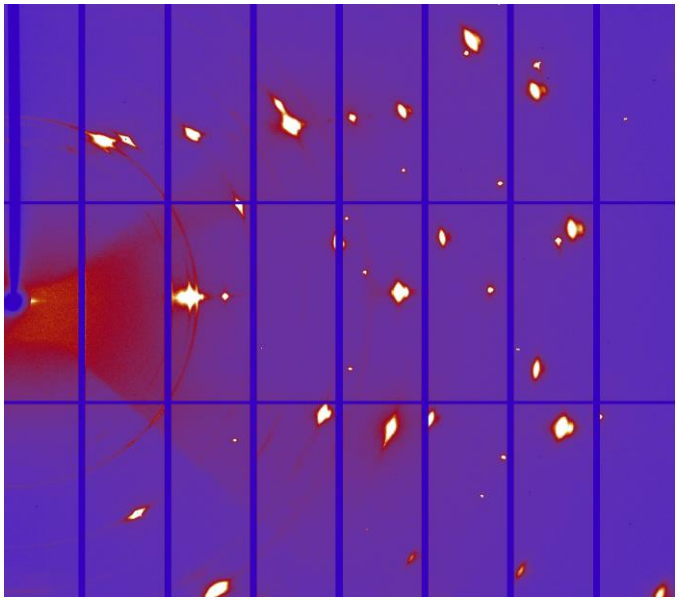
Report:

In the experiment we probed the magnetoelastic effect in the Holmium-Yttrium multilayers. Two samples of different thicknesses of Ho and Y ([Ho45Å/Y30Å] and [Ho60Å/Y30Å], respectivilly) were investigated in-situ by the diffraction method as a function of an applied magnetic field and temperature. With the help of polarized neutron reflectometry [1,2], it was observed that an in-plane applied magnetic induces nonzero chirality in the spin helix structure of Ho/Y multilayers during field cooling process. We expected that besides the field induced chirality, the crystal structure will change.

The diffraction patterns were were measured in H = 0 T (without magnet) and in H = 1 T at different temperatures. The magnet system with permanent magnets was produced at the PNPI workshop. The magnet system was adopted for HUBER diffractometer with position-sensitive detector. The maximum field in a gap was about 1 T at the distance between poles of 4 cm. The sample with size 3*3 cm was maunted betwenn magnet poles. Nitrogen criostream system was used for cooling from 140 to 90 K with step 5 K (T_N = 133 K for Ho).

Typical diffraction pattern is shown in figure.



The difference of two patterns obtained at a given temperature at H = 1 T and without field shows no changes in intensity and peak postion. the first assumption that can be made that nothing magnetoelastic effect was observed. From the other hand this may mean that the magnetic field to 1 T is not enough to observed magnetostrcition. At the same time, these results require a more thorough investigation.

[1] Tarnavich V. V. et al // Phys. Rev. B. – 2014. – Vol. 89. – Pp. 054406.

[2] Tarnavich V. V. et al. // Journal of Surface Investigation. X-ray, Synchrotron and Neutron Techniques. – 2014. – Vol. 8. – Pp. 976–982.