Contribution ID: **107** Type: **Talk (20 min + 5 min discussion)**

Monoclinic symmetry of the hcp-type ordered areas in bulk cobalt

Monday, 4 December 2023 16:15 (25 minutes)

The gradual ferromagnetic spin reorientation in the hcp phase of cobalt between 230 ℃ and 330 ℃ reported for a Co single crystal [1] suggests that this phase cannot have a hexagonal symmetry [2,3]. This hypothesis is verified positively by synchrotron radiation diffraction (MSPD@ALBA) and neutron diffraction (SPODI@MLZ and D2B@ILL) on the powder of cobalt [3]. The analysis of diffraction data has been done by using a specific set of Bragg peaks, which are not affected by the stacking faults present in abundance in hcp-Co [1,4]. The crystal structure of the hcp-type ordered areas of cobalt is described by a monoclinic symmetry with the magnetic space group C2'/m', where the former hexagonal [001] axis is no longer perpendicular to the hexagonal layers. The hexagonal [001] and [010] axes make an angle equal $\alpha \approx 90.10(1)^\circ$, while the angle between in-plane [100] and [010] axes equals $\gamma \approx 120.11(1)^\circ$. The monoclinic symmetry provides an approximate description of the crystal structure of the stacking faulted hcp-Co areas coexisting with fcc-Co areas [3].
[1] E. Bertaut, A. Delapalme & R. Pauthenet, Solid State Commun. 1 (1963) 81
[2] P. Fabrykiewicz, R. Przeniosło & I. Sosnowska, Acta Cryst. A77 (2021) 327
[3] P. Kozłowski, P. Fabrykiewicz, I. Sosnowska, F. Fauth, A. Senyshyn, E. Suard, D. Oleszak & R. Przeniosło, Phys Rev. B107 (2023) 104104
[4] O. Blaschko, G. Krexner, J. Pleschiutschnig, G. Ernst, C. Hitzenberger, H. P. Karnthaler & A. Korner, Phys. Rev. Lett. 60 (1988) 2800

Primary authors: KOZŁOWSKI, Paweł; FABRYKIEWICZ, Piotr (Institute of Crystallography, RWTH Aachen University, Germany and Jülich Centre for Neutron Science (JCNS) at Heinz Maier-Leibnitz Zentrum (MLZ), Forschungszentrum Jülich GmbH, Garching, Germany)

Co-authors: SOSNOWSKA, Izabela (Faculty of Physics, University of Warsaw); FAUTH, Francois (CELLS-ALBA); SENYSHYN, Anatoliy; SUARD, Emmanuelle (Institut Laue-Langevin); OLESZAK, Dariusz (Faculty of Materials Science and Engineering, Warsaw University of Technology); PRZENIOSŁO, Radoslaw (Faculty of Physics, University of Warsaw)

Presenter: FABRYKIEWICZ, Piotr (Institute of Crystallography, RWTH Aachen University, Germany and Jülich Centre for Neutron Science (JCNS) at Heinz Maier-Leibnitz Zentrum (MLZ), Forschungszentrum Jülich GmbH, Garching, Germany)

Session Classification: Structure Research

Track Classification: Structure Research