Contribution ID: **124** Type: **Poster**

Dedicated neutron scattering instrument for complex magnetic structures POLI

Wednesday, 11 December 2019 15:40 (20 minutes)

Polarized single-crystal diffractometer POLI at MLZ employs non-polarized double-focusing monochromators in combination with high-efficiency 3He cell polarizers, which lead to a gain in both flux and resolution in comparison with other short-wavelength polarized neutron diffractometers using Heusler-alloy monochromators. With flexible instrument setups, namely: 1) classical single crystal neutron diffraction in extreme environments like high magnetic fields, very low/high temperatures, high voltage, pressure cells etc. and their combinations; 2) polarize neutron diffraction (flipping-ratio measurements) using high magnetic field and 3) zero-field spherical neutron polarimetry using the third generation Cryopad, and rather high flux of hot polarized neutron, POLI raises to a powerful tool in complex magnetic structure research. Recently 8 T magnet for magnetic phase diagrams and polarized diffraction has been implemented on POLI. Typical applications of the instrument are: 1) basic magnetic structure refinement, 2) magnetic structure studies under very low temperature and high pressure, 3) distinguish between magnetic spin density wave, helicoidal or cycloidal chiral structures, 4) separate incommensurate structures with very long period, 5) magnetic domain study with depolarization analysis. Our versatile instrument gives a unique access to understanding complicated magnetic structures and offers a good starting point for further exploring dynamics in novel magnetic physics.

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Session Classification: Poster session

Track Classification: Structure Research