

Reconstruction of Magnetization Density Distributions in Antiferromagnets with the new Polarized Neutron Diffraction Setup on POLI

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A dedicated polarized neutron diffraction (PND) setup, using a symmetric-field high T_c superconducting magnet with a maximal field of 2.2 T in combination with a ³He polarizer and Mezei-type flipper, has been developed at the instrument POLI. Each component is optimized by numerical simulations and the complete setup is successfully tested and calibrated.

This new PND setup was used to collect flipping-ratio (FR) data as function of the applied magnetic field and temperature for different antiferromagnetic compounds. A new advanced approach for the reconstruction of maximum entropy spin density maps from FR measurements is presented. Using this approach, 3D spin density maps can be built for the first time not only for the paramagnetic, but also for the antiferromagnetic phase. These 3D maps reveal new features compared to the results from conventional maximum entropy software and might be used to directly visualize magnetic multipoles.

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