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MARIA –The high-intensity polarized neutron reflectometer of JCNS

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The high-intensity reflectometer MARIA of JCNS is installed in the neutron guide hall of the FRM II reactor and is using a velocity selector ($4.5\text{\AA} < \lambda < 40\text{\AA}$) as a primary wavelength filter with 10% resolution. In combination with a Fermi-Chopper the wavelength resolution can be increased to 1% or 3%. The beam is optionally polarized by a double-reflecting super mirror and the elliptically focusing neutron guide increases the flux at the sample position thus reducing the required sample size or measuring time. A flexible Hexapod, as sample table, can be equipped with an electromagnet (up to 1.1T) or a cryomagnet (up to 5T), a UHV-chamber (10–10 mbar range) for the measurement of Oxide MBE samples and also with soft matter solid/liquid interface cells connected to a “sample robot” for automatic solvent contrast. Together with the $400 \times 400 \text{ mm}^2$ position sensitive detector and a ^3He polarization spin filter based on Spin-Exchange Optical Pumping, the instrument is well equipped for investigating specular reflectivity and off-specular scattering from magnetic layered structures. Furthermore the GISANS option can be used to investigate lateral correlations in the nm range. MARIA is a state of the art reflectometer that gives the opportunity to investigate reflectivity in a dynamic range of up to 7-8 orders of magnitude including off-specular scattering and GISANS. Furthermore the high intensity allows for kinetic measurements down to a few seconds over a dynamic range of 4 orders.

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