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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 in Garching and is using a combination of a velocity selector and a Fermi-Chopper for the monochromatization of the neutron beam (1%,3%,5% or 10%). The full cross section of the beam is polarized by a double-reflecting super mirror and in the vertical direction the elliptically focussing neutron guide increases the flux at the sample position and consequently reduces 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), low temperature sample environment, a UHV-chamber (10^{-10} mbar range) for the measurement of Oxide MBE samples (transfer forth and back) and last but not least with various soft matter cells. Together with the 400 x 400 mm² position sensitive detector and a time-stable ³He polarization analyser based on Spin-Exchange Optical Pumping (SEOP), the instrument is well equipped to investigate specular reflectivity and off-specular scattering from magnetic layered structures down to the monolayer regime. Furthermore the GISANS option can be used to investigate lateral correlations in the nm range. All the options, like GISANS, polarization and ³He polarization analyser can be moved in and out of the beam in seconds by remote controlled push button operation and do not require any realignment.

MARIA is a state of the art reflectometer at a constant flux reactor. It gives you the opportunity to investigate easily reflectivity curves in a dynamic range of up to 7-8 orders of magnitude including off-specular scattering and GISANS measurement. Furthermore the high intensity allows for kinetic measurements down to a few seconds over a dynamic range of 3-4 orders.

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