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The high intensity reflectometer of the JCNS: MARIA

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The MAGnetism Reflectometer with high Incoming Angle (MARIA) is a world class vertical sample reflectometer dedicated to the investigation of thin films and interfaces in the field of magnetism, material science, soft matter and biology. The elliptic vertically focusing guide allows the investigation of small samples with a typical size of $1 \times 1 \text{ cm}^2$ quite efficiently. The double bounce polarizer and the in-situ pumped ^3He SEOP neutron spin filter cell for analyzing the polarization of the reflected neutron beam can be moved into the beam in seconds. The polarized flux of MARIA amounts to $5 \cdot 10^7 \text{ n}/(\text{s} \cdot \text{cm}^2)$ at the sample position with a horizontally collimated beam of 3 mrad and a wavelength of $\lambda = 0.45 \text{ nm}$ with a wavelength resolution of $\Delta\lambda/\lambda = 10\%$. In the non-polarized mode a flux of $1.2 \cdot 10^8 \text{ n}/(\text{s} \cdot \text{cm}^2)$ is reached in this configuration. MARIA can be also operated in Grazing Incidence Small Angle Neutron Scattering (GISANS) mode by forming a pinhole collimation with the two 4 segment slits and an absorber preventing the focusing of the elliptic guide in the vertical direction. In the present contribution we review the full range of available sample environments for measurements in high magnetic fields/cryogenic temperatures (hard matter) and the automatic solid/liquid cell sample changer for soft matter applications. Finally we focus on some scientific highlights from our user program.

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