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Nanoscience crystallography at a high brilliance laboratory X-ray diffractometer: from mesoscopic to interatomic length scales

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The high brilliance laboratory small angle X-ray scattering instrument GALAXI [1] is used to investigate, on mesoscopic length scales, structural correlations in bulk materials or between objects deposited on a surface. The instrument is capable to perform GISAXS experiments in reflection at grazing incidence as well as SAXS experiments in transmission geometry. The X-ray flux on sample is comparable or higher than the one obtained at a comparable beamline at a second-generation synchrotron radiation source. Some results of studies on energy and soft materials as well as materials for information technology will be given.

The device properties of thin film heterostructures crucially depend on the structure of the interfaces, not only at the mesoscopic length scale but also at the interatomic length scale. We therefore have the aim to extend the instrument's capabilities towards wide-angle scattering. In this contribution, we will emphasize on the science case of such a development. Also, the possible realisation of this project will be discussed, taking into account the wavelength distribution of the photons emitted by the source.

[1] Jülich Centre for Neutron Science. (2016). GALAXI: Gallium anode low-angle x-ray instrument. *Journal of large-scale research facilities*, 2, A61. <http://dx.doi.org/10.17815/jlsrf-2-109>

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