Many faces of SAXS - new SAXS beamline (SMAUG) for material science and biocrystallography in SOLARIS National Synchrotron Radiation Centre

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Small-angle scattering of synchrotron radiation is an extremely useful technique in both materials research and biocrystallography. Therefore the research capabilities in the area of structural biology and structure of new materials are currently being developed at the SOLARIS National Synchrotron Radiation Centre [1]. The construction of a beamline for small-angle scattering of synchrotron radiation (SMAUG) is well advanced, with the end station launched in December 2024, offering SAXS experiments in the current configuration up to $q_{min}=1.3 \times 10^{-4}$ A^{-1}. Two high-end cryo-electron microscopes are also in operation, offering access to studies of the structure of proteins and their complexes and additionally, the construction of a line for biocrystallographic studies (ARYA) has been initiated.

Various research needs in structural studies require the use of a wide range of additional techniques supporting XRD, SAXS or WAXS studies. Therefore, the end station of SMAUG beamline has been equipped with a various additional systems that modify experimental conditions. In addition to the standard bioSAXS module, which is is intended for routine studies of the structure of biomolecules in solutions, a pressure chamber will be installed in July 2025 for studies in solutions up to 600 MPa. Therefore, during the presentation, exemplary results of studies on the effect of high pressure on the conformation and structure of proteins carried out by us in other synchrotron facilities as well as just on the SMAUG line will be presented. Other useful measurement functionalities are rheo-SAXS/WAXS, HT-SAXS/WAXS and DSC-SAXS/WAXS studies. Therefore adequate examples of applications of simultaneous experiments of this type will be presented.

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