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Port-GISANS: A portable GISANS booster for revealing the structure of complex soft matter interfaces and biomembranes.

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Grazing incidence small angle neutron scattering (GISANS) has the potential to reveal highly relevant scientific questions in many areas of science. Examples include biomembranes, responsiveness of lipid membranes to external stimuli in situ such as exposure to light for photolipids and hydration, in-plane structure of DNA composites and micellar nanoreactors. These experiments are often limited by the neutron flux and/or signal to noise ratio. This may be overcome with dedicated GISANS instrumentation but currently experimental capabilities are limited.

To overcome this, we are developing Port-GISANS, which will be a module to enable high quality GISANS experiments on existing and future small-angle neutron scattering (SANS) instruments. Port-GISANS will enable high quality surface scattering experiments with neutrons and allow high quality GISANS measurements at ESS from day one. The idea of the concept is to focus the incident neutron beam along the surface normal of the sample. Focusing the beam onto the sample will considerably increase the incident flux (at least by a factor of 10). Focusing compromises on divergence, resulting in a limited depth resolution. For many systems, e.g. thin films and single interfaces this is acceptable, as all in-plane scattering originates from the layer of interest.

In this presentation we will present the conceptual and technical design of the Port-GISANS adapter and benchmark ray tracing simulations to show its potential and performance.

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