Exploiting brilliance at cSAXS, the small-angle X-ray scattering beamline at the Swiss Light Source

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Located at about 1 hour from Zurich, the Swiss Light Source is a 3rd generation synchrotron quite comparable in size with Alba. The coherent small-angle X-ray scattering (cSAXS) beamline exploits the brilliance of its undulator source to perform experiments such as scanning SAXS, in which the beam is focused to a spot of about 10 microns and the specimen is raster scanned. By collecting SAXS patterns at each scanning position, this approach produces 2D and 3D images of samples in which structural properties on the nanometer scale are probed at each of their pixels or voxels. By further selecting the coherent part of the beam, diffraction patterns can be inverted using phase retrieval algorithms in a technique called ptychography to produce images with a spatial resolution down to 10 nm. Although our measurements currently take many hours, a planned upgrade of the ring and the undulator is expected to increase the brilliance by about 2 orders of magnitude. This will offer opportunities to speed up the measurements or improve the resolution, but will also challenge us to develop more efficient data acquisition and analysis methods.