

# **SAXS and USAXS data format needs from APS point of view**

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SAXS instruments present challenge for development of common SAS data format, as the variability of the instruments is probably larger than among SANS facilities. cursory review of installed APS SAXS instruments showed, that no more than two share common area detector, resulting in wide range of different proprietary 2-D data formats used by detector manufacturers. Beamlines are often optimized for different applications and the control software is may be build on different systems. This results in complicated environment which is difficult to support.

As the data collection of synchrotron-based SAXS machines increases, number of pixels in 2-D image increases, and readouts of detectors improve (up to 30 Hz for “GE detector”), beamlines have to deal with humongous amounts of data collected in short time, which need to be reduced and processed. In some cases only dedicated software is capable dealing with reducing the 2-D data to 1-D lineouts for further processing. Organizing and maintaining integrity of the original image data as well as the reduced data is challenge. Most common 1-D data format at this time is a large quantity of ASCII data sets with reasonable naming conventions and folder organization. While this is cumbersome, it has unique compatibility with most of the available data analysis software.

USAXS instrument based on Bonse-Hart design presents slightly different challenge to data format, as often the data are slit smeared but with very high Q-resolution (fixed for all points). Ideally in case such the data should be modeled with models which include slit smearing. As the geometry of the Bonse-Hart camera is significantly different from pinhole cameras, not many parameters needed for data reduction and analysis are the same.

SAXS data analysis faces sometimes different considerations than when using SANS data. Wavelength of SAXS cameras is usually (not always) well defined by used monochromator so the wavelength spread smearing is unimportant. As the number of pixels of SAXS cameras is large the pixel size smearing can be sometimes neglected. On the other hand, commonly used program for 2-D data reduction, Fit2D, does not provide any error estimates and other packages (“Nika”) provide errors which may not be sufficiently meaningful, which can pose challenge to data analysis software.

The presentation will review the needs of SAXS and USAXS instruments in view of development of common SAXS (1-D) data format.