New *in situ* SAXS/WAXS setup and other refurbishments at the ASAXS beamline B1

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In spring 2009, the anomalous small-angle X-ray scattering (ASAXS) beamline B1 at DORIS III was updated by constructing a wide-angle X-ray scattering (WAXS) setup to the full vacuum system for a linear MYTHEN strip detector. Figure 1 shows the in situ SAXS/WAXS setup at the beamline. The WAXS setup is perfectly adjusted to leave no gap between the SAXS and WAXS data. Data from both detectors is collected simultaneously via the *online* measurement program, which controls the detectors through a TANGO device server. Simultaneous SAXS and WAXS measurements became a realizable idea due to the possibility to borrow a Pilatus 300k detector from the new MINAXS beamline of S. V. Roth and a MYTHEN detector from the DESY detector loan pool. The Pilatus 300k covers only a quarter of the flight tube and thus there is space left for a WAXS detector without losing any signal on the SAXS detector. The WAXS detector covers an angle range from about 6.23 to 30.43°.

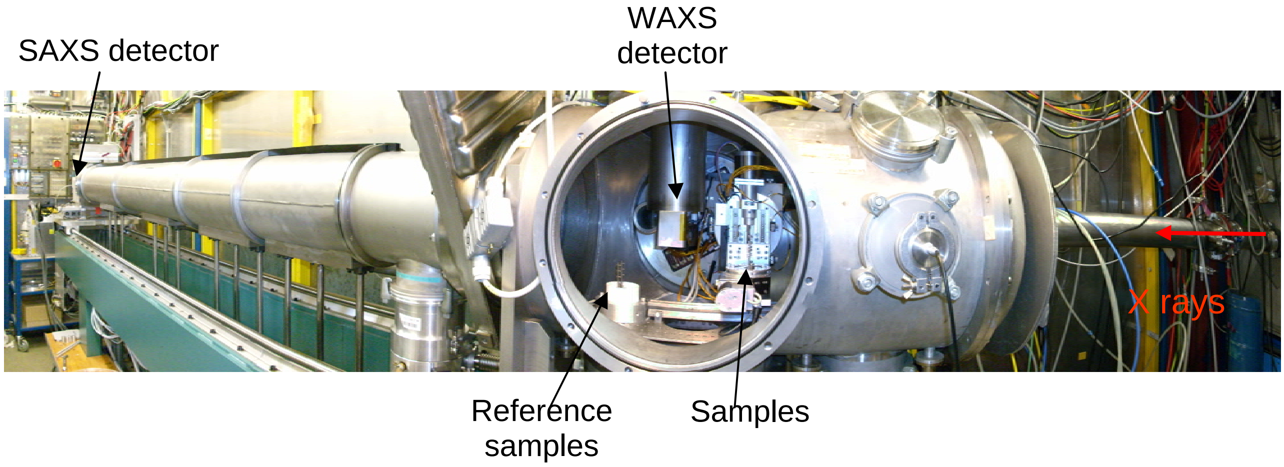

Figure 1. Panorama of beamline B1 in SAXS/WAXS mode with longest sample-to-detector distance of the SAXS detector. The distance of the detector can be adjusted by the user with little effort because the system is completely automatized.

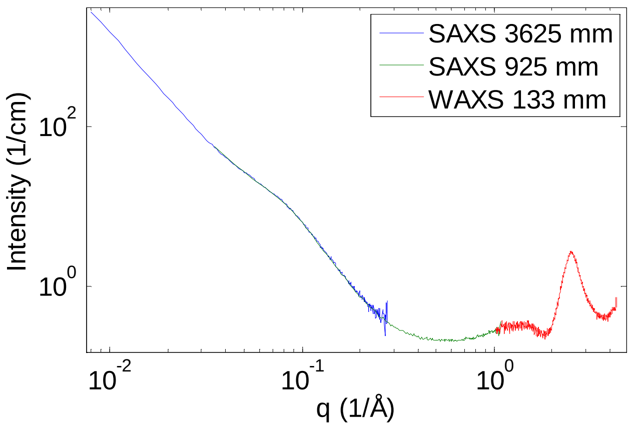

Figure 2. SAXS/WAXS data of a sample at 16 keV photon energy. SAXS was measured at two distances (not simultaneously). The distances of the detectors from the sample are shown in the legend.

The Matlab based data processing macros were updated to include integration of scattering images directly onto a user-defined *q* range by means of a C routine. New graphical improvements to the macros also made the data quality control easier. A GIT repository (http://github.com/uvainio/Beamline-B1-macros) for the code was created, so that users can easily access the most up-to-date code and several people can develop the code simultaneously. The data analysis routines were also modified to be able to handle data from Pilatus and Mythen detectors. Furthermore, during autumn, a stand-alone graphical user interface was created for quick and easy checking of 2D Pilatus test data.

Last minute technical improvements on the beamline were made in December 2009 when a new flight tube window was tested for the first time. At 5 keV photon energy the window transmitted more X rays than the previous flight tube window, allowing for 35 % increase in intensity on the detector. In addition, the raster image visible in the scattering pattern due to a polymer fibre net supporting the old window was no longer seen in the new image, since the new window is supported by aluminium rods, which coincide more or less with the gaps between modules in the Pilatus 300k or 1M detectors. Figure 3 shows the new flight tube window and first test patterns compared to the old window.

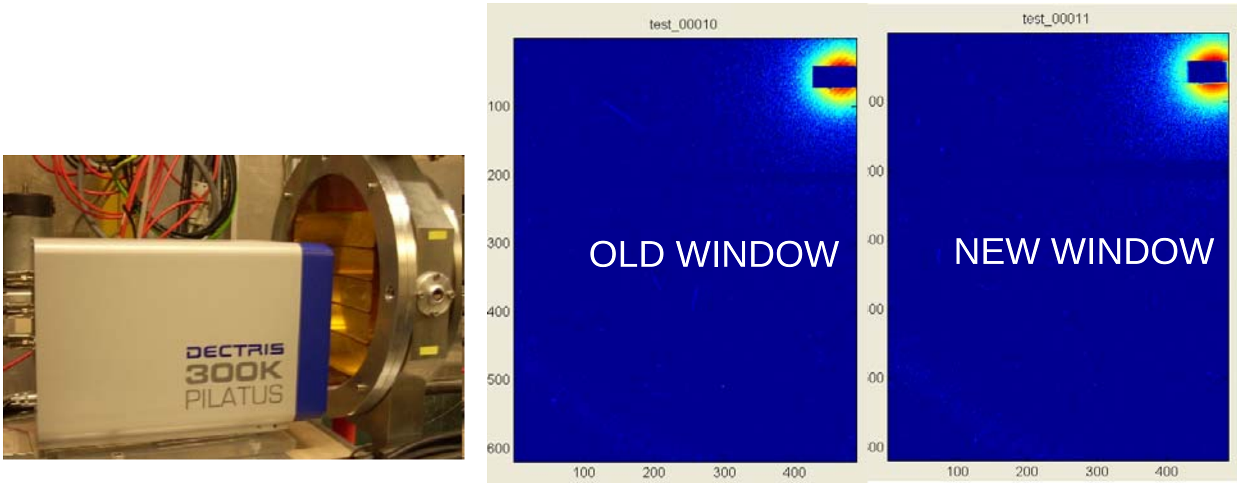

Figure 3. Left: New flight tube window in place. Middle: A 10 s test picture at 5 keV of silver behenate with the old flight tube window. A raster pattern is seen near to the beamstop in the upper right corner. Right: Same conditions with the new window give 35 % more intensity and no raster pattern.