Beamline Jockey Days - Challenges in Imaging



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Efficiency optimisations at the Diamond imaging Beamline I13-2

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We currently progress the automation of the I13-2 Imaging beamline to increase the scientific output, while reducing the workload on the staff. During the COVID period, we installed an automated sample changer system (robot arm), which in principle allows us operating the beamline without the presence of users and to scan more than a hundred samples per shift. Most importantly the sample centring is also automated when running with sample changer robot, giving full automation capability in this mode. At the moment, the most challenging aspect of using sample changer robot is preparation of sample to the requirements of the sample gripper. In case of beamline preparation for any experiment, a semi-automated beamline alignment procedure is being used, which is labour intensive. We are implementing more efficient alignment and calibration procedures. We mostly depend on the help of the support teams for the automation projects at the beamline and in achieving our goals.

Another important step is the automated data analyses. The SAVU reconstruction pipeline with a python wrapper system works very well when users need quick and basic reconstructions. In the near future HTTomo software- a Python package providing user interface is being developed, especially for the bigger data in larger quantities. This is envisioned as a reconstruction pipeline for researchers with limited background in micro-tomography.

We care about the optimisation of photon efficiency of all beamline components. The detectors require constant attention to ensure preserving their efficiency. The browning of the detector lenses is a major challenge. The de-browning of the objectives requires to take them off to put them in a UV box, and a distortion correction pattern needs to be measured and calculated when changing/re-focusing of the objectives. Most recently we installed a CRL system to collimate the X-ray beam, which will be mostly used to adapt the beam-size to the condenser diameter of the full-field X-ray microscope (TXM) and to the sample size when performing micro-tomography. This is important when zooming into single features of the sample.

We firmly believe that the automation and optimization of each of the processes will improve the quantity, quality as well as the ease of use of the beamline.

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