STXM analysis: preparing to go live @ 750 Hz

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With recent advances in detector technology and the implementation of continuous 2D scans using Piezo actuators, STXM scans achieve a much higher number of resolution elements in shorter times. Nowadays, even scans as large as 1000×1000 frames, each with 4 mega pixels of diffraction data, can be obtained in less than one hour. Although compressed, data rates easily reach a scale of one Tebi Byte per day.

Such nano-SAXS scans combine the real-space resolution defined by focal spot size / step size with the reciprocal resolution from the diffraction data; hence, local structures that are smaller than the actual beam size can be measured, and their distribution is then mapped to real-space. Certain observable have been defined and used algorithmically to extract quantitative information about the specimen [1-4]. We are integrating these algorithms into our software project **dada – the *da*ta *da*emon**, a unified interface to raw data and basic analysis methods [5].

In order to analyse larger fields of view at higher spatial and reciprocal resolution, we have designed and commissioned a dedicated STXM cluster based on a parallel version of dada. A load balancer distributes the jobs to 24 computing nodes with essential hardware; the raw data streams from a central fileserver, but is also cached on local SSD memory in the control computer using a self-developed network file system protocol. The user interacts with the dada cluster via a web interface, and can select scans, change analysis parameters, and colour palette renderings. An HTTP interface can be used from third-party software, e.g. Matlab, to access both raw data and analysis results.

The stationary dada cluster in Göttingen allows to analyse more than 3500 EigerX 4MP frames per second; a mobile version is planned for real-time at 750 Hz directly at the beamline.

References

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