

# **X-ray Tomography at Synchrotron Facilities**

## **Report of Contributions**

Contribution ID: 1

Type: **not specified**

## Welcome address

*Monday, February 22, 2021 3:00 PM (20 minutes)*

**Presenters:** DE CARLO, Francesco (APS); MANCINI, Lucia (Elettra - Sincrotrone Trieste S.C.p.A., LINXS)

Contribution ID: 2

Type: **Oral presentation + Demo**

## **Tomography at the Advanced Photon Source**

*Monday, February 22, 2021 3:20 PM (1h 10m)*

**Presenter:** MARK RIVERS, VIKTOR NIKITIN AND FRANCESCO DE CARLO (Advanced Photon Source)

Contribution ID: 3

Type: **not specified**

## **Interactive Q&A (moderator: L. Mancini)**

*Monday, February 22, 2021 4:30 PM (25 minutes)*

Contribution ID: 4

Type: **Oral presentation + Demo**

## Workflows at Diamond's tomography beamlines

*Monday, February 22, 2021 5:10 PM (1h 10m)*

Typical workflows for microtomography experiments at I12, I13-2 and DIAD will be presented. I12 (53-150keV) and I13-2 (8-30keV) are suited to large and small samples respectively, and the new beamline DIAD (7-38keV) will allow simultaneous imaging and diffraction for small samples. Methods for accurate beamline alignment and stable sample mounting will be discussed, together with the optimisation of scanning parameters for various ex and in situ scenarios. Software for beamline control (EPICS), data acquisition (GDA) and reconstruction (Savu) will be presented alongside methods and policies for data migration and archiving.

**Presenter:** ANDREW BODEY, ROBERT ATWOOD AND SHARIF AHMED (Diamond Light Source)

Contribution ID: 5

Type: **not specified**

## **Interactive Q&A (moderator: D.Y. Parkinson)**

*Monday, February 22, 2021 6:20 PM (30 minutes)*

Contribution ID: 7

Type: **not specified**

## Short introduction to Day 2

*Tuesday, February 23, 2021 3:00 PM (5 minutes)*

Contribution ID: 8

Type: **Oral presentation + Demo**

## Tomodata - a Python interface for PyHST2 at SOLEIL

*Tuesday, February 23, 2021 3:05 PM (45 minutes)*

At SOLEIL's tomography beamlines, tomography acquisitions are performed using the SOLEIL FlyScan continuous scanning architecture. The resulting data are reconstructed using PyHST2. In both cases, a layer of Python code has been developed to guide the user through the process, aligning samples, setting parameters, correcting artefacts, and launching reconstructions. Batch or pipeline processing are possible.

We have also put a great deal of thought into the computing hardware used for data storage, transfer, and processing, and at the PSICHE beamline this is in the process of being upgraded to its second iteration.

This presentation will demonstrate the above tomography workflow, and will explain the new computing systems. Comments, questions, and suggestions for future developments are welcomed.

**Presenter:** ANDREW KING (SOLEIL Synchrotron)

Contribution ID: 9

Type: **not specified**

## **Interactive Q&A (moderator: C. Rau)**

*Tuesday, February 23, 2021 3:50 PM (25 minutes)*

Contribution ID: 10

Type: **Oral presentation**

## **System control and data reduction for nano-resolution spectro-tomography at SSRL**

*Tuesday, February 23, 2021 4:30 PM (30 minutes)*

**Presenter:** YIJIN LIU (Stanford Synchrotron Radiation Lightsource)

Contribution ID: **11**

Type: **not specified**

## **Interactive Q&A (moderator: F. De Carlo)**

*Tuesday, February 23, 2021 5:00 PM (25 minutes)*

Contribution ID: 12

Type: **Oral presentation + Demo**

## Unification of the ESRF tomographic processing software

*Tuesday, February 23, 2021 5:55 PM (30 minutes)*

The ESRF tomography acquisition and processing software has traditionally suffered from fragmentation across the different beamlines, resulting in many different solutions for similar problems.

The associated maintenance and development costs have severely hindered its progress.

We are currently re-thinking our acquisition and processing workflows from scratch, with a unified underlying solution across the board. The centralization of the development is expected to deliver a uniform and standardized experience on all the ESRF tomography beamlines, and to provide high quality software.

In this talk, we will explore the unified development strategy, and its most relevant software projects.

**Presenter:** NICOLA VIGANO' (European Synchrotron Radiation Facility)

Contribution ID: 13

Type: **not specified**

## **Interactive Q&A (moderator: F. De Carlo)**

*Tuesday, February 23, 2021 6:25 PM (25 minutes)*

Contribution ID: 14

Type: **not specified**

## Short introduction to Day 3

*Wednesday, February 24, 2021 3:00 PM (5 minutes)*

Contribution ID: 15

Type: **Oral presentation + Demo**

## Work- and Dataflow for CT at BAMline

*Wednesday, February 24, 2021 3:05 PM (45 minutes)*

After a general presentation of the beamline, specifically the workflow for ex-situ CT at BAMline is presented. Although being used in a broad variety of research fields the usual workflow for CT experiments is in most cases similar in terms of sample mounting, tomographic scan and reconstruction. Specific scanning schemes allow for a preview reconstruction carried out during the scan. A detailed description of the used hardware as well as the self-coded programs applied in the data pipeline will be given. This will be accompanied by a practical demonstration of the software involved in the entire process.

**Presenter:** HENNING MARKÖTTER AND MICHAEL SINTSCHUK (Helmholtz-Zentrum Berlin (BESSY II))

Contribution ID: **16**

Type: **not specified**

## **Interactive Q&A (moderator: L. Mancini)**

*Wednesday, February 24, 2021 3:50 PM (25 minutes)*

Contribution ID: 17

Type: **Oral presentation + Demo**

## User interface at the P05 Nanotomography

*Wednesday, February 24, 2021 4:30 PM (40 minutes)*

Most users at the Nanotomography endstation at P05 are not very experienced in synchrotron tomography measurements, as they are coming from very different fields, e.g. Biologist, Geologist or Medics. The setup of a transmission x-ray microscope (TXM) however is often more complex with respect to sample alignment, different detector choices and varying scan parameters. An in-house developed control GUI (graphical user interface) has been set up at the instrument, allowing users to switch between different cameras, to choose different image settings (zoom, histogram etc.), to align the sample in the direct beam as well as in the TXM mode, and to start the scans with different parameters (e.g. exposure times, rotation speed...). The structure of the GUI is set up in such a way, that it is mainly self-explanatory and that all main features are covered in this one application. The structure in which it has been organized serves as an intuitive step by step guide, which reduces at the same time the risk of potential accidents drastically. In a separate Reconstruction GUI running on the DESY computer cluster, the users can start the reconstructions themselves, already right after the first scan is finished. In this way, it is possible for the user to check the reconstruction quality and adapt e.g. scan parameters or sample preparation methods.

**Presenter:** SILJA FLENNER (Helmholtz-Zentrum Geesthacht (DESY))

Contribution ID: **18**

Type: **not specified**

## **Interactive Q&A (moderator: A. Rack)**

*Wednesday, February 24, 2021 5:10 PM (25 minutes)*

Contribution ID: 19

Type: **Oral presentation + Demo**

## **High-throughput 3D Imaging at KARA**

*Wednesday, February 24, 2021 5:35 PM (30 minutes)*

**Presenter:** TOMAS FARAGO (ANKA -KIT)

Contribution ID: 20

Type: **not specified**

## **Interactive Q&A (moderator: A. Rack)**

*Wednesday, February 24, 2021 6:05 PM (25 minutes)*

Contribution ID: 21

Type: **not specified**

## Short introduction to Day 4

*Thursday, February 25, 2021 3:00 PM (5 minutes)*

Contribution ID: 22

Type: **Oral presentation + Demo**

## **MicroCT pipeline at the SYRMEP beamline of Elettra**

*Thursday, February 25, 2021 3:05 PM (1h 5m)*

**Presenter:** AMAL ABOUELHASSAN, ADRIANO CONTILLO, FRANCESCO BRUN AND LUCIA MANCINI (Elettra Sincrotrone Trieste)

Contribution ID: 23

Type: **not specified**

## **Interactive Q&A (moderator: C. Rau)**

*Thursday, February 25, 2021 4:10 PM (25 minutes)*

Contribution ID: 24

Type: **Oral presentation + Demo**

## Collecting and analyzing data at Beamline 8.3.2 (microCT) at the Advanced Light Source

*Thursday, February 25, 2021 4:50 PM (40 minutes)*

I will demonstrate the process of setting up scans, collecting data, and doing image processing at Beamline 8.3.2 (microCT) at the Advanced Light Source (ALS) at Lawrence Berkeley National Laboratory. Like many of the beamlines at the Advanced Light Source (ALS), Beamline 8.3.2 uses Labview for beamline and enstation control, which provides convenient graphical interfaces for doing many tasks, and I will demonstrate how these work for users. I will also demonstrate the two approaches to data analysis we are using. One is based on workstations located at the beamline, and uses both python scripts and a graphical interface called Xi-CAM. The other is based on using NERSC, our local high performance computing center. This second approach uses high performance data transfer with globus and the computing jobs are launched through a jupyter web interface.

**Presenter:** DILWORTH Y. PARKINSON (Advanced Light Source)

Contribution ID: 25

Type: **not specified**

## **Interactive Q&A (moderator: V. Nikitin)**

*Thursday, February 25, 2021 5:30 PM (25 minutes)*

Contribution ID: 26

Type: **Oral presentation**

## **Environment for full-field tomographic reconstructions at MAX IV beamlines**

*Thursday, February 25, 2021 5:55 PM (30 minutes)*

**Presenter:** ZDENEK MATEJ (MAX IV)

Contribution ID: 28

Type: **not specified**

## **Interactive Q&A (moderator: V. Nikitin)**

*Thursday, February 25, 2021 6:25 PM (25 minutes)*

Contribution ID: 29

Type: **not specified**

## Short introduction to Day 5

*Friday, February 26, 2021 3:00 PM (5 minutes)*

Contribution ID: 30

Type: **Oral presentation + Demo**

## Operation at the TOMCAT beamline: latest developments from acquisition to data visualisation

*Friday, February 26, 2021 3:05 PM (1 hour)*

In this workshop, we will first give a short presentation (~20 min) on how full field tomography is performed in a standard way at TOMCAT. The latest developments achieved to ease the operation will be presented: hdf5 data handling, reconstruction pipeline optimisation, offline HPC cluster and data management.

In a second part, a live interactive demo and discussion round (~40 min) will be proposed focusing on the ultra-fast tomography end-station. Based on practical examples and requests of the audience, information will be given on the different triggering options, the adequate acquisition strategy and the large amount of data generated.

**Presenter:** FEDERICA MARONE AND CHRISTIAN SCHLEPUETZ (Swiss Light Source)

Contribution ID: **31**

Type: **not specified**

## **Interactive Q&A (moderator: L. Mancini)**

*Friday, February 26, 2021 4:05 PM (25 minutes)*

Contribution ID: 32

Type: **not specified**

## **Plenary discussion (moderator: F. De Carlo)**

*Friday, February 26, 2021 4:45 PM (1 hour)*

Contribution ID: 33

Type: **not specified**

## **Wrap up, summary & farewell**

*Friday, February 26, 2021 5:45 PM (15 minutes)*

Contribution ID: 35

Type: **Oral presentation + Demo**

## **Multiscale monochromatic and pink-beam microCT imaging at the ESRF-ID17 biomedical beamline**

*Tuesday, February 23, 2021 5:25 PM (30 minutes)*

Recent trends in hard X-ray biomedical microCT aim at pushing the limits in both spatial and temporal resolutions. Additionally, when functional parameters in small animal organs need to be accessed, microCT has to be performed *in vivo*. All these challenges necessitate intense and coherent photon beams. To address these requests, the ESRF-ID17 biomedical beamline is equipped with different setups, using either monochromatic beam in the range 30-100 keV for low-medium resolution or pink-beam with a spectrum optimized around 25-50 keV for submicron imaging. The presentation will illustrate the different options available at ID17 completed by a demo session focussed on the propagation phase contrast imaging procedures using monochromatic X-rays.

**Presenter:** ALBERTO BRAVIN (European Synchrotron Radiation Facility)