## Beamline Jockey Days - Challenges in Imaging



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## Scintillators and Detectors at the TOMCAT Beamline: latest developments and challenges

Tuesday 13 November 2018 10:00 (25 minutes)

At the Swiss Light Source (SLS, Paul Scherrer Institut, Switzerland), the TOmographic Microscopy and Coherent rAdiology experimentTs (TOMCAT) beamline offers multiple X-ray tomographic microscopy end-stations with absorption and phase contrast imaging capabilities: propagation-based tomography [1], grating-based interferometry [2] with directional sensitivity [3] and Zernike Phase Contrast (ZPC) nano-tomography [4]. Sitting on a 2.9T superbend with a critical energy of 11.1keV, the beamline can be operated in monochromatic mode either with a Double Crystal Multilayer Monochromator (DCMM) with a bandwidth of a few percent or with Silicon (111) crystals providing a bandwidth down to 10–4. Both cover an energy range between 8 and 45 keV [5]. The beamline can also be operated in white-beam mode, providing the ideal conditions for ultra-fast acquisitions, thanks to the in-house developed high-speed X-ray detector GigaFRoST [6]. Several microscopes are in operation, which cover isotropic voxel sizes from 11 microns down to 60 nm, allowing a broad range of research and industrial applications: biology, geology, material characterization, paleontology, etc.

This talk will give an overview of the different X-ray microscopes and detectors available for the users. Highlights will be put on the latest camera and detector developments. Furthermore, depending on user requirements (optimizing for speed and/or resolution), several scintillators type and thicknesses are in use: the LuAG:Ce scintillators (CRYTUR, Czech Republic) are our work horses. Lately, because of their degradations (delamination, dust issues, aging, …), we enlarged our scintillators portfolio towards LSO:Ce and GGG:Eu (ESRF). However, we are still facing several problems, illustrated in this talk. This is why cleaning procedure and scintillators handling are in constant evolution and new solutions are currently under investigations.

## References:

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- [6] Mokso R. et al, J. Synchrotron Rad. 24, 1250-1259 (2017)

Primary author: Dr BONNIN, Anne (Paul Scherrer Institut)

**Co-authors:** Dr SCHLEPUETZ, Christian (Paul Scherrer Institut); Dr MARONE, Federica (Paul Scherrer Institut); Prof. STAMPANONI, Marco (ETH/PSI)

**Presenter:** Dr BONNIN, Anne (Paul Scherrer Institut)

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