# *fly*Scan : a Fast and Multi-Technique Data Acquisition Platform for the SOLEIL Beamlines

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about SOLEIL

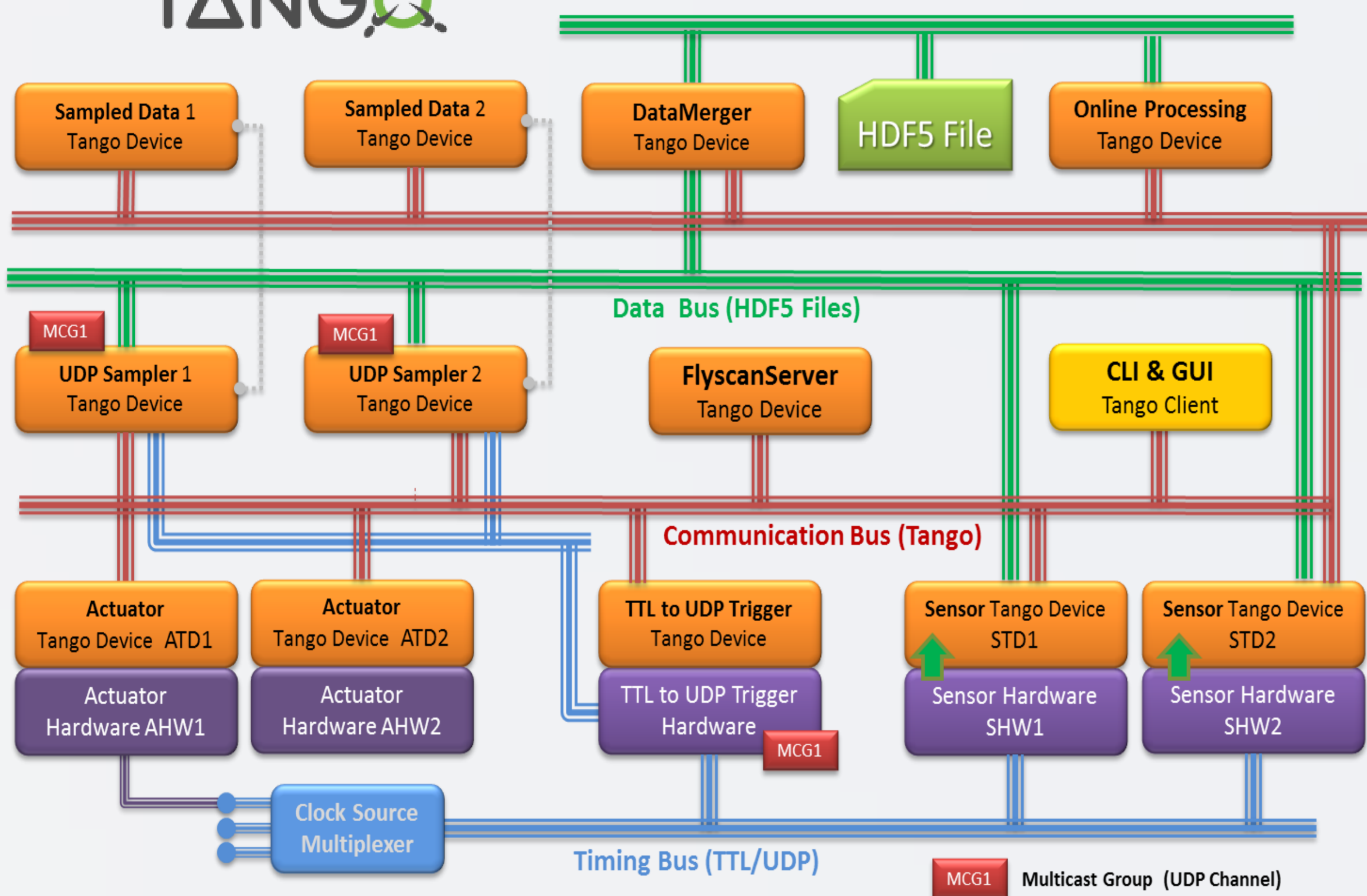### SOLEIL is the French national synchrotron facility
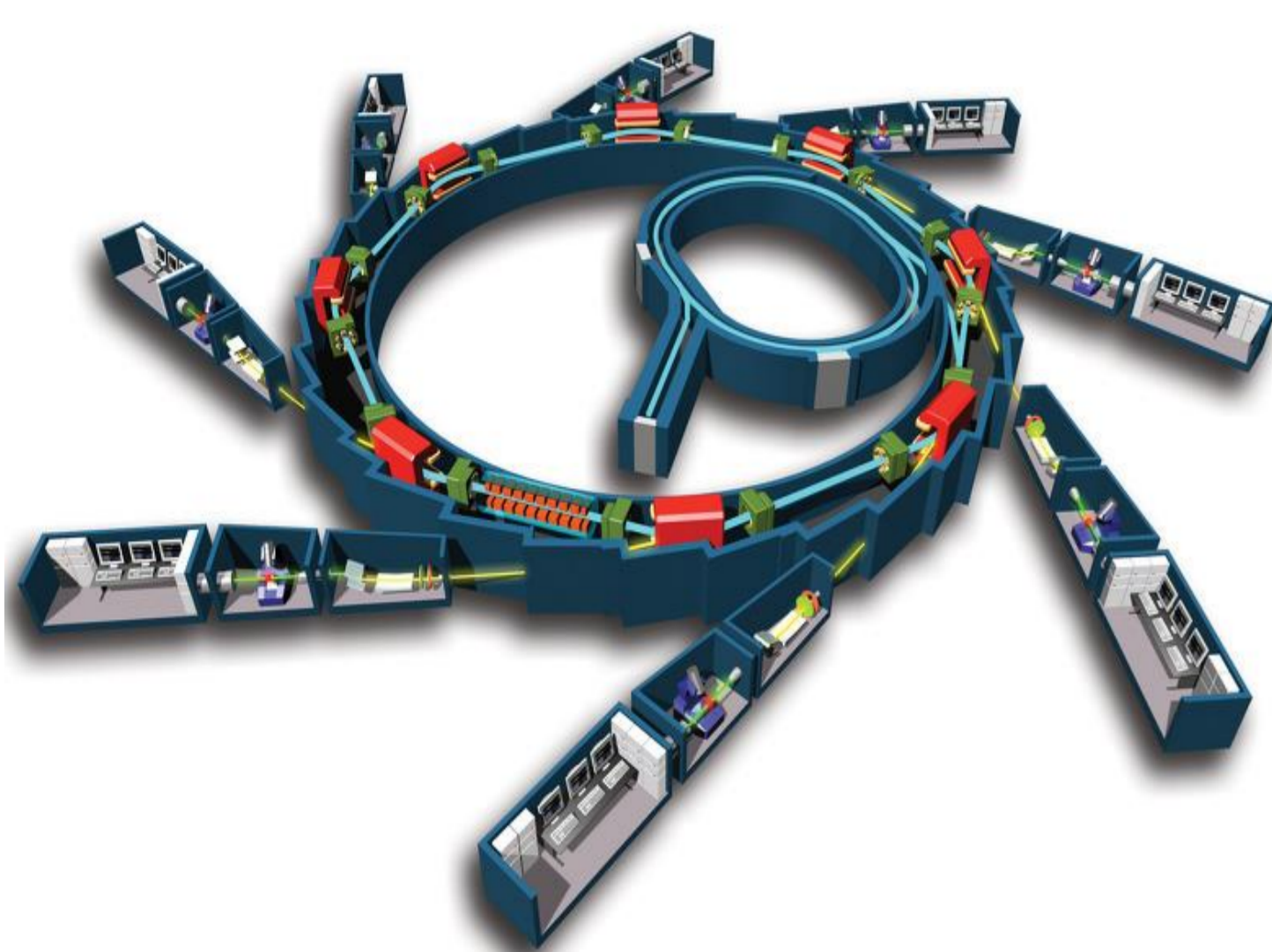
- 3rd gen. light source
- 2.75 GeV
- infrared to hard X-rays
- 29 beamlines (max. 43)
- open to users since 2007
- staff: 350 employees
- beam time: 5500 hours/year

architecture

use case: µTomography
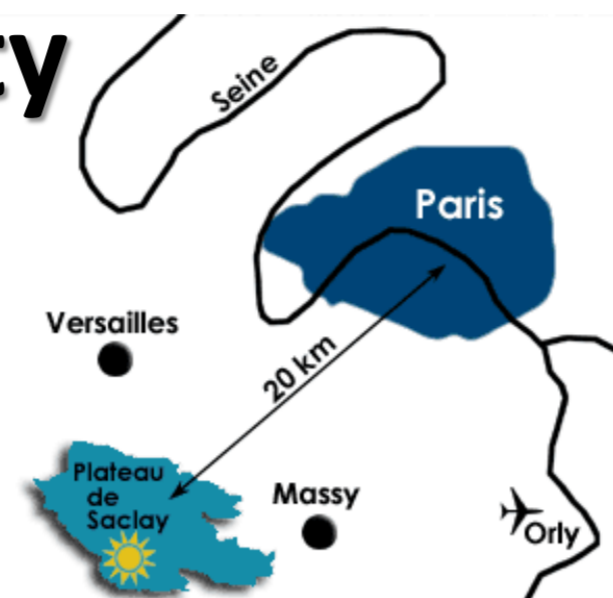
- wood science - in-situ loading / deformation
- relatively fast acquisition required to follow the dynamics
- voxel size is 1,3 X 1,3 x 1,3 µm^3
- 1000 images acquired along a continuous sample rotation of 360°
- exposure time 600 ms/image (weak signal)
- approx. 10 minutes per sample

mechanical loading
evolution of radial deformation (post acquisition data treatment)
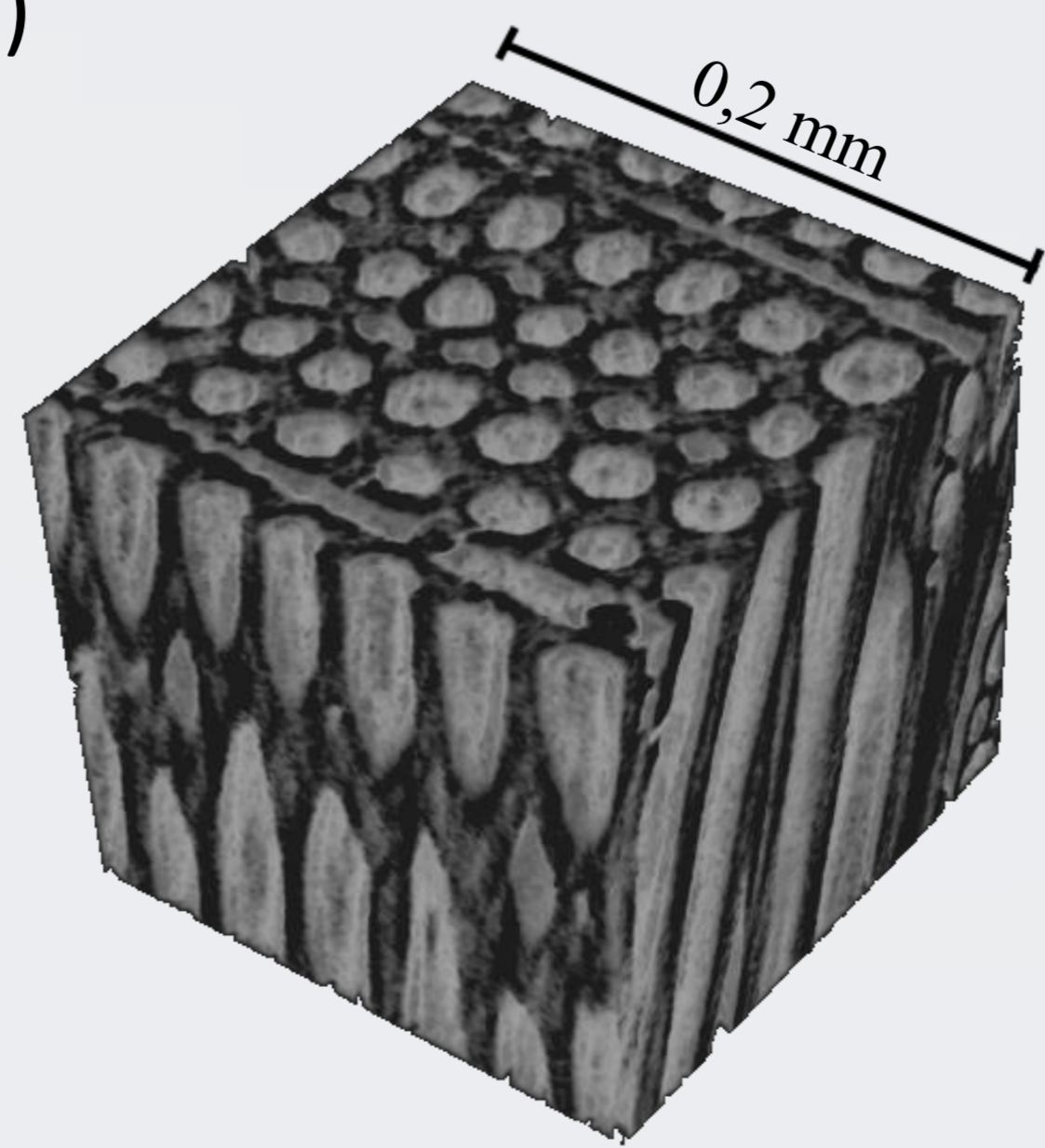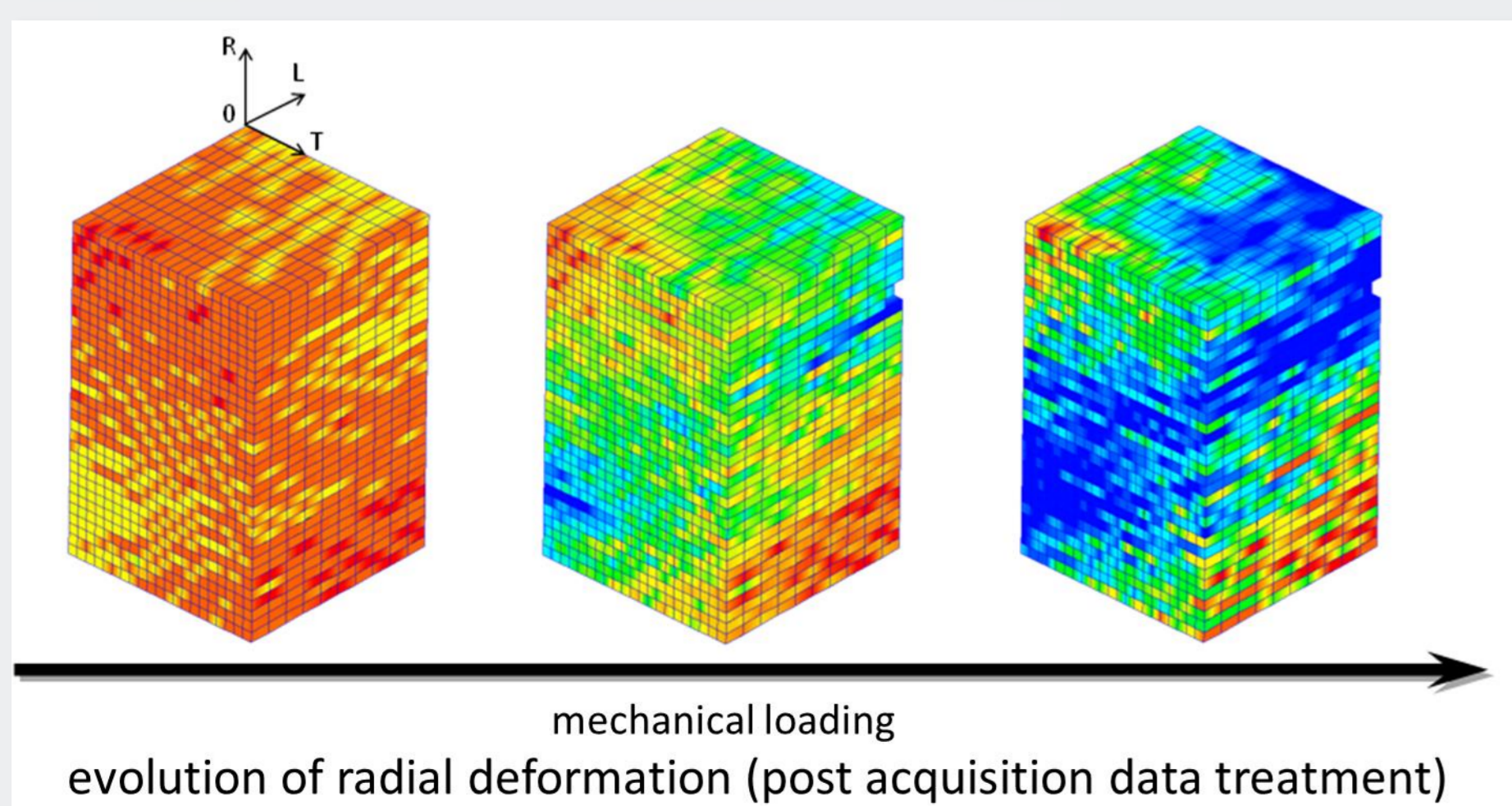
with courtesy of A.King – SOLEIL- France, M.Bonnet, M.Bornet - Laboratoire Navier - France and ifsttar (www.ifsttar.fr)
submitted to 4th Wood Science Days - Clermont-Ferrand - France, 4-6 novembre 2015

about the *fly*Scan project

- *fly*Scan : DAQ for synchrotron radiation based experiments
  - general purpose, fast, multi-technique scanning platform

- **motivations:**
  - beam time optimization (faster data acquisition process)
  - studies of processes involving rapid transformation of the sample

- **provided service:**
  - acquisition of spatially or temporally correlated data produced by sensors along the continuous trajectory of one (or more) actuator(s)
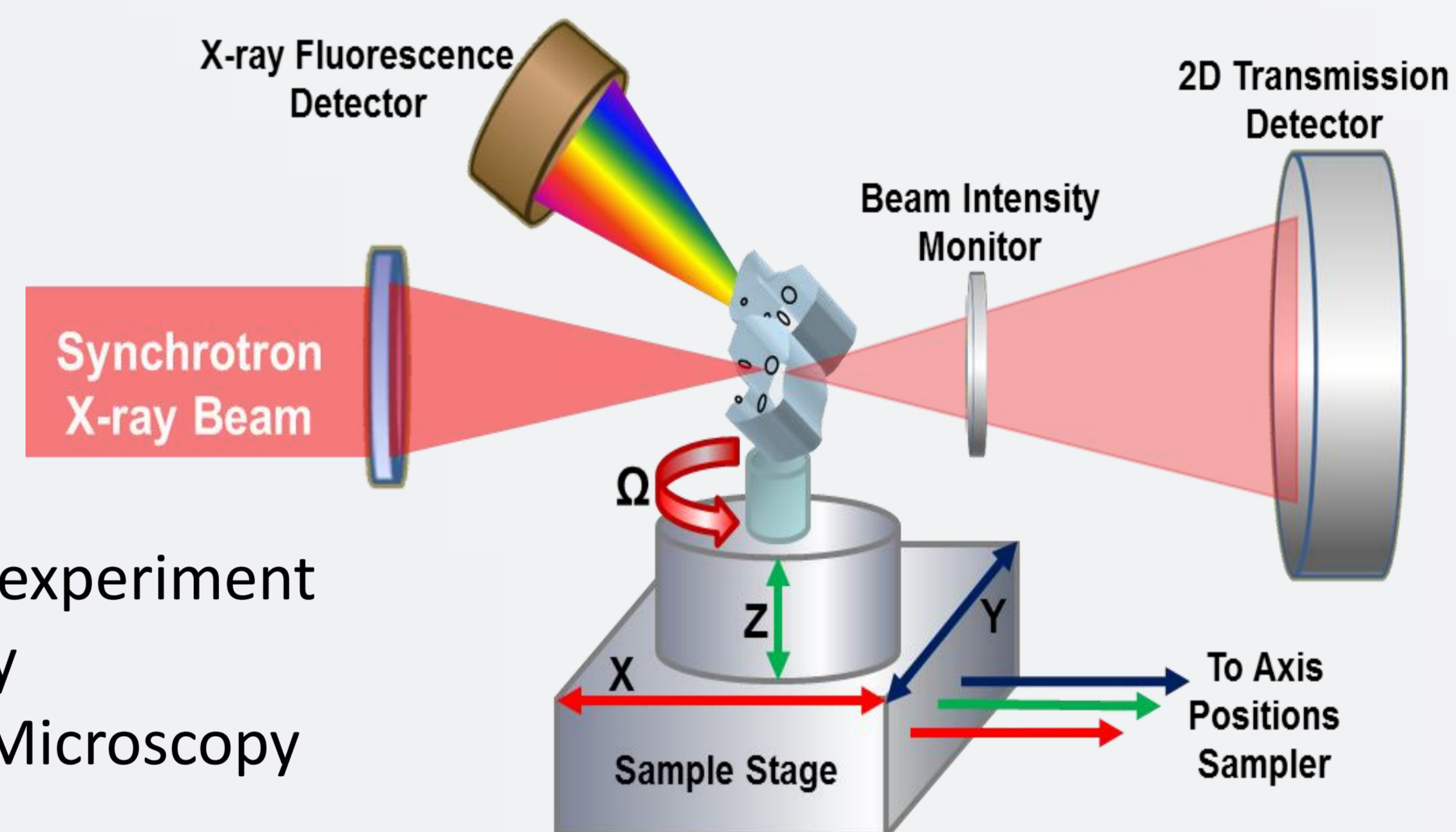
- **applications:**
  - any scan based experiment
  - e.g. tomography
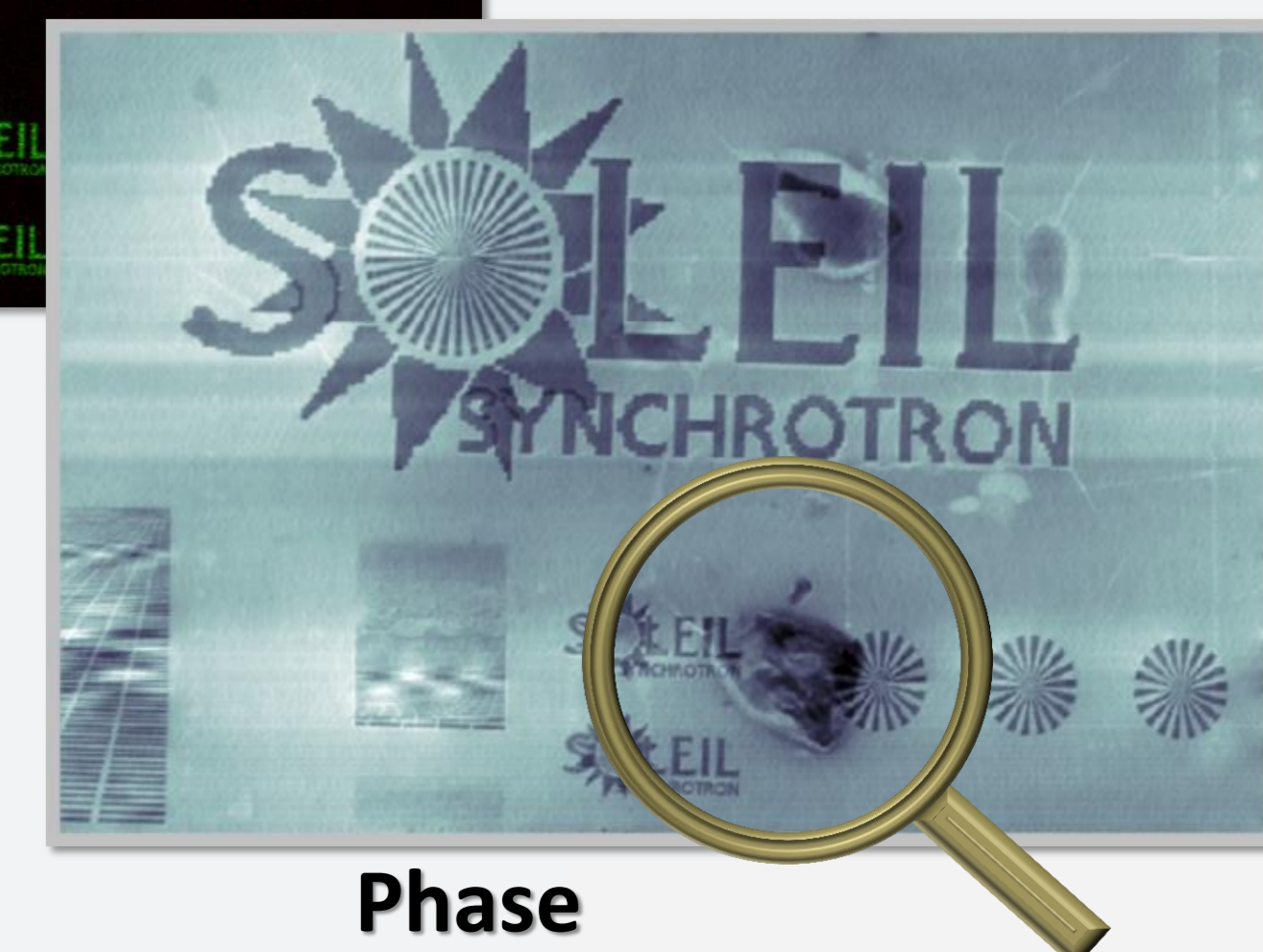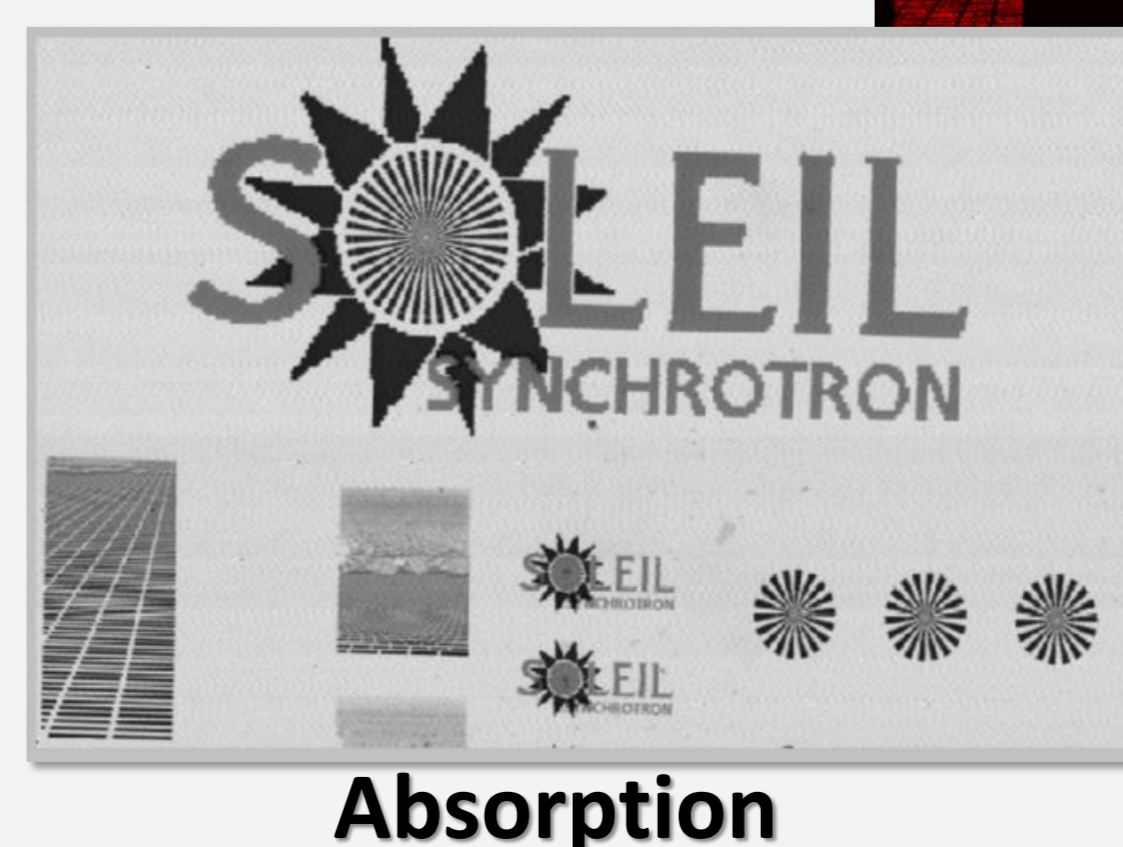 - e.g. hard X-ray Microscopy

some figures

- **performance gain:**
  up to x60 faster than step-by-step

- **data throughput:**
  up to 5.4 Gb/s (6.1 Gb/s peak) on a dedicated 10 Gb/s Ethernet link

use case: X-ray Microscopy
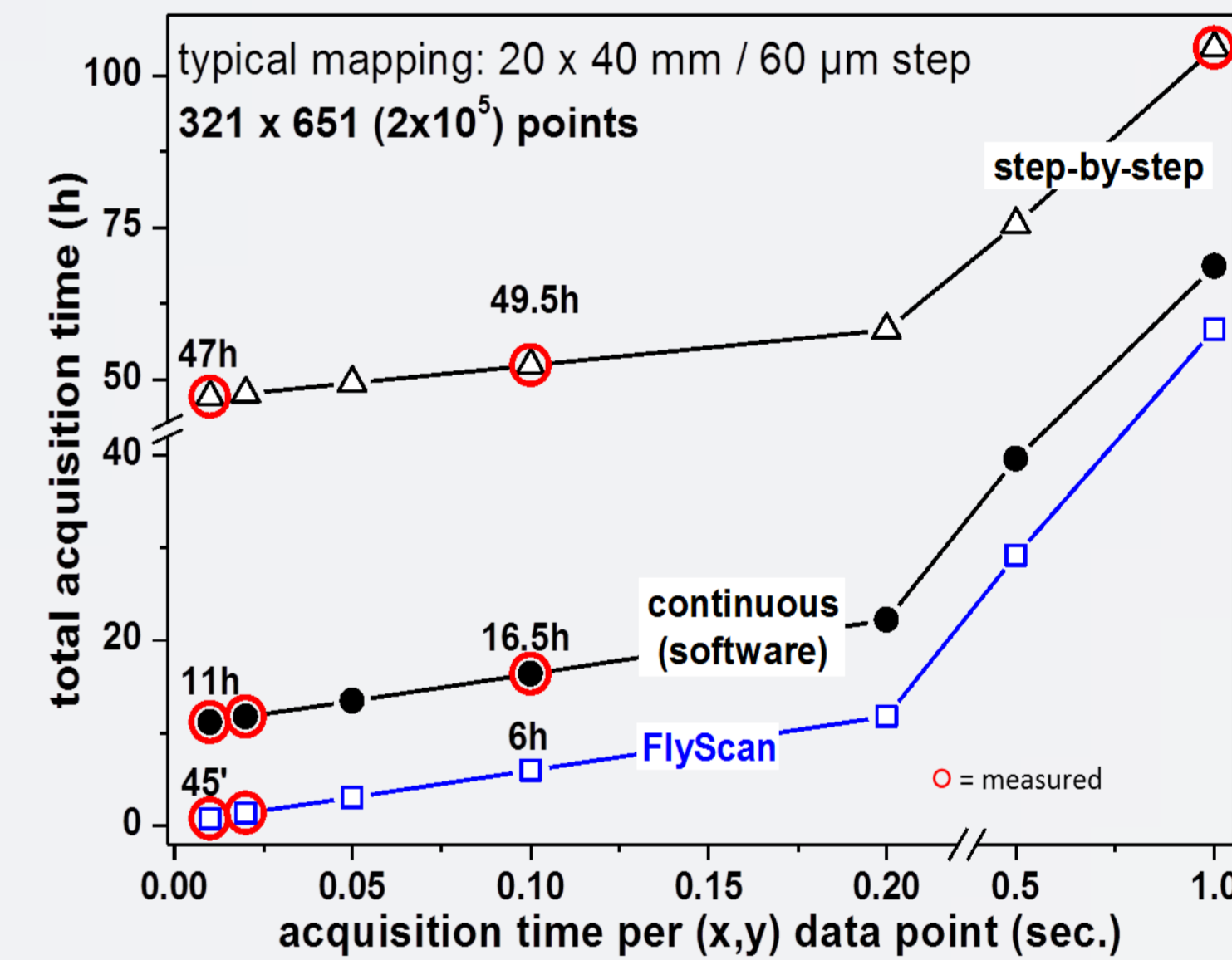
- fast scanning X-ray fluorescence imaging combined with absorption, differential phase contrast and dark field imaging
- sample: 250 µm x 75µm scanned in 500 x 1000 pixels at 4 ms/pixel
- completed in 35 minutes and produced 100 Go of raw data

Fluorescence
Au (gold) and Ni (nickel) distributions

Absorption

Phase