Elettra - Sincrotrone Trieste
GUI status update
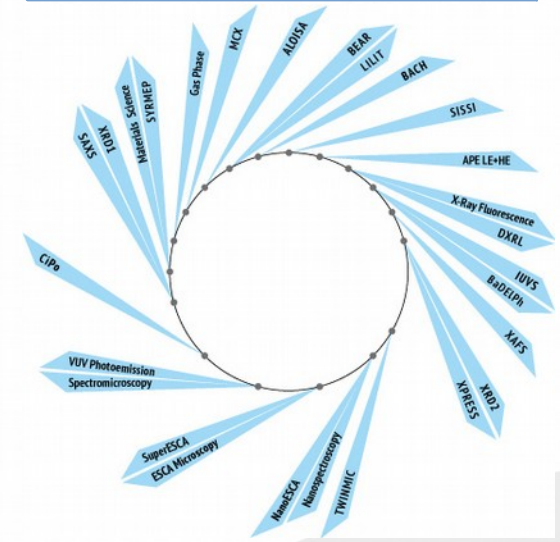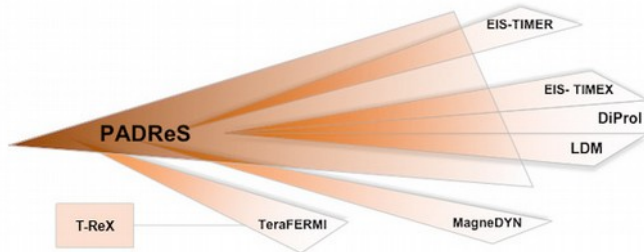

Roberto Borghes

Elettra and FERMI light sources

FERMI FEL:
6 beamlines
Seeded Free Electron Laser in operation since 2012

Elettra Synchrotron: 28 beamlines
3rd generation ring in operation since 1993

IT Group organization

ICT Systems and Services
networking, mail, data storage and
computational resources, ...

Business Intelligence
facility organizational services, user support,
data sharing, ...

Control Systems
accelerators control, machine physics,
feedback systems, ...

Software for Experiments
beamline and experiment control

Scientific and Quantum Computing
data analysis and visualisation, Quantum
computing R&D, ...

GUI status update

GUIs architecture and technologies

Control Room applications:

- Primary focus on reliability and responsiveness
- Strong interaction with Tango control system
- Cumbia library and tools (Qt C++ libs, remote web option)
- Also Matlab and PyQt for "Machine physics"

Remote access applications:

- Primary focus on web applications
- Scalable and reliable backend: PUMA (NGINX + NCHAN + SSE)
- Multiple in-house frontend tools
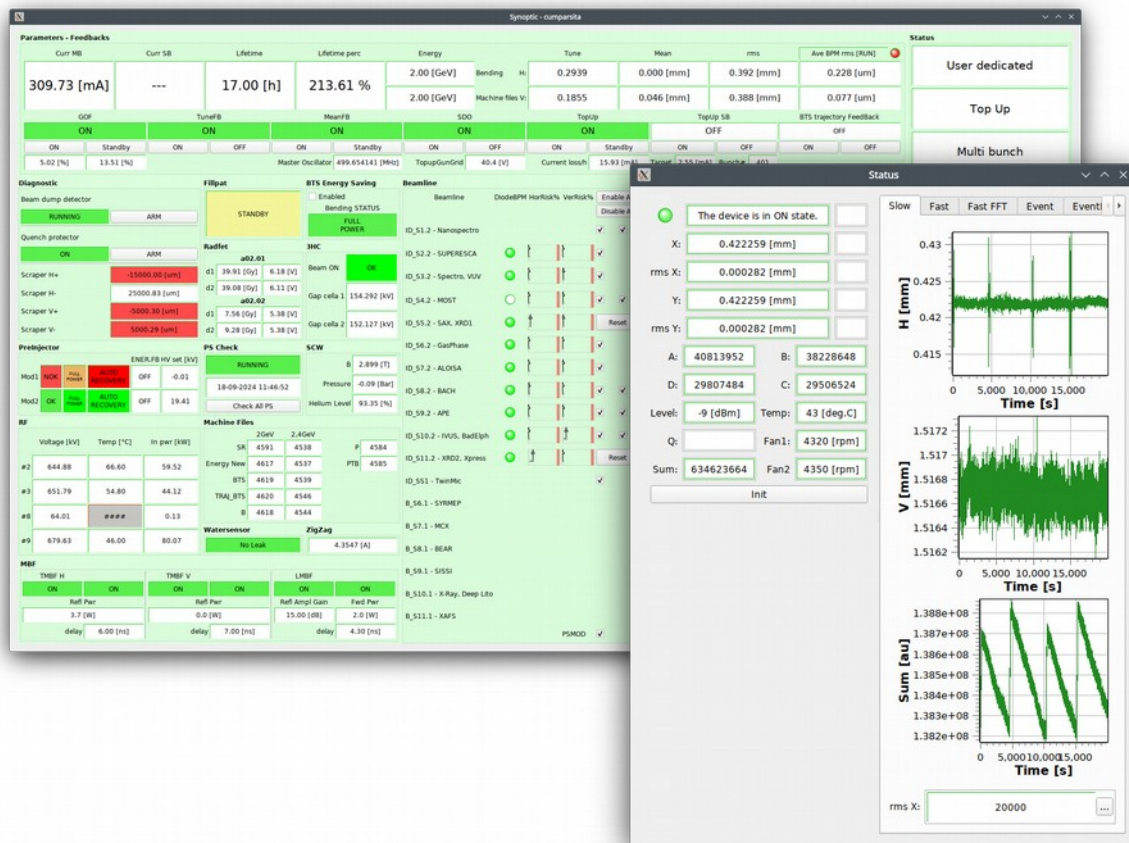
Control Room apps

- Qt5/6 C++ libraries
- **CUMBIA**: in house GUI devel tool (QTango evolution)
- TANGO and EPICS native integration
- NO coding tool (la-cumparsita)
- Multiple platform supported: Linux, Android, web

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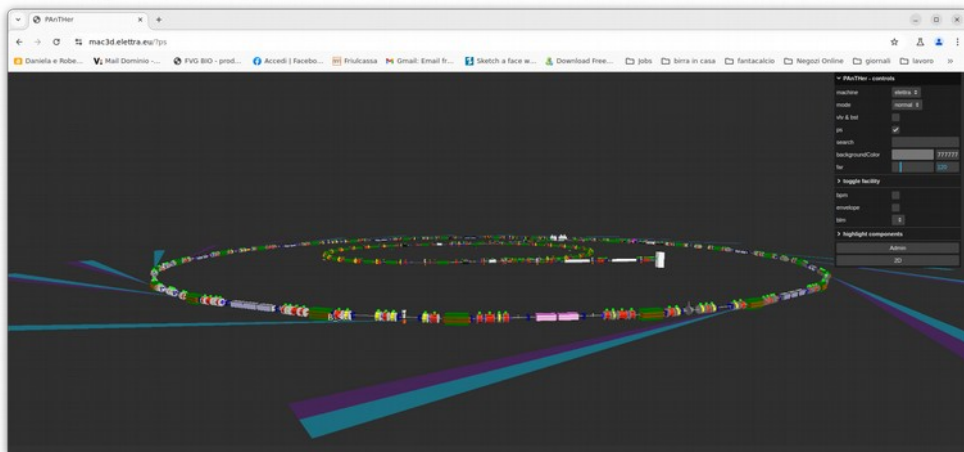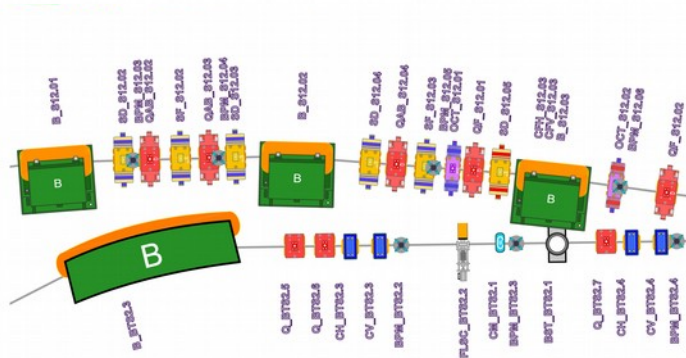
Remote access apps

PUMA
- backend (NCHAN+NGINX+SSE)
- native clients (html, Javascript, SVG)

PANTHER (advanced development stage)
- 2D and 3D live synoptics
- Pan, zoom, object search (speech recognition)
- Lattice and 3D objects from CAD files
- Javascript, SVG, ThreeJS, svg-pan-zoom, hammer.js

https://mac3d.elettra.eu/?ps

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**Elettra Sincrotrone Trieste**

GUIs architecture and technologies

Beamline control applications:

- Synoptics should be intuitive and accessible
- Strong interaction with Tango control system
- Desktop GUIs: Python Taurus framework
- Remote web synoptics and interfaces: Python/Javascript DonkiWeb

Experiment control applications:

- Primary focus on reliability and responsiveness
- Desktop GUIs: Python Taurus framework
- Introduced Web GUIs via MX collaborations
- Independent BL groups use LabView, IDL, Java, …
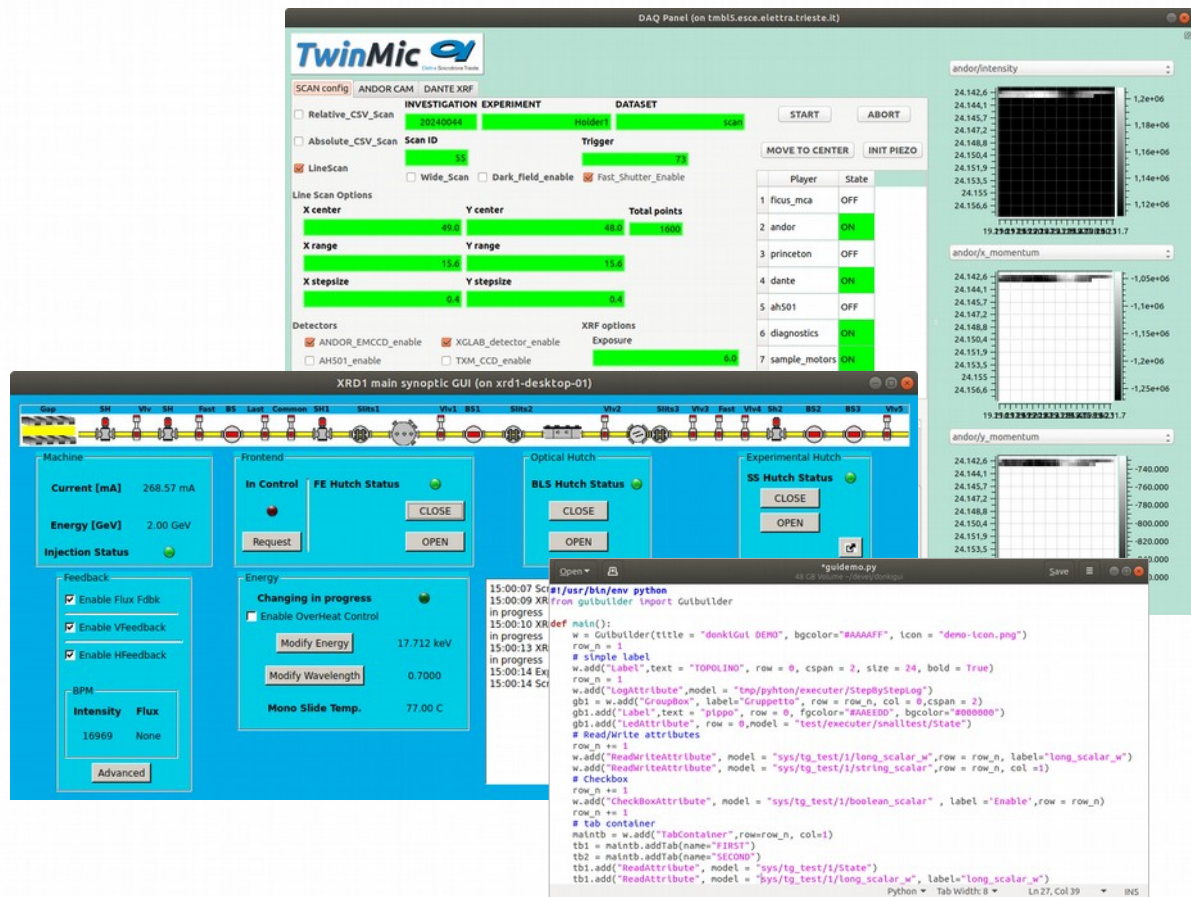
Desktop apps

- Python Taurus framework
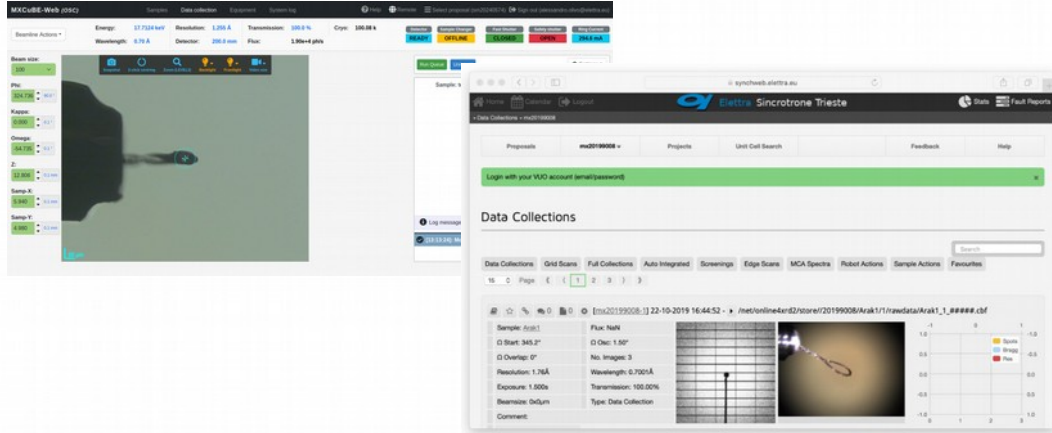- Linux Ubuntu OS

Tools:
- Classic Qt Taurus designer with additional plugins
- DonkiGUI tool: creates panels in few python lines

- Contacts:
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Software For Experiments / 3
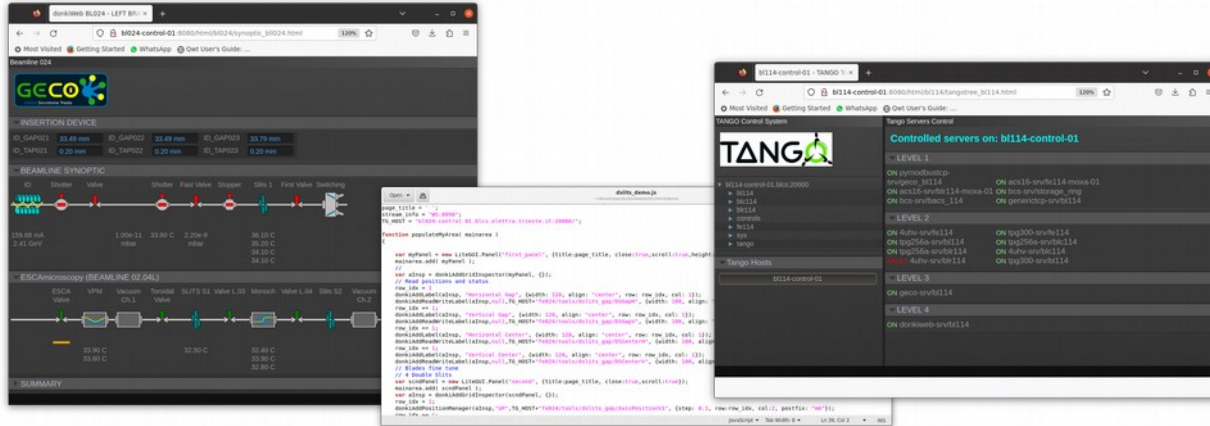

WEB apps

MX beamlines (from collaborations):
- MXCUBE-web
- Synchweb
- Braggy

SPE Tools (in house devel):
- **DonkiWeb** tool: creates web panels and synoptics in few lines of code (conference poster)
- Python bottle backend
- Litegui.js widgets and API

- Contacts: roberto.borghes@elettra.eu
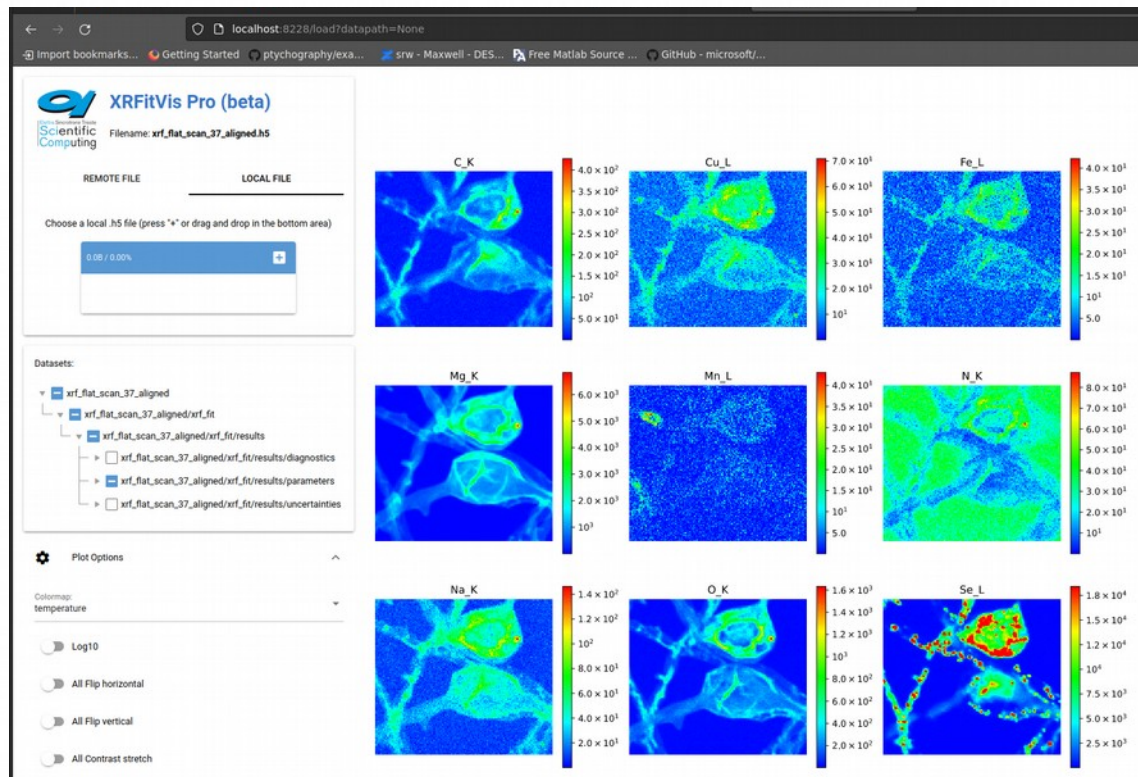
GUIs architecture and technologies

- **Custom** for the needs of the SciQC team

- Primary focus on **data analysis**

- Prioritise **prototyping** and **speed** with a continuous development cycle

- Preference for **web apps**

Usual Python suspects:
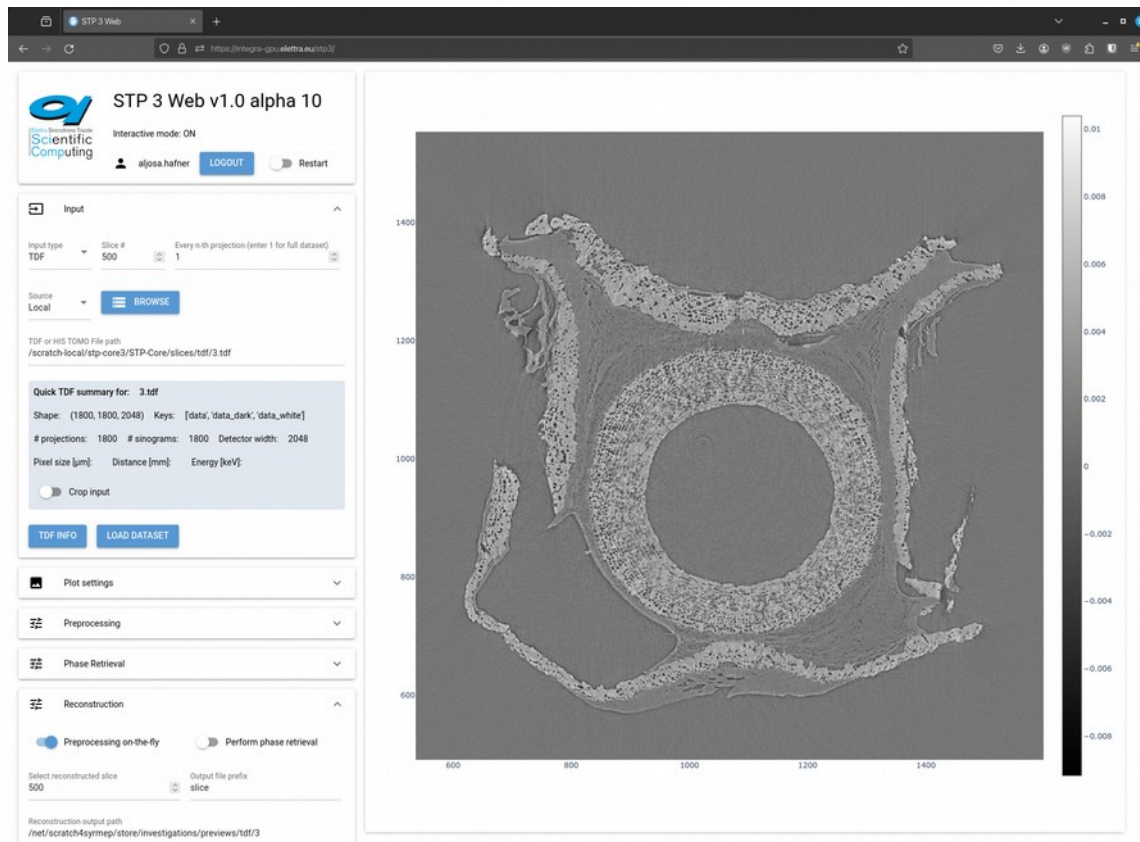   NiceGUI, Flask, FastAPI, Bottle, Streamlit, Plotly Dash

But also barebone:
   JavaScript, Websockets, and Android

XRFitVis Pro

- XRF map visualisation
- Works with PyMCA output
- NiceGUI + custom dev
- Elettra VUO authentication
- Remote and local files
- Many visualisation options
- Available at:
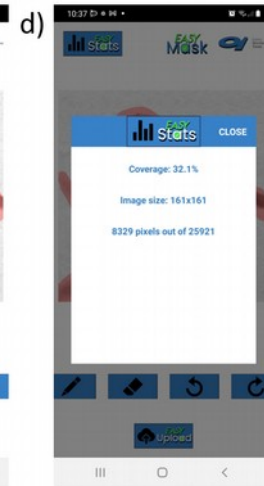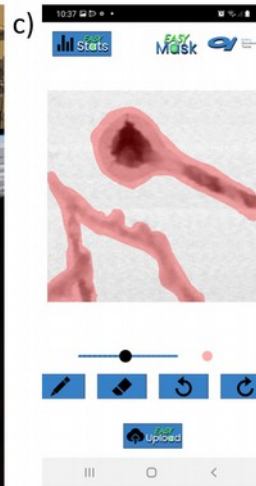 vuo.elettra.eu/go/xrfitvis
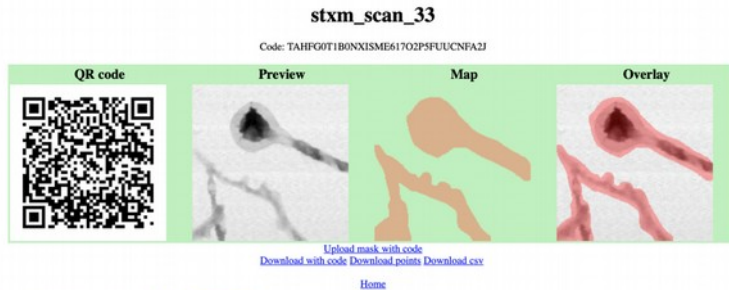
- Contact: scicomp@elettra.eu

STP3 Web

- CT analysis @ SYRMEP beamline
- Based on **MAPI**: Modular Adaptive Processing Infrastructure (see conference poster)
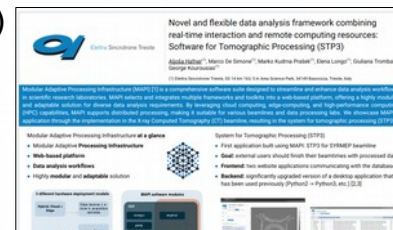
- Web front-end (NiceGUI)
- Cloud, Local, Edge deployment
- Custom job submission for data provenance
- Contact: scicomp@elettra.eu

EasyMask

- Android App + VUO Web
- Mobile as auxiliary input device
- Scanning experiments (STXM, Ptychography, XRF)
- Sparse maps as input for acquisition
- Assists selection of ROIs
- Part of a larger Compressive Sensing project:
  Kourousias *et al.* PLOS One (2023)
  https://doi.org/10.1371/journal.pone.0285057

- Contact: scicomp@elettra.eu

THANK YOU FOR YOUR
ATTENTION

www.elettra.eu