



Elettra Sincrotrone Trieste

Remote Experiments

- approach
- technologies
- in-house developments
- challenges

George Kourousias

Hardware

- TANGO, TCP/IP servers, REST

Software

- Remote desktops
- Web-interfaces

Auxiliaries

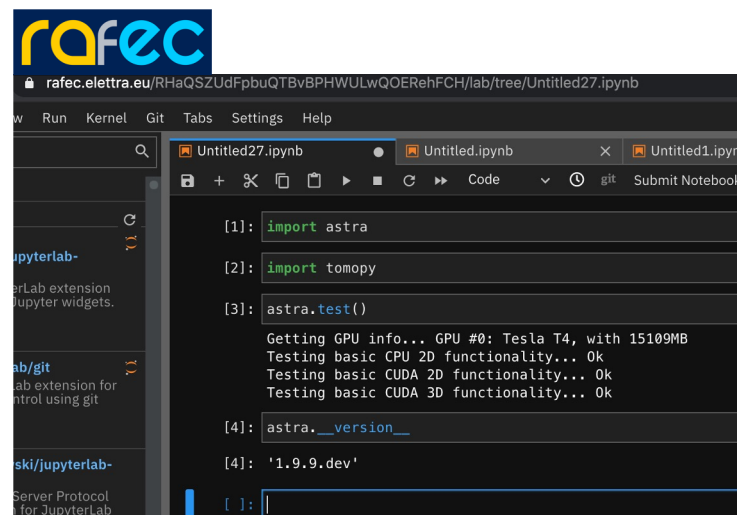
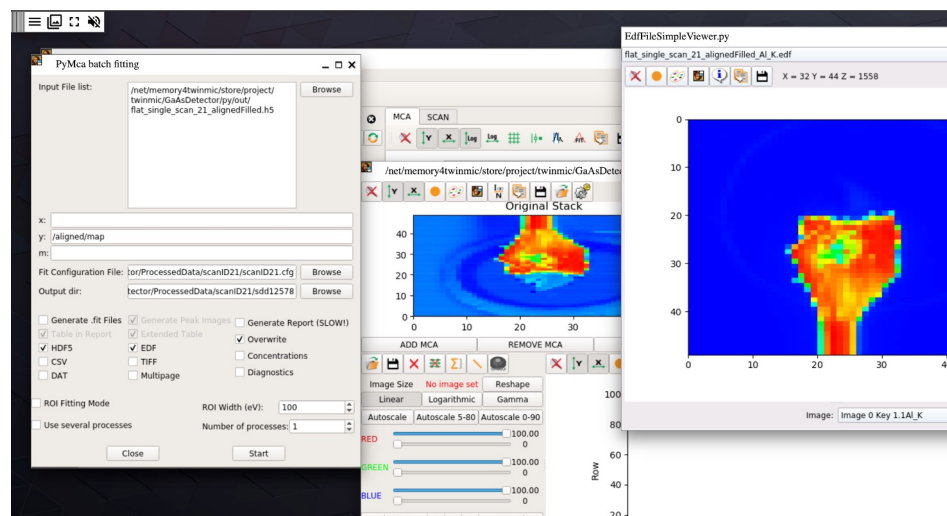
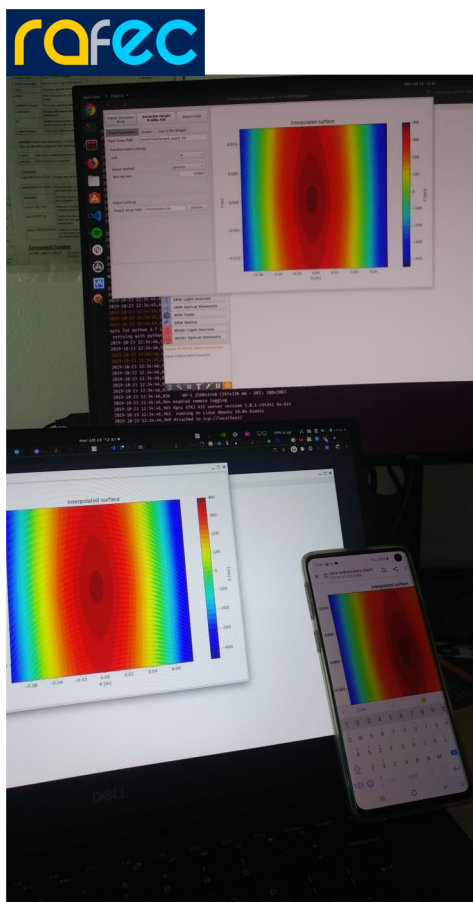
- labbook
- smart-glasses, robots

Necessities

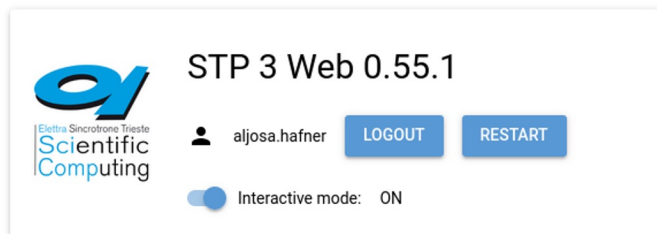
- security, management, online FAIR data

In-house developments: RAFEC

Remote apps
XPRa-based



In-house developments: Web-based CT analysis (STP3)



STP 3 Web 0.55.1

aljosa.hafner **LOGOUT** **RESTART**

Interactive mode: ON

Input

Input type: TDF | Slice #: 500 | Every n-th projection (enter 1 for full dataset): 1

BROWSE LOCAL

TDF or HIS TOMO File path
/home/aljosa.hafner/Documents/ELENA_samples/tdf/3.tdf

Quick TDF summary for: 3.tdf

Shape: (1800, 1800, 2048) Keys: ['data', 'data_dark', 'data_white']

projections: 1800 # sinograms: 1800 Detector width: 2048

Pixel size [µm]: | Distance [mm]: | Energy [keV]:

Crop input

TDF INFO **LOAD DATASET** **NEW DATASET**

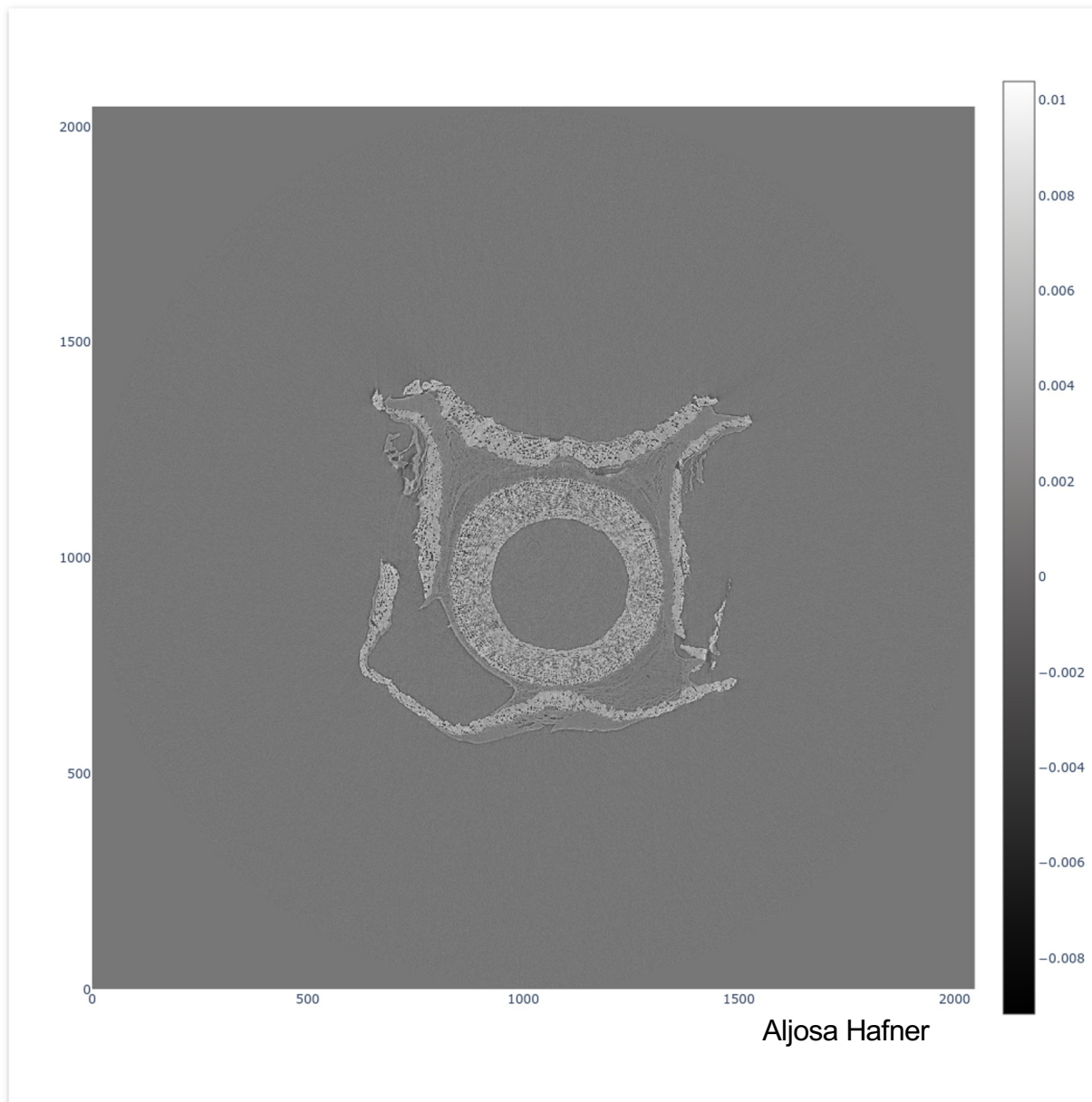
Plot settings

Preprocessing

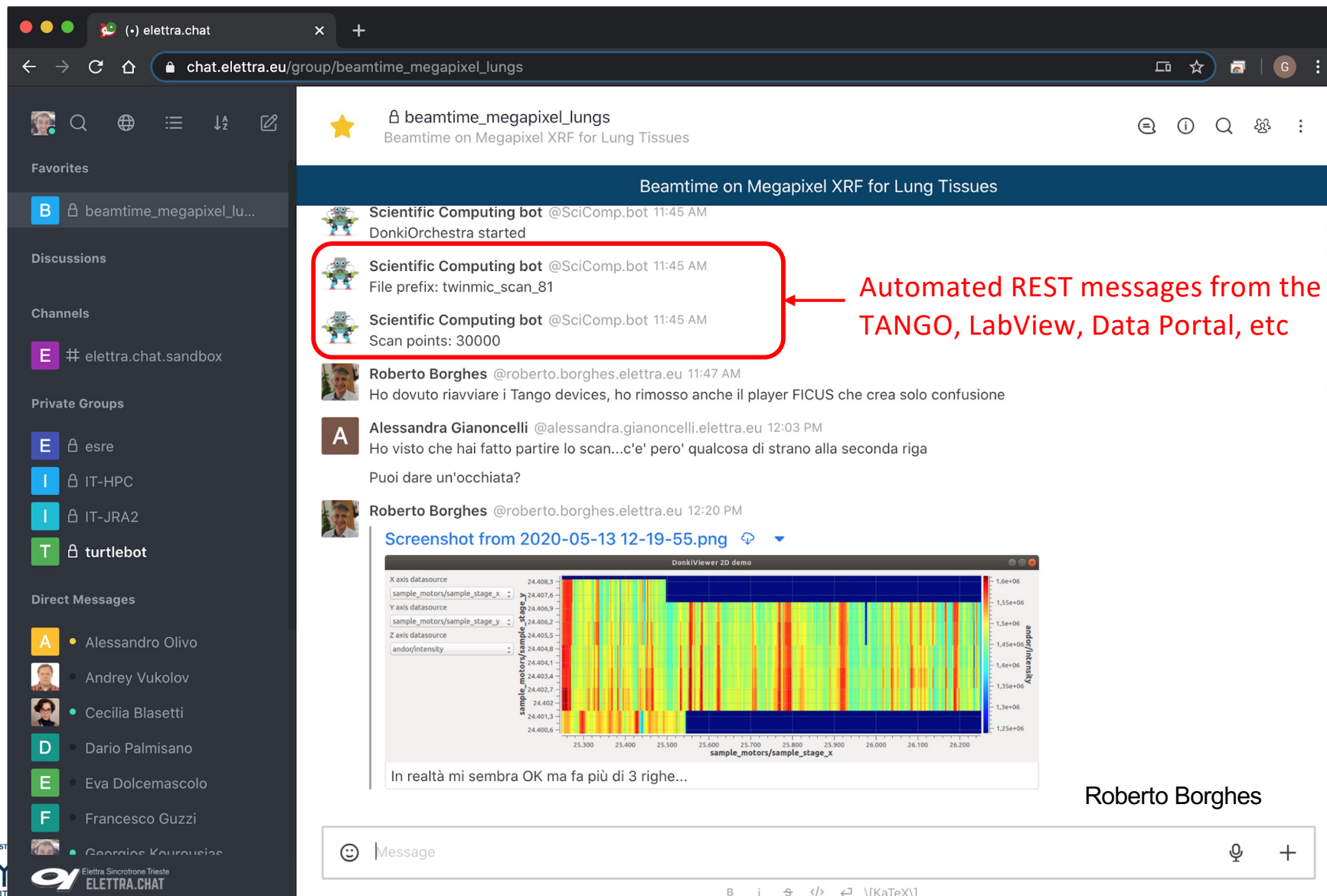
Phase Retrieval

Reconstruction

Preprocessing on-the-fly Perform phase retrieval



In-house developments: DonkiLog WhatsApp-like log keeping



The screenshot shows a web browser window with the URL `chat.elettra.eu/group/beamtime_megapixel_lungs`. The chat interface includes a sidebar with navigation options like Favorites, Discussions, Channels, and Direct Messages. The main chat area displays a group chat titled "beamtime_megapixel_lungs" with the description "Beamtime on Megapixel XRF for Lung Tissues".

Key messages in the chat include:

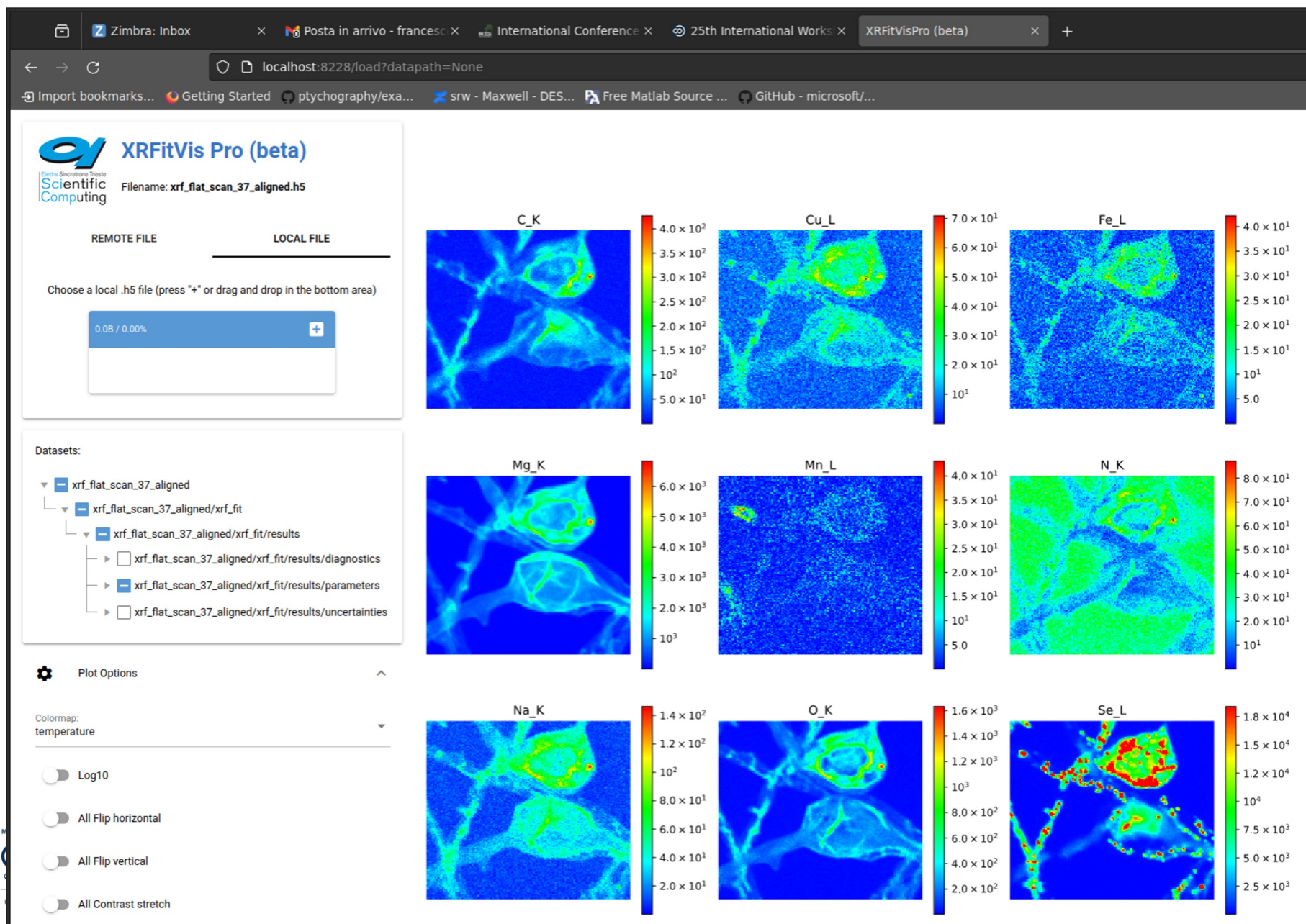
- Scientific Computing bot** @SciComp.bot 11:45 AM: DonkiOrchestra started
- Scientific Computing bot** @SciComp.bot 11:45 AM: File prefix: twinmic_scan_B1
- Scientific Computing bot** @SciComp.bot 11:45 AM: Scan points: 30000
- Roberto Borghes** @roberto.borghes.elettra.eu 11:47 AM: Ho dovuto riavviare i Tango devices, ho rimosso anche il player FICUS che crea solo confusione
- Alessandra Gianoncelli** @alessandra.gianoncelli.elettra.eu 12:03 PM: Ho visto che hai fatto partire lo scan...c'e' pero' qualcosa di strano alla seconda riga. Puoi dare un'occhiata?
- Roberto Borghes** @roberto.borghes.elettra.eu 12:20 PM: Screenshot from 2020-05-13 12-19-55.png

The screenshot of the heatmap visualization shows a grid of intensity data. The X-axis is labeled "sample_motors/sample_stage_x" and ranges from 25,300 to 26,200. The Y-axis is labeled "sample_motors/sample_stage_y" and ranges from 24,400.6 to 24,408.3. The color scale on the right indicates intensity values from 1.25e+06 to 1.6e+06. The plot shows a dense pattern of vertical lines with varying colors (red, yellow, green, blue) representing intensity fluctuations.

A red box highlights the bot messages, with a red arrow pointing to them from the text: "Automated REST messages from the TANGO, LabView, Data Portal, etc".

At the bottom right of the chat area, the name "Roberto Borghes" is displayed.

In-house developments: PyMCA results visualisation on the web (EDFviewer)



The screenshot displays the XRFitVis Pro (beta) web interface. The browser address bar shows the URL `localhost:8228/load?datapath=None`. The interface includes a file management section on the left with a file list and plot options. The main area features a 3x4 grid of elemental maps, each with a color scale legend.

File Management:

- Filename: `xrf_flat_scan_37_aligned.h5`
- Options: REMOTE FILE, LOCAL FILE
- Message: Choose a local .h5 file (press "+" or drag and drop in the bottom area)
- Progress: 0.0B / 0.00%

Datasets:

- xrf_flat_scan_37_aligned
 - xrf_flat_scan_37_aligned/xrf_fit
 - xrf_flat_scan_37_aligned/xrf_fit/results
 - xrf_flat_scan_37_aligned/xrf_fit/results/diagnostics
 - xrf_flat_scan_37_aligned/xrf_fit/results/parameters
 - xrf_flat_scan_37_aligned/xrf_fit/results/uncertainties

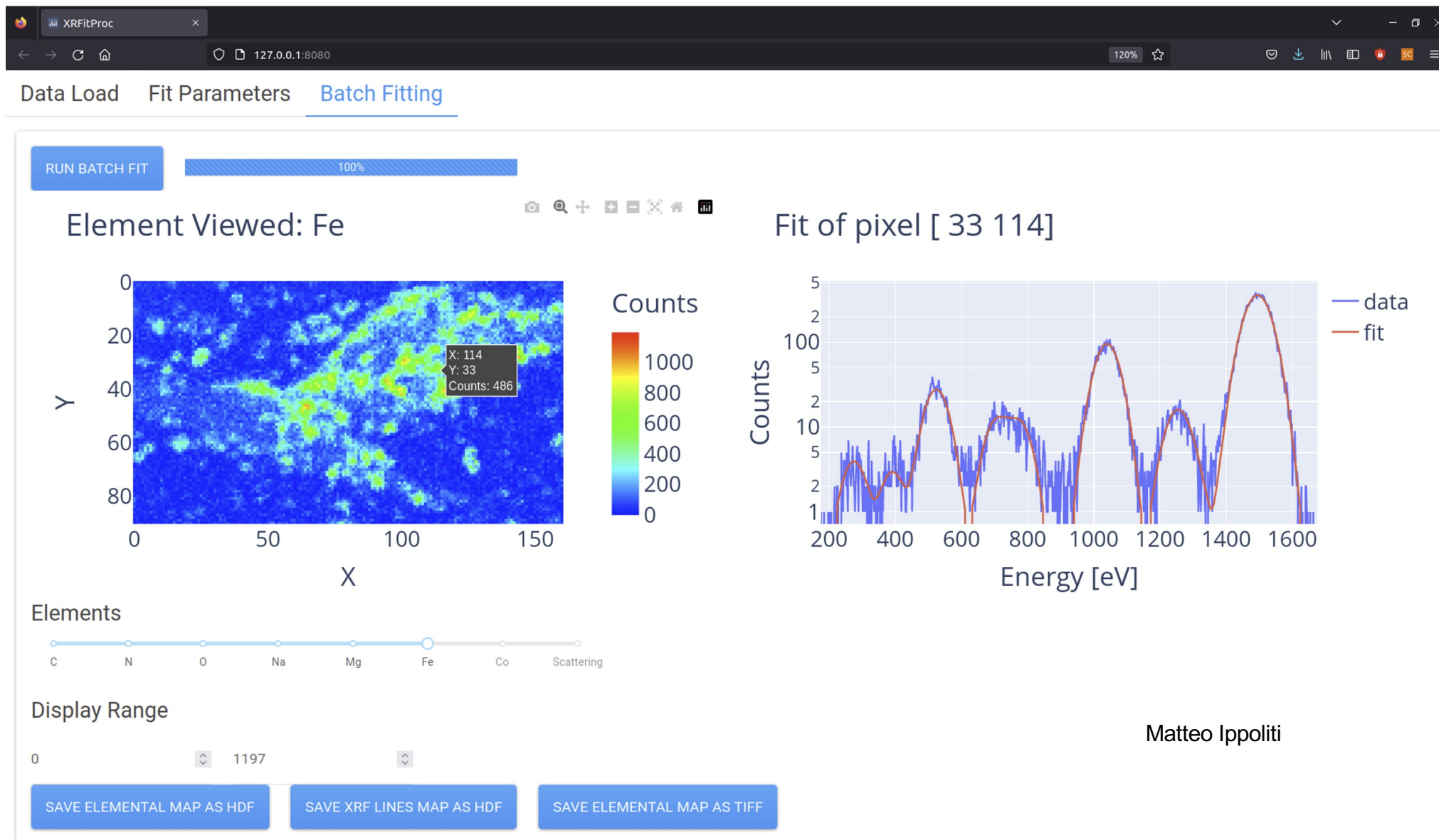
Plot Options:

- Colormap: temperature
- Log10:
- All Flip horizontal:
- All Flip vertical:
- All Contrast stretch:

Elemental Maps and Color Scales:

Element	Color Scale Range
C_K	5.0×10^1 to 4.0×10^2
Cu_L	10^1 to 7.0×10^1
Fe_L	5.0 to 4.0×10^1
Mg_K	10^3 to 6.0×10^3
Mn_L	5.0 to 4.0×10^1
N_K	10^1 to 8.0×10^1
Na_K	2.0×10^1 to 1.4×10^2
O_K	2.0×10^2 to 1.6×10^3
Se_L	2.5×10^3 to 1.8×10^4

In-house developments: XRF fitting on the web

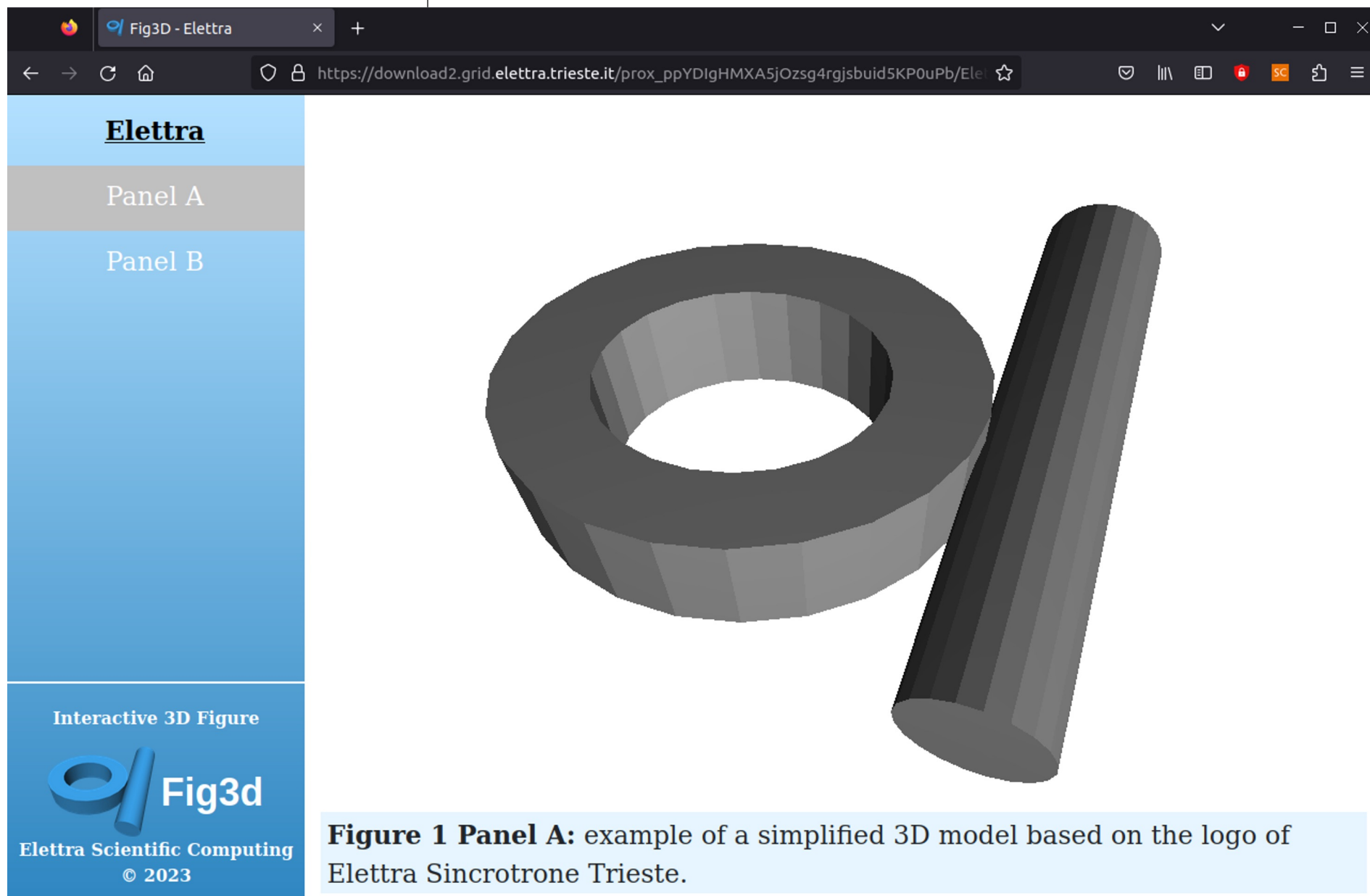


The screenshot shows a web browser window with the URL `127.0.0.1:8080`. The application has three tabs: **Data Load**, **Fit Parameters**, and **Batch Fitting** (which is active). A progress bar at the top left shows **RUN BATCH FIT** at 100% completion.

The main interface is divided into two panels:

- Left Panel: Element Viewed: Fe**
 - A heatmap showing the distribution of Fe counts across a grid. The X-axis ranges from 0 to 150, and the Y-axis ranges from 0 to 80. A color scale on the right indicates counts from 0 (blue) to 1000 (red).
 - A tooltip for a selected pixel at `X: 114`, `Y: 33` shows `Counts: 486`.
 - Below the heatmap is a slider for **Elements** with markers for C, N, O, Na, Mg, Fe, Co, and Scattering. The Fe marker is currently selected.
 - A **Display Range** section shows a range from 0 to 1197.
 - At the bottom are three buttons: **SAVE ELEMENTAL MAP AS HDF**, **SAVE XRF LINES MAP AS HDF**, and **SAVE ELEMENTAL MAP AS TIFF**.
- Right Panel: Fit of pixel [33 114]**
 - A line graph showing **Counts** on a logarithmic Y-axis (1 to 100) versus **Energy [eV]** on the X-axis (200 to 1600).
 - The graph displays **data** (blue line) and **fit** (orange line) for the selected pixel.
 - The fit shows several peaks corresponding to the XRF spectrum of Fe.

Matteo Ippoliti



Elettra

Panel A

Panel B

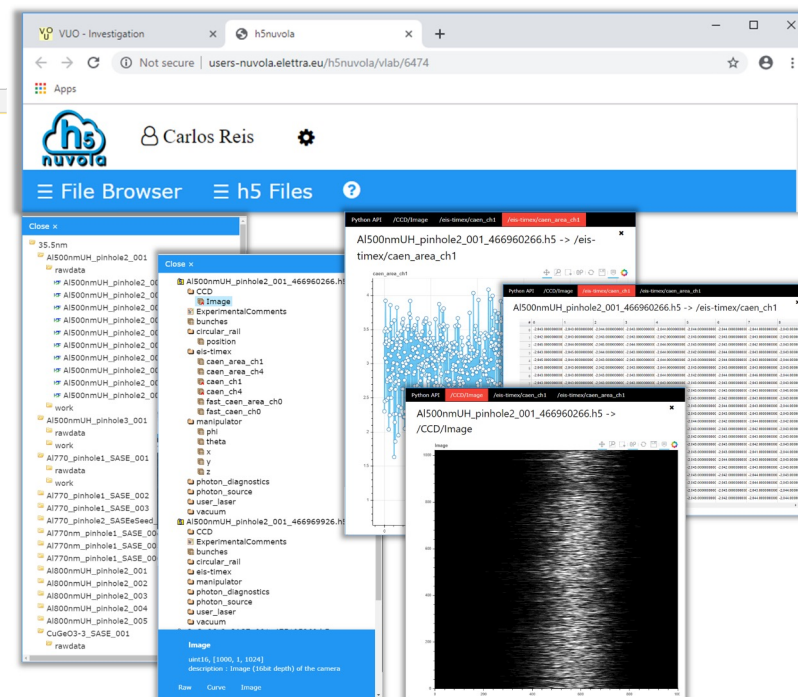
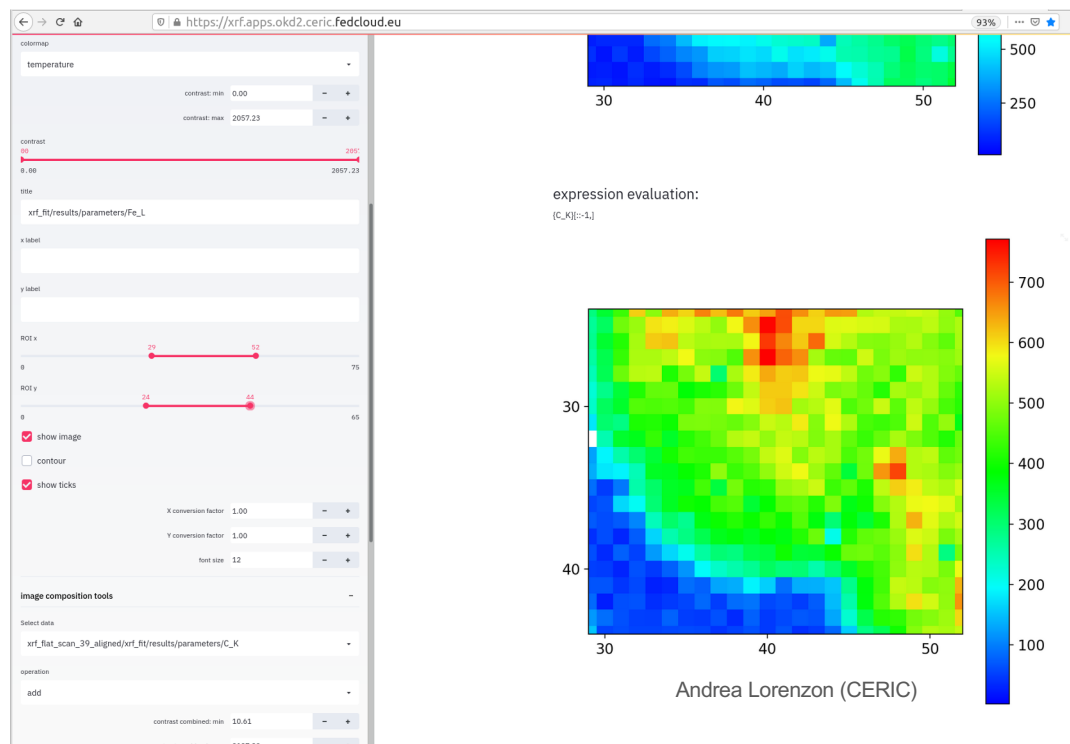
Interactive 3D Figure

Fig3d

Elettra Scientific Computing
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Figure 1 Panel A: example of a simplified 3D model based on the logo of Elettra Sincrotrone Trieste.

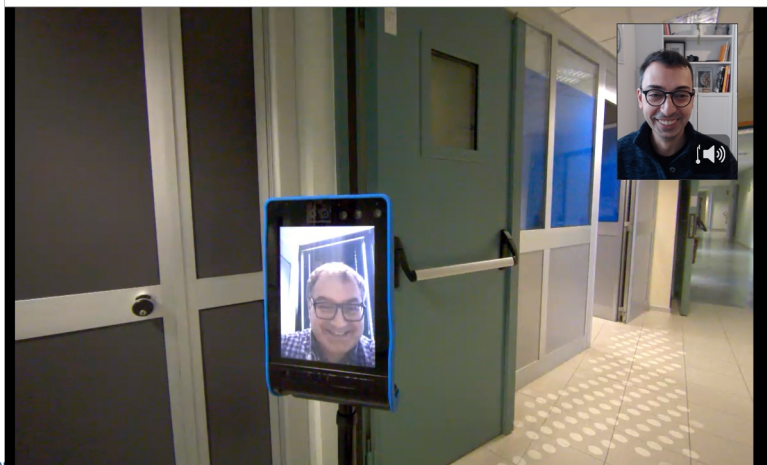
In-house developments: HDF5 viewer (H5Nuvola)



experimenting with new devices and modalities



ElettraDouble3DUE



interesting tech but **NOT** used enough

In-house developments: Landing page with all available systems for each proposal (VUO)

Remote tunnels

EIS-TIMER
20184072

Zoom meeting room
Exp. N° 20184072

Applications
RAFEC-JUPYTER

[calibration](#) | [dark](#) | [fotodiodo](#) | [test](#) | [testdaq1019](#) | [Timing_PumpA](#) | [Timing_PumpB](#)

Investigation details	
Name	20184072
Description	We propose to induce, via FEL pulse excitation, transient magnetic structures leading to all-optical switching with periodicities below 30 nm and to probe their ultrafast evolution via a resonant small angle scattering experiment. The excitation pattern will be shaped by diffractive elements placed in front of the sample leading to a nanoscale interference pattern. A systematic variation of the periodicities and shapes of our diffracting structures will allow us to access spatial dimensions of below 40 nm in order to shed light on ultrafast spin and electron transport on the nanoscale. In this way we also expect that the experiment will establish the fundamental spatial limit of controlling magnetism with light. (c.vonkorf@schmising) VON KORFF SCHMISING Clemens [Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie]
Principal Investigator	(c.vonkorf@schmising) VON KORFF SCHMISING Clemens [Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie]
Proposal	20184072
Open access	No

Name	Unix username	Other Investigators	Authorized tag from	Authorized tag to	In proposal
BENCIVENGA Filippo	filippo.bencivenga		14/08/2020		
BORCHERT Martin	borchert		23/10/2020	07/11/2020	✓
CAPOTONDI Flavio	flavio.capotondi		14/08/2020	23/09/2021	
DE ANGELIS Dario	dario_deangelis		14/08/2020	07/11/2020	
FOGLIA Laura	lafoglia		14/08/2020		
MINCIGRUCCI Riccardo	r.mincigrucci		14/08/2020		
PANCALDI Matteo	mpancaldi.physics		04/09/2020	23/09/2021	
PEDERSOLI Emanuele	emanuele.pedersoli		14/08/2020	19/12/2020	
PELLI CRESI Jacopo Stefano	jacopostefano.pellicres		14/08/2020	19/10/2021	
STEINBACH Felix	steinbac		23/10/2020	07/11/2020	✓
WEHINGER Bjorn	bjorn.wehinger		14/08/2020	19/10/2021	
YAO Kelvin	yao1		23/10/2020	07/11/2020	✓

Items: 1-12

Experiments	
Select	calibration
Select	dark
Select	fotodiodo
Select	test
Select	testdaq1019
Select	Timing_PumpA
Select	Timing_PumpB

[\[Add a new experiment\]](#)

[\[Access online storage\]](#)



[\[Restore permissions on online storage\]](#)

Items: 1-7

Tag	
Code	EIS-TIMER
Description	Ultrastat Time-Resolved Studies of Matter under EXtreme and Metastable Condition
Max 400 characters	
Beamline	EIS-TIMER
Resource	EIS-TIMER
Investigation enabled	Yes
Add participants automatically	No
Unix group	AEIS-TIMER

Scratch	
Scratch host	kermit
Scratch path	/scratchtimer/investigations
Scratch destage path	/scratchtimer/destageArea

Online	
Online host	online4eis
Online path	/store/eis-timer
Online module	store-timer

Administrator	Matricula	Administrators Matricula expiration date	Unix username
BENCIVENGA Filippo	00577		filippo.bencivenga
FERRI Proxy			caribolis
FOGLIA Laura	00943		lafoglia
GIANNESI Luca	A0039		luca.giannessi
MINCIGRUCCI Riccardo	00931		r.mincigrucci
PANMIGLIANI Fulvio	W0010		fulvio.panmigiani
SIMONCIG Alberto	00933		alberto.simoncig

User	Email	Unix username	Investigations	From	To
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[Edit] BILLE Fulvio	fulvio.bille@elettra.eu	bille	✓	14/08/2020	
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[Edit] FERRI Proxy	ferriproxy@elettra.eu	controls	✓	14/08/2020	
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[Edit] GIANNESI Luca	luca.giannessi@elettra.eu	luca.giannessi	✓	14/08/2020	
[Edit] GIORDANO Valentina	valentina.giordano@univ-lyon1.fr	valentina.giordano	✓	09/10/2020	19/10/2020
[Edit] GUTT Christian	gutt@physik.uni-siegen.de	gutt	✓	14/08/2020	18/04/2019

Focused project on Essential Remotisation (ESRE)



- Focus on : data, workstations, and novel systems
- Puts together technologies and expertise from different groups
- hand-in-hand with Elettra IT, CERIC PANOSC, ExPaNDS, and Elettra & FERMI beamlines
- It assisted beamline experiment but can provide solutions to a wider audience

Challenges and key takes

- remotisation helps User Access
 - boosted during the pandemic - helps also nowadays
- Web-based is the way to go
 - older GUIs/panels (TANGO ecosystem) tend to be standalone
- Lots of in-house developments
 - all Open Source but highly custom to specific needs
- Advanced tech like robots are interesting
 - but not utilised enough
- Focused projects on remotisation are needed
 - there are projects but mostly focused on data
- It is a multidisciplinary approach
 - IT, beamlines, (and eventually User Office)

Thank you!



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