



SOLARIS
CENTRE



GUI strategy at SOLARIS: status & future plans

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NSRC SOLARIS institute

- Synchrotron radiation research + cryomicroscopy.
- Synchrotron accelerator, linear accelerator, 2 diagnostic beamlines, 5 scientific beamlines and 2 microscopes fully operational.
- 1 beamline during commissioning (CS already working).
- 2 beamlines under construction/development.

Co?

Control System in NSRC SOLARIS

- Accelerators and beamlines for control system use PLC (BMS, MPS, PSS) and TANGO (high level, mostly python, sometimes C++).
 - OS: CentOS 6, 7 (mainly), 8, Windows 10 + some embedded custom Linux and 1 Fedora (old one).
 - Python versions: 2.7 (GUIs), 3.6 (devices and GUIs), 3.7 (some web).
 - Tango versions: 9.3.5 (mainly), 9.2.5 (few systems left), 9.1 (embedded) and some 8 (e.g. old archiving).
 - Taurus versions: 3.7 (virtual env), 4.1 (accelerators), 4.4 (virtual env), 4.5 (beamlines) and 4.7 (for Py3.6 and PyQt5).
 - Additionally, some projects use Vue.js, Tango GQL and Taranta (for authentication).
 - Archiving: hdb++ + MySQL InnoDB
- Cryomicroscopes are fully independent and are based on manufacturer software.

Control System in NSRC SOLARIS – numbers

- Around 4000 Tango Devices.
- Around 600 Tango Classes.
- Around 800 Servers instances.
- 9 tango hosts.
- Over 100 hosts.
- 20 workstations.

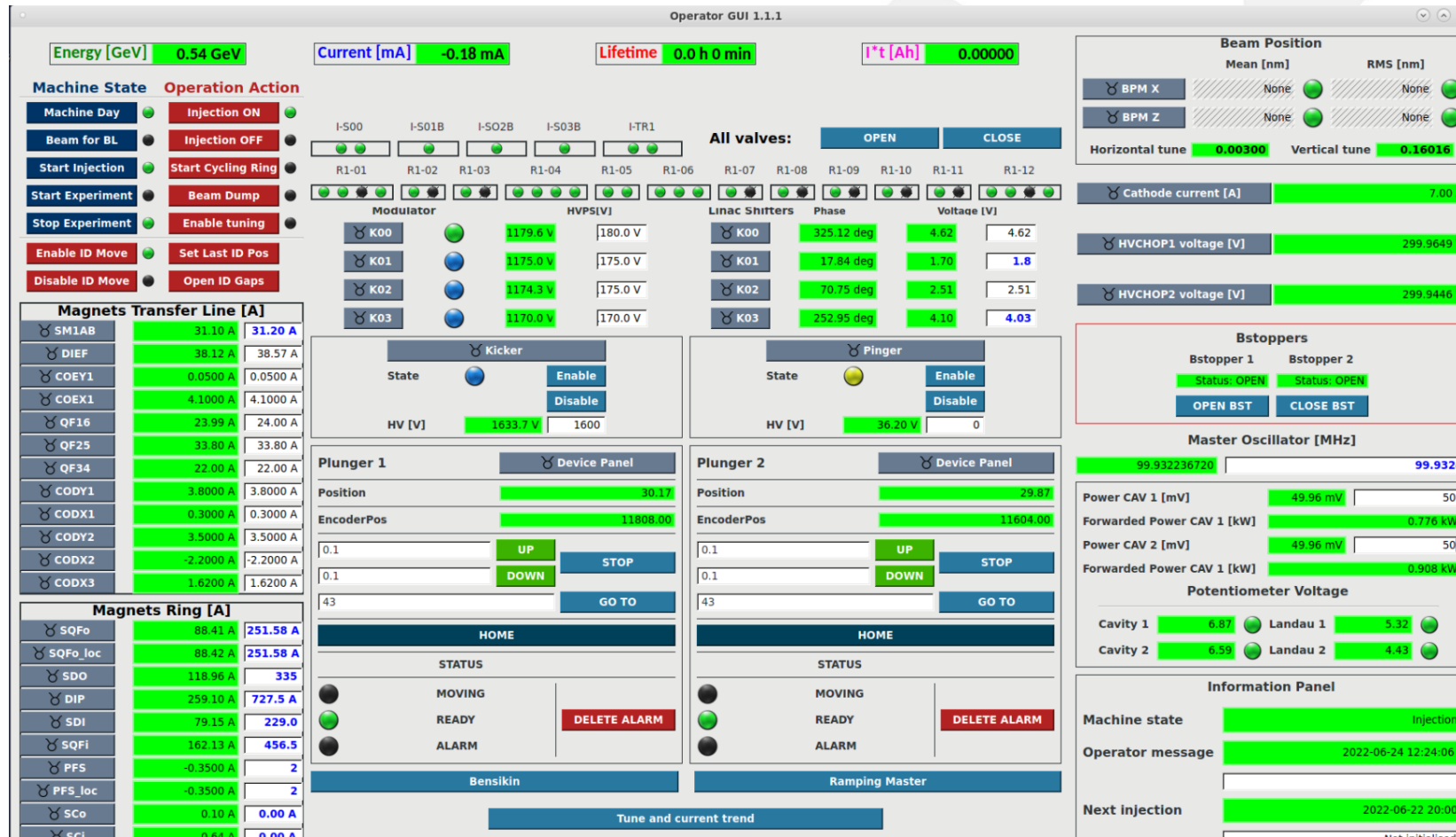
GUIs in SOLARIS

- Most of the GUIs are based on Taurus.
- We have few web applications (Vue + TGQL + custom web archive reader based on PyTA).
- 1 QTango GUI.
- There are some pure PyQt (with custom Tango communication) and MATLAB GUIs, mostly written by operators and scientists.
- Most of the software for research is provided by manufacturers and is Windows based.

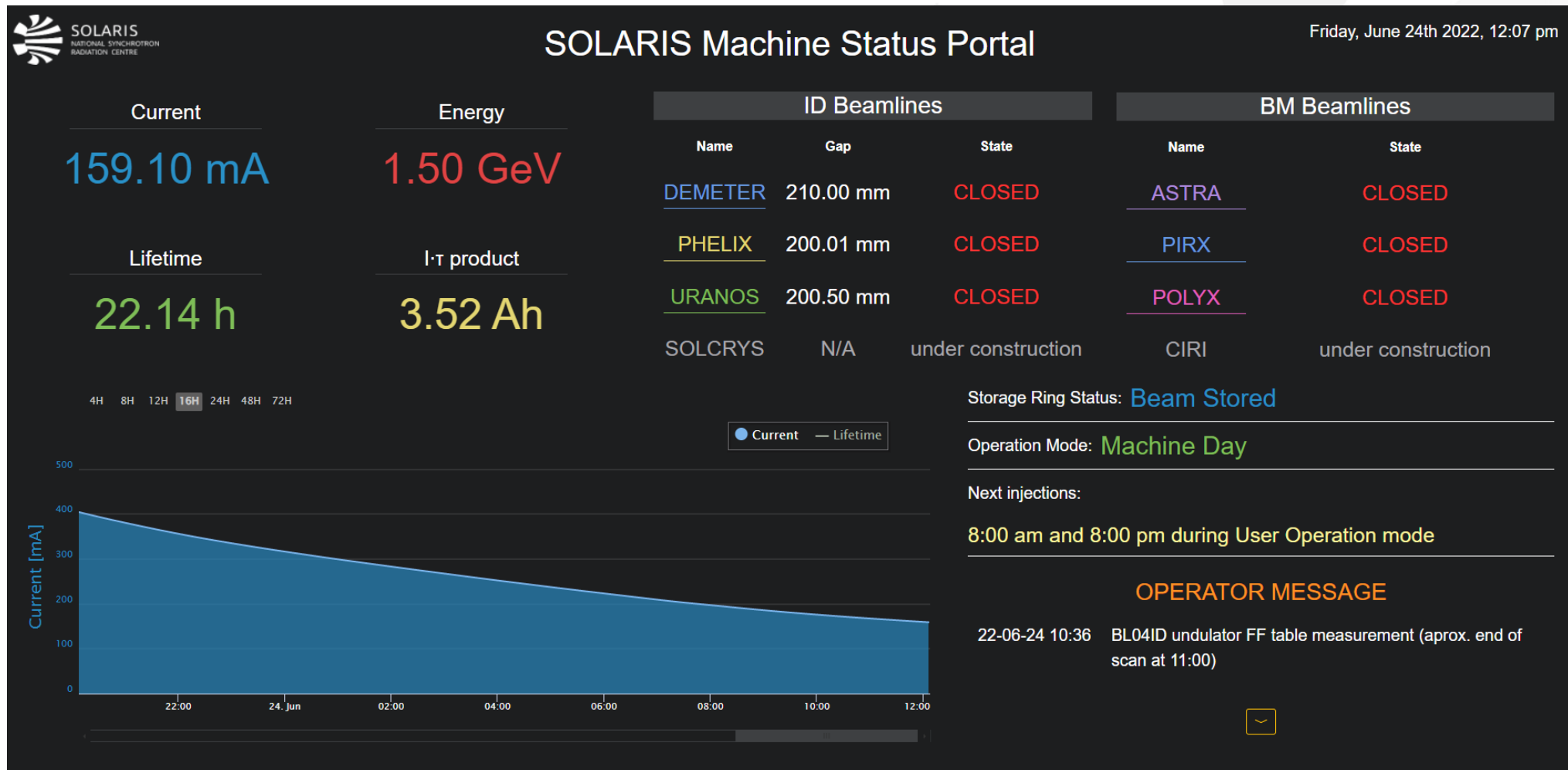
GUIs in SOLARIS – spectrum

- Over 100 applications in repository.
- The range of applications is very wide:
 - Simple forms with few buttons and labels.
 - Panels to control single devices from power supplies, ion pumps, to Undulators and Cavities.
 - Complicated GUIs to operate entire machine (e.g. RF section, beam injection), setup beamlines and execute sample scans (also based on Taurus GUI).
 - Synoptics (JDraw and svgsynoptic2) of simple sections to entire beamlines.
- Many additional trends and forms on workstations (also based on Taurus GUI).
- Few operators and scientists' GUIs.
- Some GUIs have over 150 attributes connected.
- ATK panels are run from Jive (in some cases too many clients can kill servers).

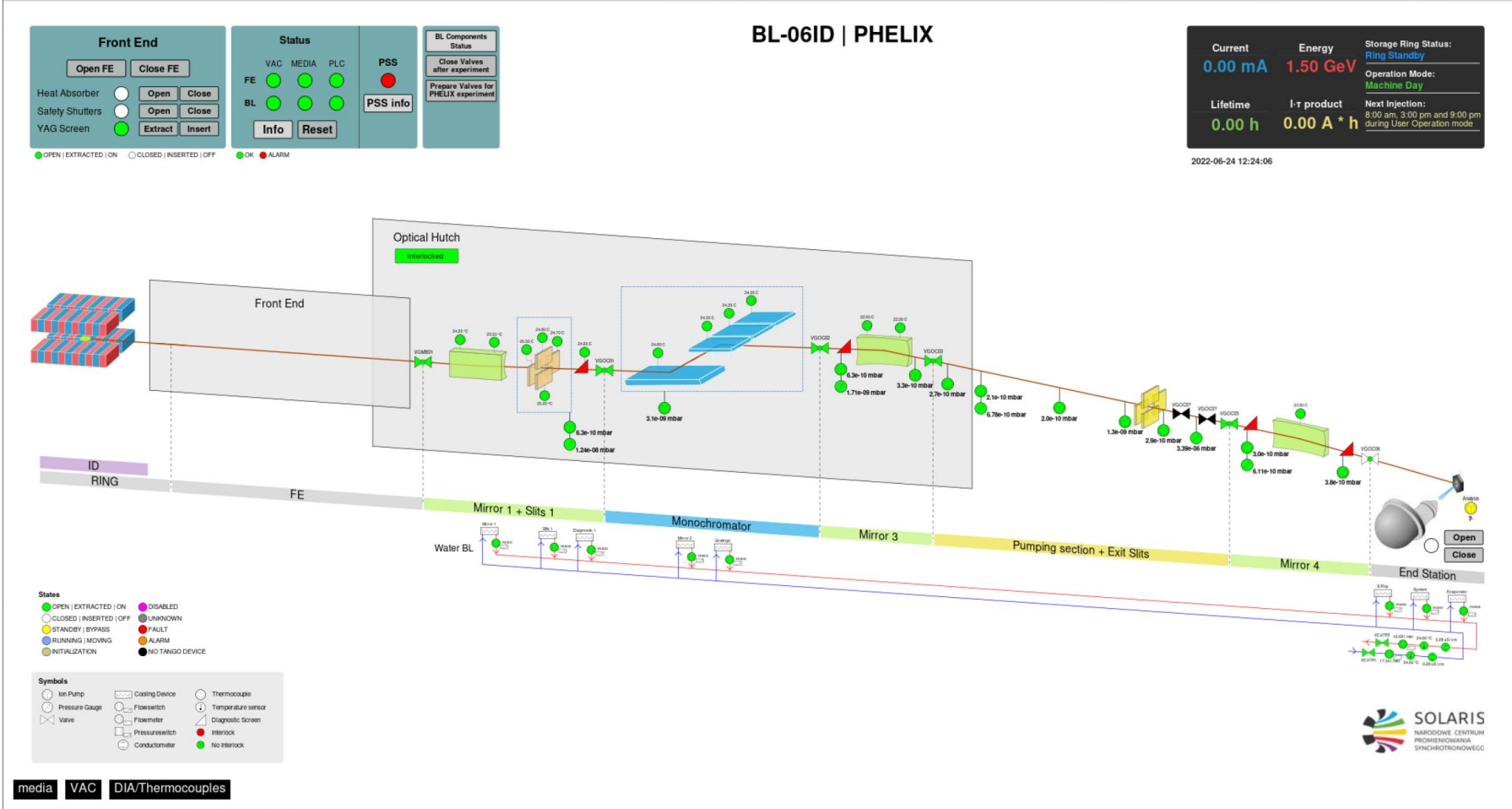
GUIs in SOLARIS – examples



GUIs in SOLARIS – examples



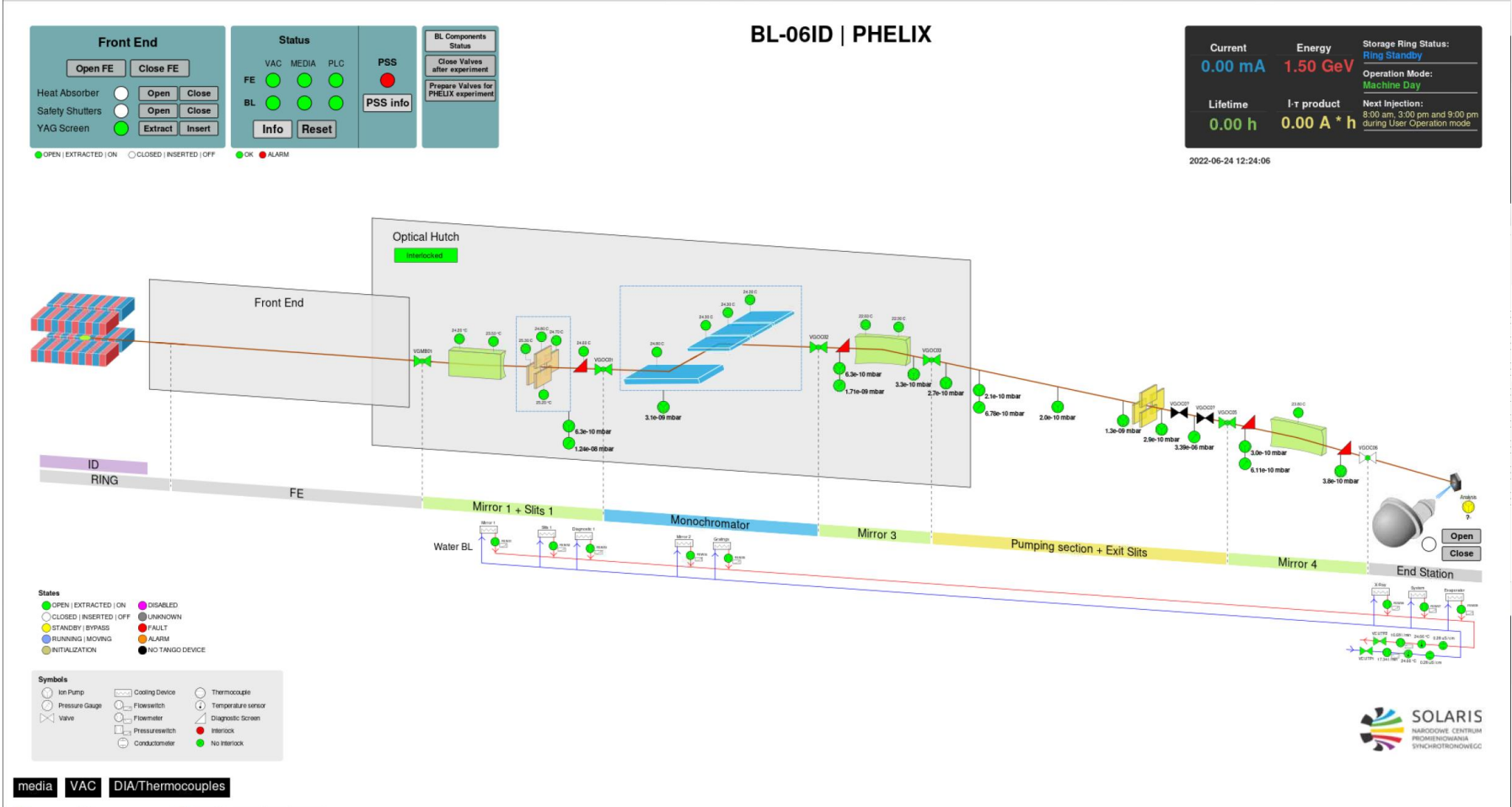
GUIs in SOLARIS – examples



GUIs in SOLARIS – standards

- In every new GUI logic should be moved to server side (e.g. facadedevice, Sardana controllers) and, if possible, also in maintained GUIs.
- Every new GUI should not use older versions than Py3.6 and Taurus 4.7 (unless Qwt or synoptic is needed).
- Taurus is preferred over other frameworks.
- svgsynoptic2 is obligatory for new synoptics.
- Web applications should use Vue.js.
- GUIs and web apps for similar purposes should have similar view and project structure (e.g. beamline operation GUIs are in one project where all configs are stored).
- Synoptics for beamlines and fronted uses same layout, symbols, colours, panels and logic.

GUIs in SOLARIS – examples



GUIs in SOLARIS – examples

Front End

Open FE Close FE

Heat Absorber ● Open Close

Safety Shutters ● Open Close

YAG Screen ● Extract Insert

Status

VAC MEDIA PLC

FE ● ● ●

BL ● ● ●

Info Reset

BL Components Status

Close Valves after experiment

Prepare Valves for STXM experiment

Prepare Valves for 8 poles experiment

Prepare Valves for PEEM experiment

PSS

● PSS info

● OPEN | EXTRACTED | ON ○ CLOSED | INSERTED | OFF

● OK ● ALARM

BL-04ID | DEMETER

Current

356.24 mA

Energy

1.50 GeV

Storage Ring Status:

Beam Delivered

Operation Mode:

User Operation

Lifetime

15.26 h

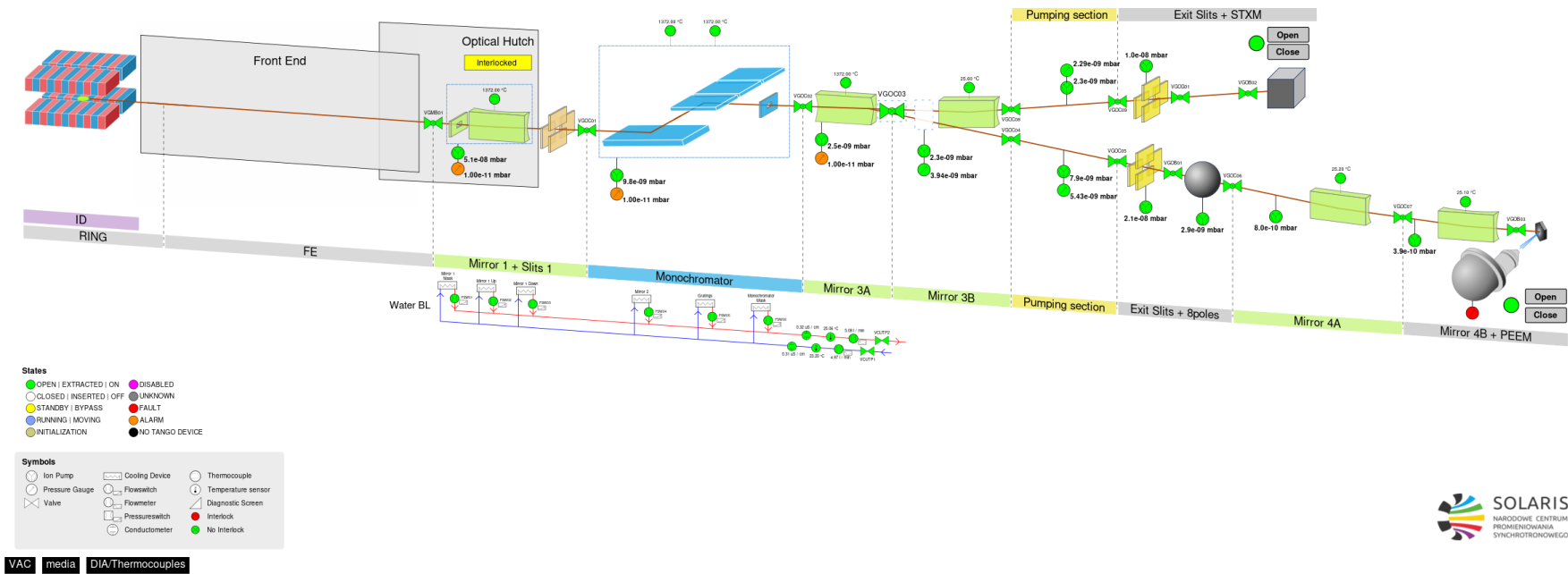
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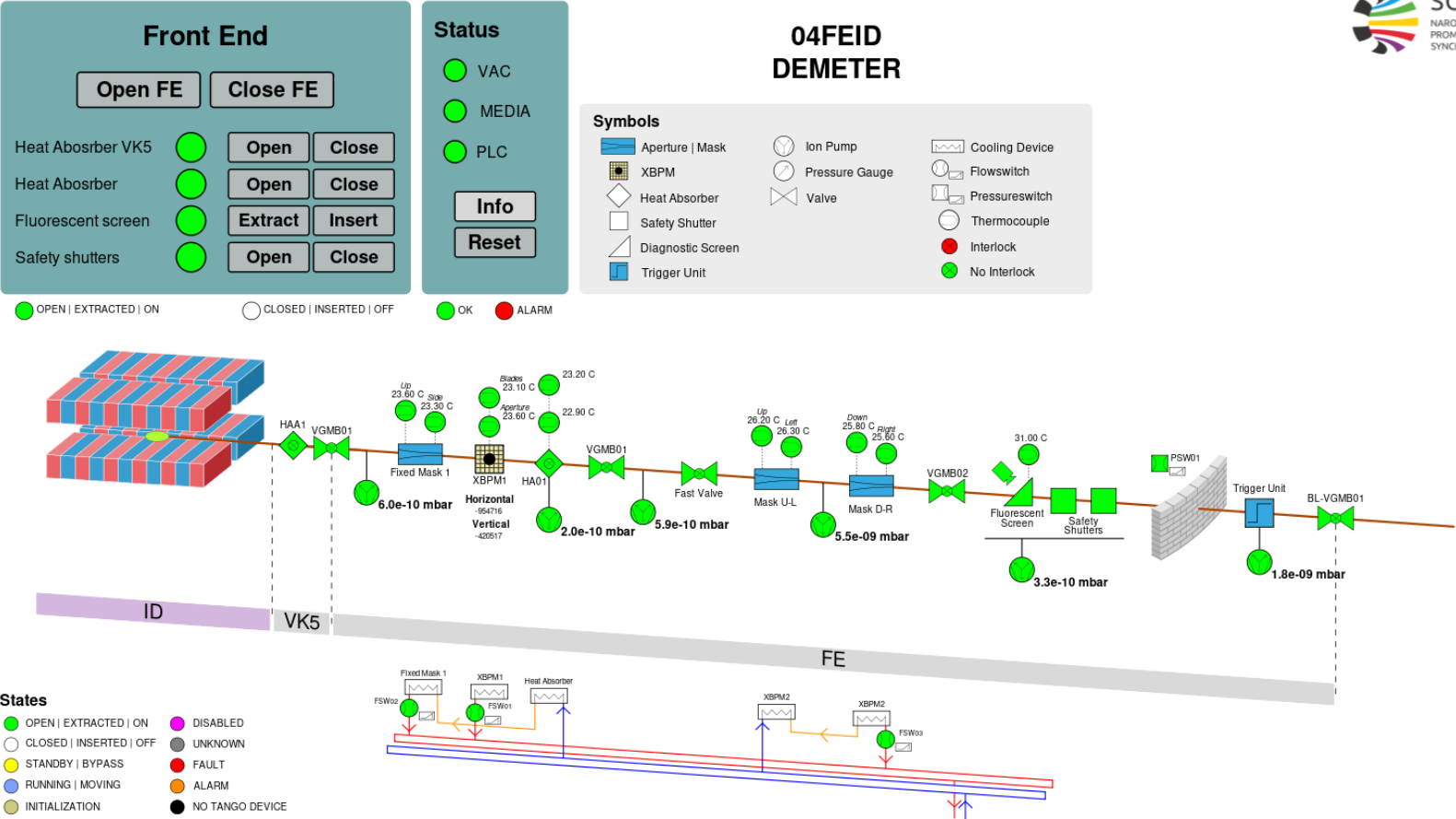
Next Injection:

8:00 am, 3:00 pm and 9:00 pm during User Operation mode

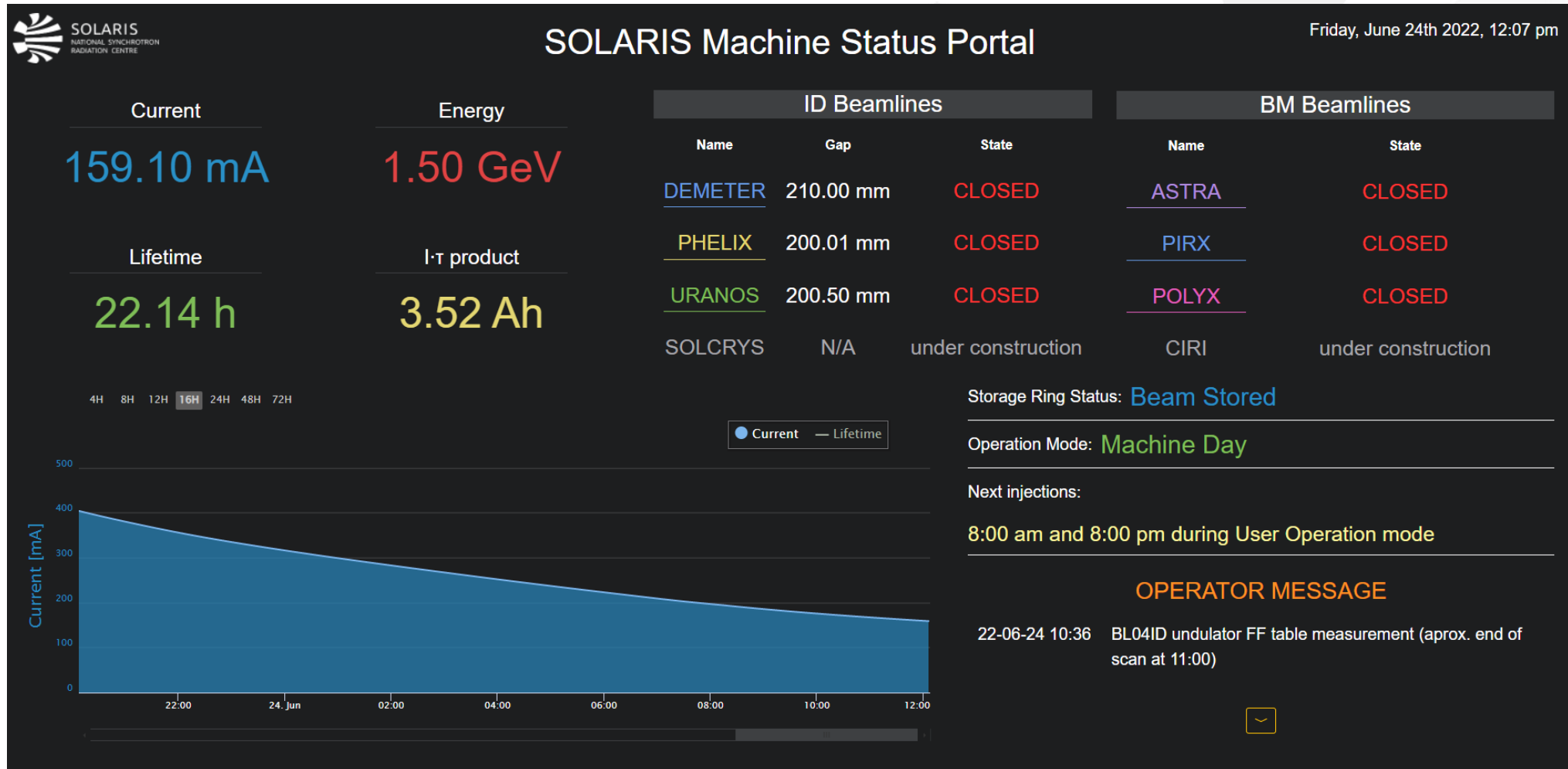
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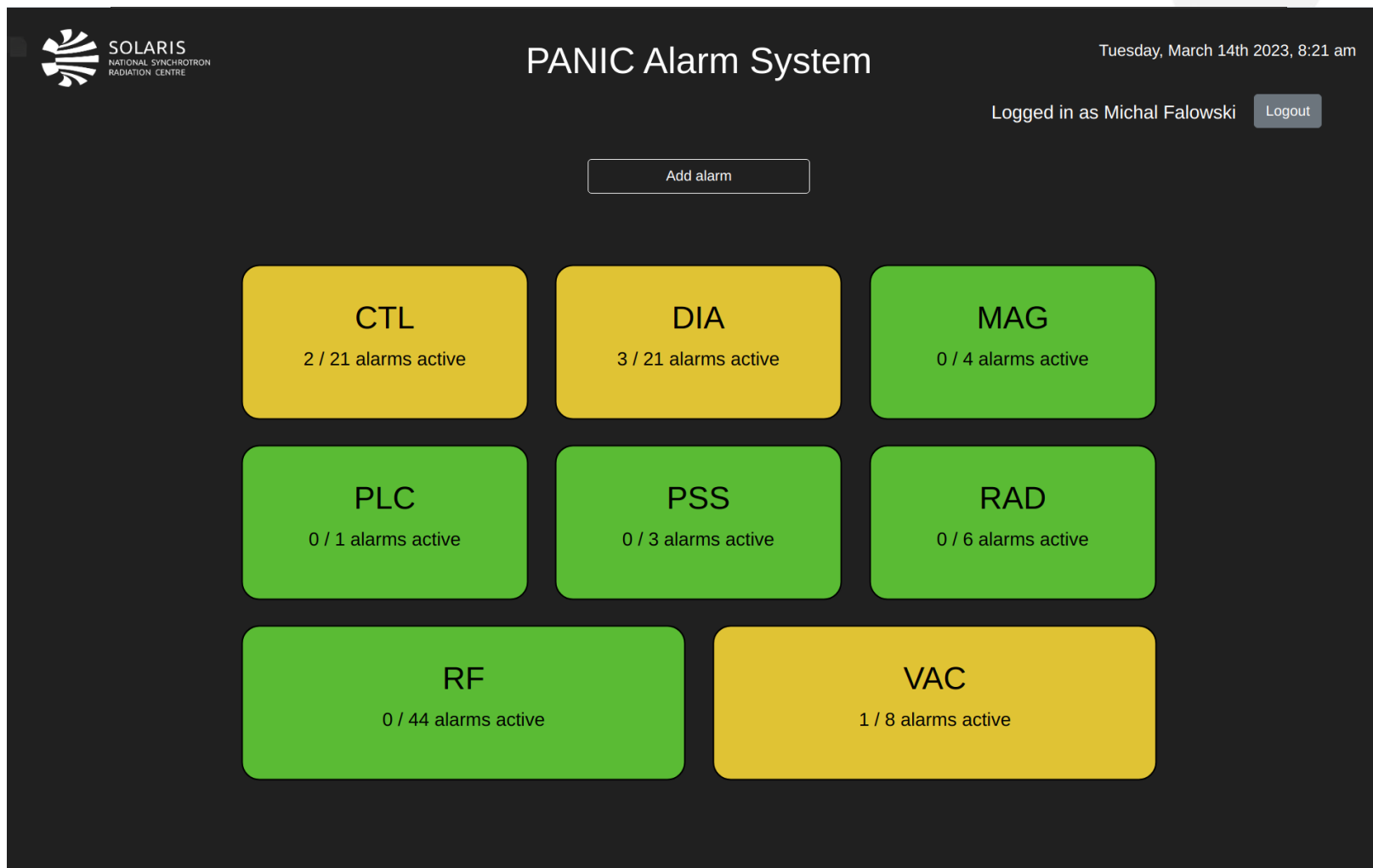
GUIs in SOLARIS – examples



GUIs in SOLARIS – examples



GUIs in SOLARIS – examples



The screenshot displays the 'PANIC Alarm System' interface. At the top left is the 'SOLARIS NATIONAL SYNCHROTRON RADIATION CENTRE' logo. The title 'PANIC Alarm System' is centered at the top. On the top right, it shows the date and time 'Tuesday, March 14th 2023, 8:21 am' and the user status 'Logged in as Michal Falowski' with a 'Logout' button. Below the title is an 'Add alarm' button. The main area contains seven colored boxes representing different alarm categories: CTL (yellow, 2 / 21 alarms active), DIA (yellow, 3 / 21 alarms active), MAG (green, 0 / 4 alarms active), PLC (green, 0 / 1 alarms active), PSS (green, 0 / 3 alarms active), RAD (green, 0 / 6 alarms active), RF (green, 0 / 44 alarms active), and VAC (yellow, 1 / 8 alarms active).

System Component	Alarms Active	Total Alarms
CTL	2	21
DIA	3	21
MAG	0	4
PLC	0	1
PSS	0	3
RAD	0	6
RF	0	44
VAC	1	8

GUIs in SOLARIS – examples



SOLARIS
NATIONAL SYNCHROTRON
RADIATION CENTRE

Interlock GUI

Tuesday, March 14th 2023, 8:19 am

Not logged in

Login

Locations

Categories

Beam line
0 / 4 Interlocks active

Frontend bending magnet
2 / 53 Interlocks active

Frontend insertion devices
1 / 71 Interlocks active

Klystron Tunnel
6 / 77 Interlocks active

Linac Tunnel
0 / 57 Interlocks active

Room
0 / 8 Interlocks active

Storage Ring
1 / 561 Interlocks active

Storage Ring Gallery
1 / 186 Interlocks active

Unknown
0 / 2 Interlocks active

Resets

Global Reset

04FEBM

04FEID

05FEID

06FEID

10FEBM

12 01 VAC
RESET

IRF RESET ALL

IVAC RESET

K00CAB02 CTL
RPS

MAG RPS ALL

SGA MAG
RESET

SGDCAB12
CTL RPS

SHG1 WATRF
RESET

SHG1 WATRF
SGDCAB11 RF
ARCDR1
RESET

SHG2 WATRF
SGDCAB11 RF
ARCDR2
RESET

TLCAB03 CTL
RPS



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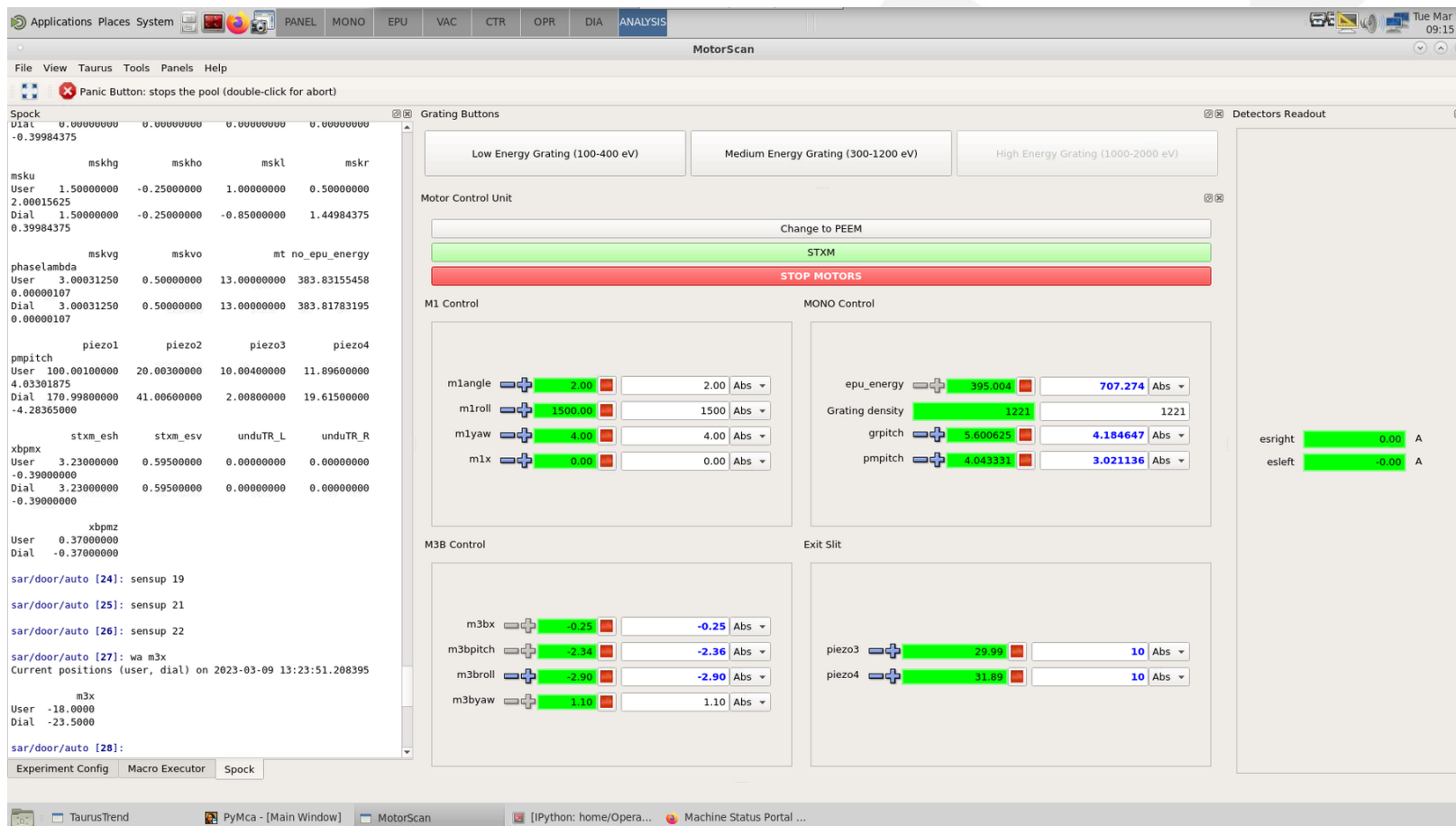
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www.synchrotron.pl

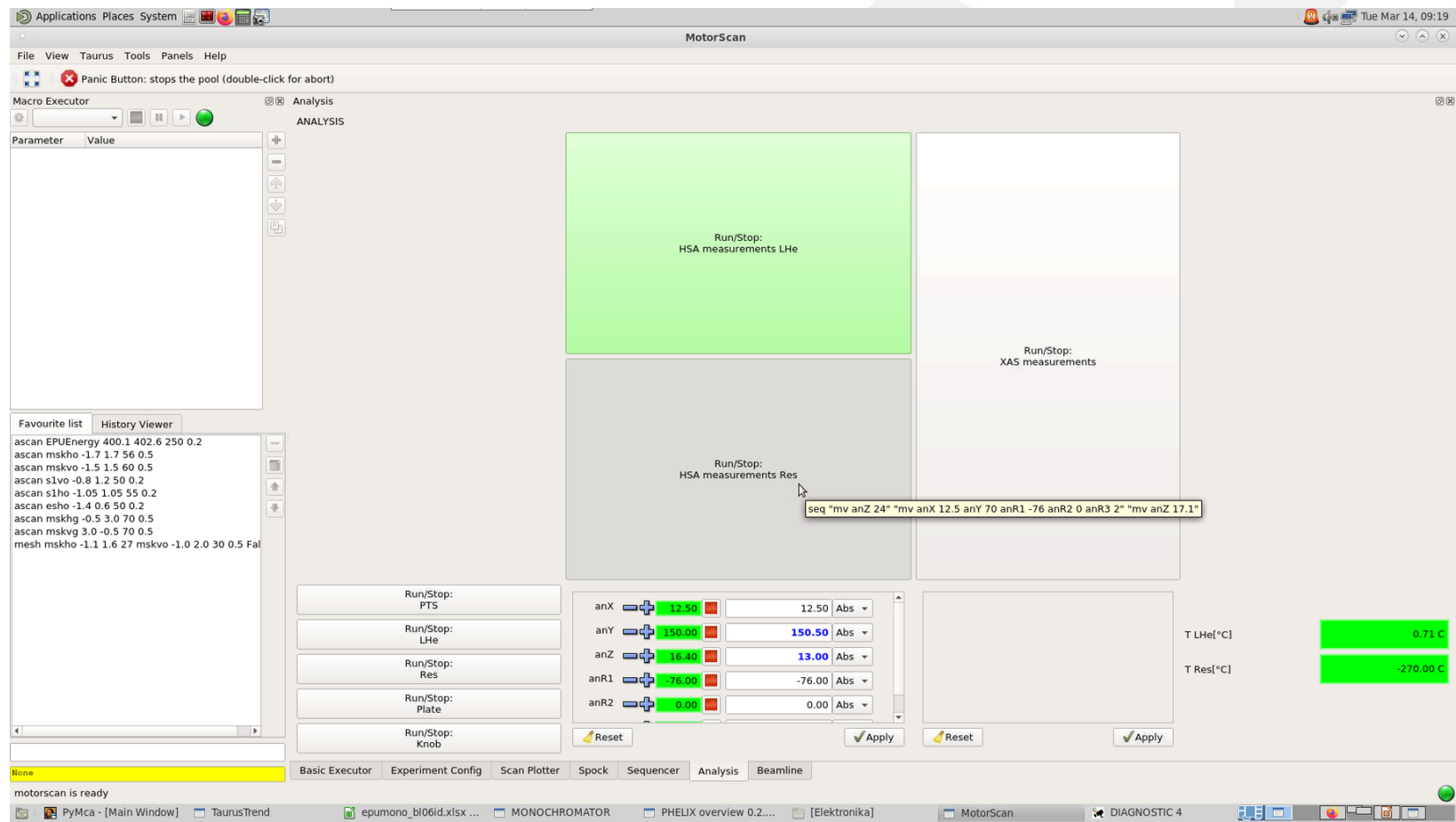
GUIs in SOLARIS – examples



GUIs in SOLARIS – examples



GUIs in SOLARIS – examples



GUIs in SOLARIS – team

- Most of the GUIs are created and maintained by CS team.
- 9 CS employees (7 full-time).
- Almost everyone in CS team takes care of at least a few GUIs (who also takes care of part of the infrastructure, devices etc.).
- Operators and scientists can also create GUI (there are already some advanced GUIs made by operators).
- At the request of operators, we can install additional software (mostly python libraries).
- We try to train willing people about TANGO and version control (to use git and our internal GitLab).

GUIs in SOLARIS – organizational aspects

- There are still many old GUIs with many custom views and logic inside the code.
- So many applications make it hard to keep them maintained while there is so high personnel rotation.
- There is no one able to keep track on all GUIs, so review is also limited.
- That is one of the reasons why new logic should be moved to server side, as this would allow to more complete code review.
- But sometimes duplication of functionalities are still occurring.
- GUIs are harder to update, mostly because they depend on more libraries and there are no backward compatibilities more often.

GUIs in SOLARIS – feedback

- So many needs requires independence in creating simpler GUIs by operators and scientists.
- Web applications are warmly received but needs more care and advertisement.
- UX/UI experience is lacking which causes sometimes complaints and disagreements on looks.
- Crashing and load time is the biggest reason for hindering the work.

GUIs in SOLARIS – TAURUS issues

- <https://gitlab.com/taurus-org/taurus/-/issues/654> – TAURUS not react to Periodic Events.
- https://gitlab.com/taurus-org/taurus_pyqtgraph/-/issues/112 – Taurus GUI is not restoring trend curves cfg.
- https://gitlab.com/taurus-org/taurus_pyqtgraph/-/issues/104 – Disappearing Y2 axis .
- Very, very, very long startup if there are many attributes connected.
- Crashing with segmentation fault.
- New Taurus not compatible with older config (or no migration scripts at the startup).
- Problem with taurus designer (missing dependency but without information).

GUIs in SOLARIS – future plans

- Migrate most of the GUIs to at least Taurus 4.7 (next Sardana update requires Taurus ≥ 5), Python 3.6 and PyQt 5.
- Try to move all trends to PyQtGraph.
- Try to migrate all trends to new Taurus.
- Create more web apps.
- Try to introduce Taranta to other users (again).
- Standardize way to deploy custom operators' GUIs to entire system.

Thank You!