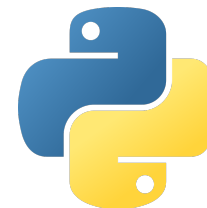
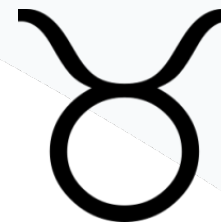




Operations made GUIs.

David Yépez
dyepez@cells.es

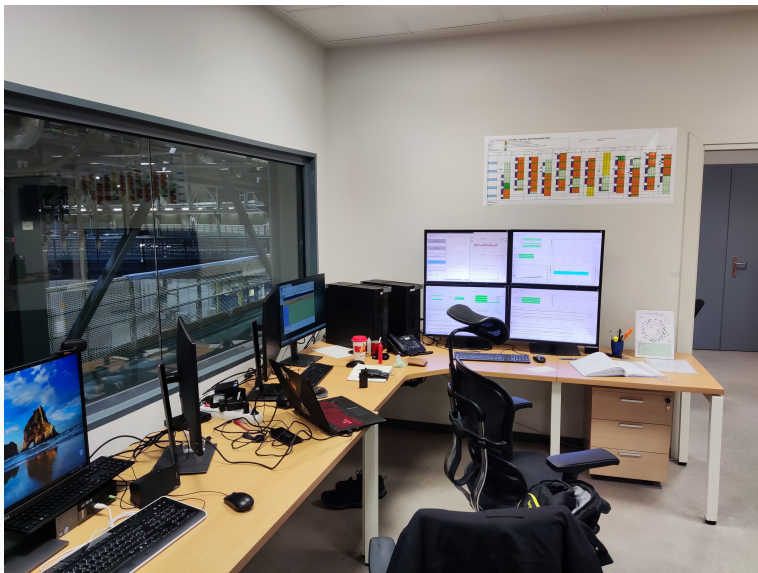
- ALBA control room.
- Accessing the machine.
 - PyTango
 - taurus.core
- Operations made GUIs.
 - Taurus.
 - taurusform, taurusplot.
 - taurusgui.
 - taurusdesigner + python
 - PyQt5 + python.
- Questions



ALBA Control Room



- 2x Workstations for operations.
- 5x Workstations for accelerators.
- 1x Workstation to display data in the wall monitors.



Taurus SIG – ESRF 2023.

14/03/2023

There are two ways to access device server at ALBA:

- PyTango:
 - The standard way of accessing tango device servers.
- Taurus:
 - From the user point of view taurus has the same functionalities than PyTango but adds another layer of security on top of it.

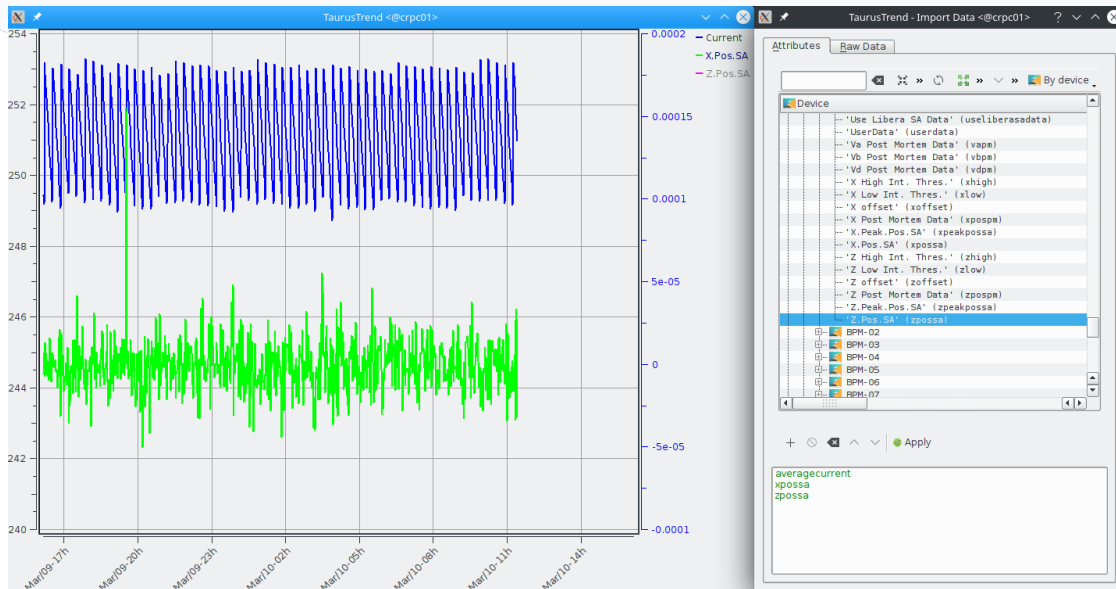
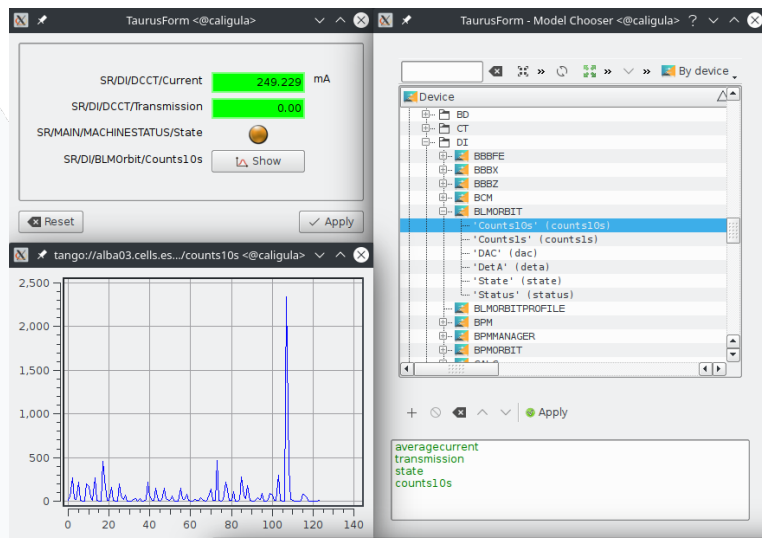
Example: A member of the accelerators group made a python script that try to read an attribute without any wait time between readings, with PyTango, the device hang, and a lot of secondary device servers depending on it fail, so we lost the beam.

Just changing to taurus module instead of pytango solve the problem... with a quirk.

Taurusform and Taurustrend



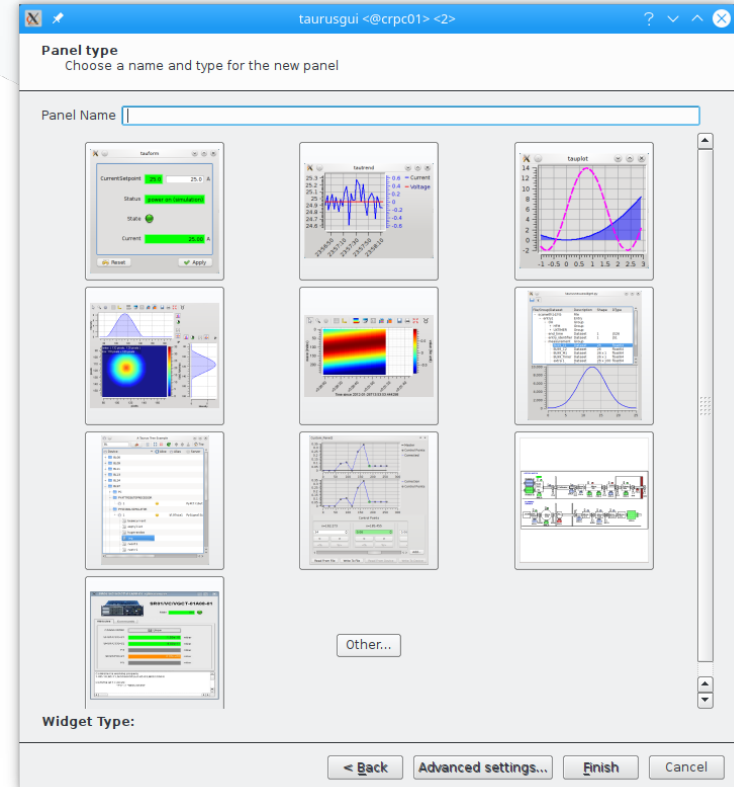
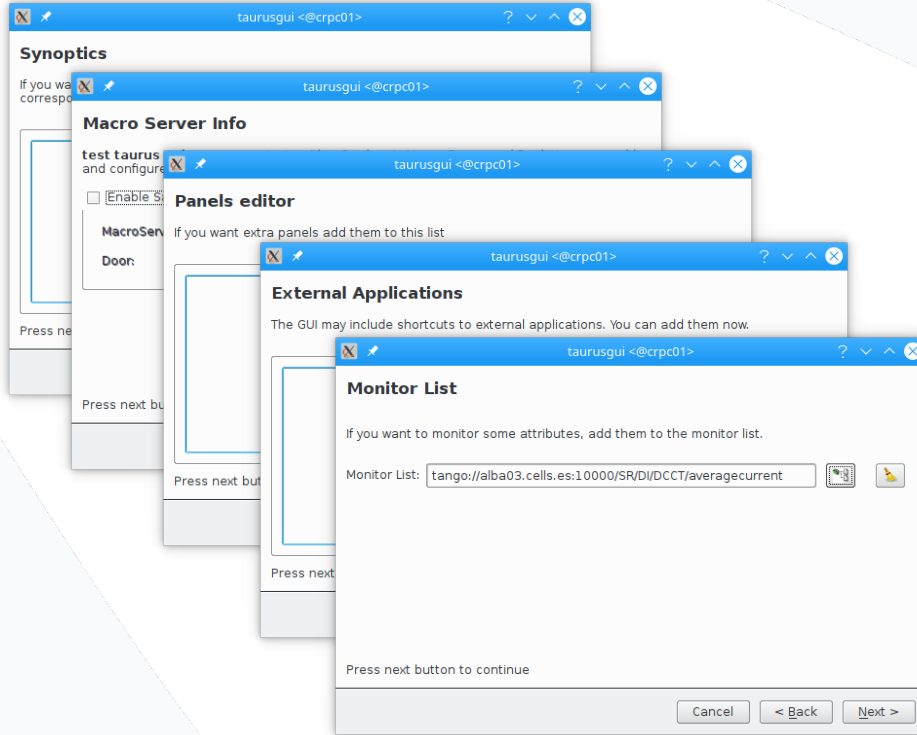
- Quick access to the device servers.



- This two utilities only need a 5 minutes training to use.

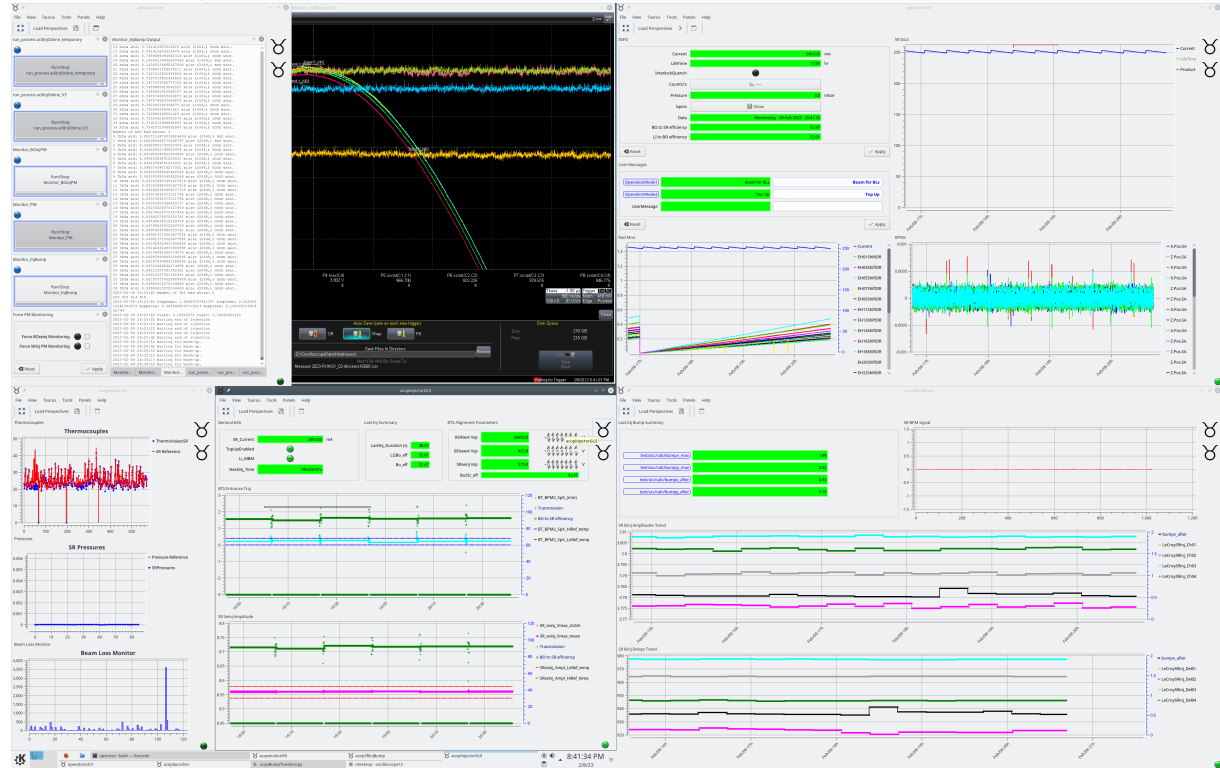
Taurus SIG – ESRF 2023.

- Allows the creation of more complex GUIs, combining taurusforms, taurustrends and more widgets.



Taurusgui examples.

- Operation Workstation crpc02 uses taurusguis.



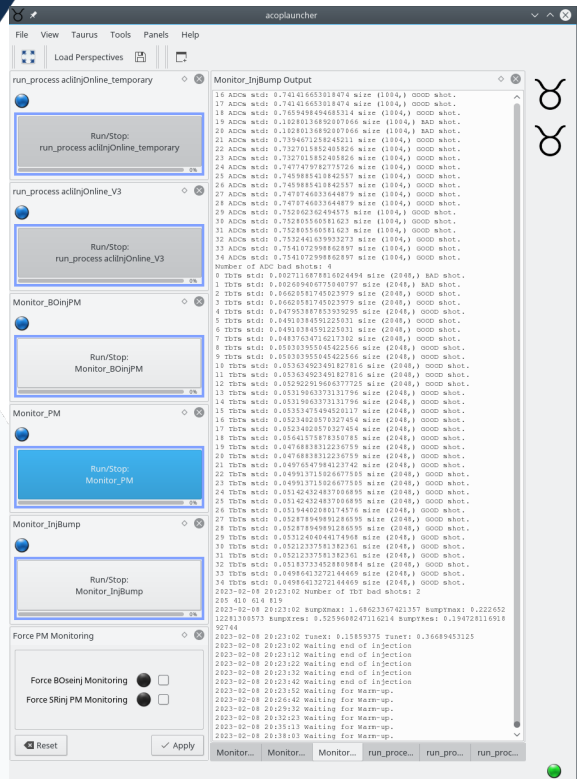
Taurus SIG – ESRF 2023.

Taurusgui examples.



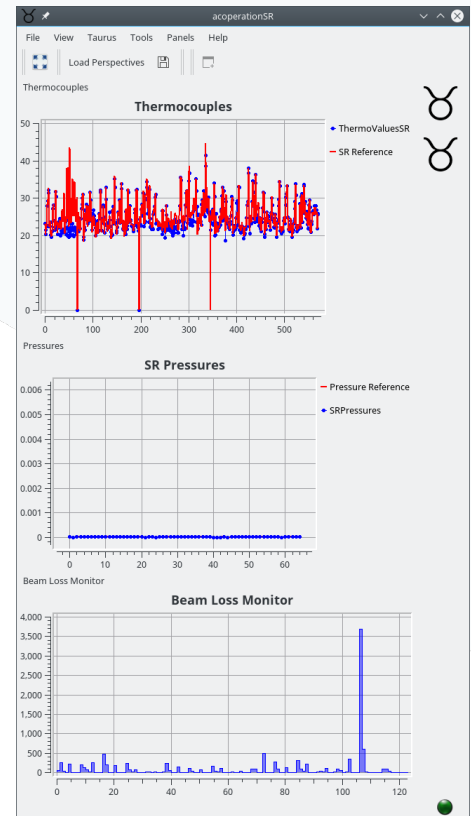
- **acoplancher.**

- This GUI launches scripts that are used during operation.
- Uses a macro-server to control the scripts execution.
- This allows to check the status of the scripts instead of having to navigate from terminal tab to tab.



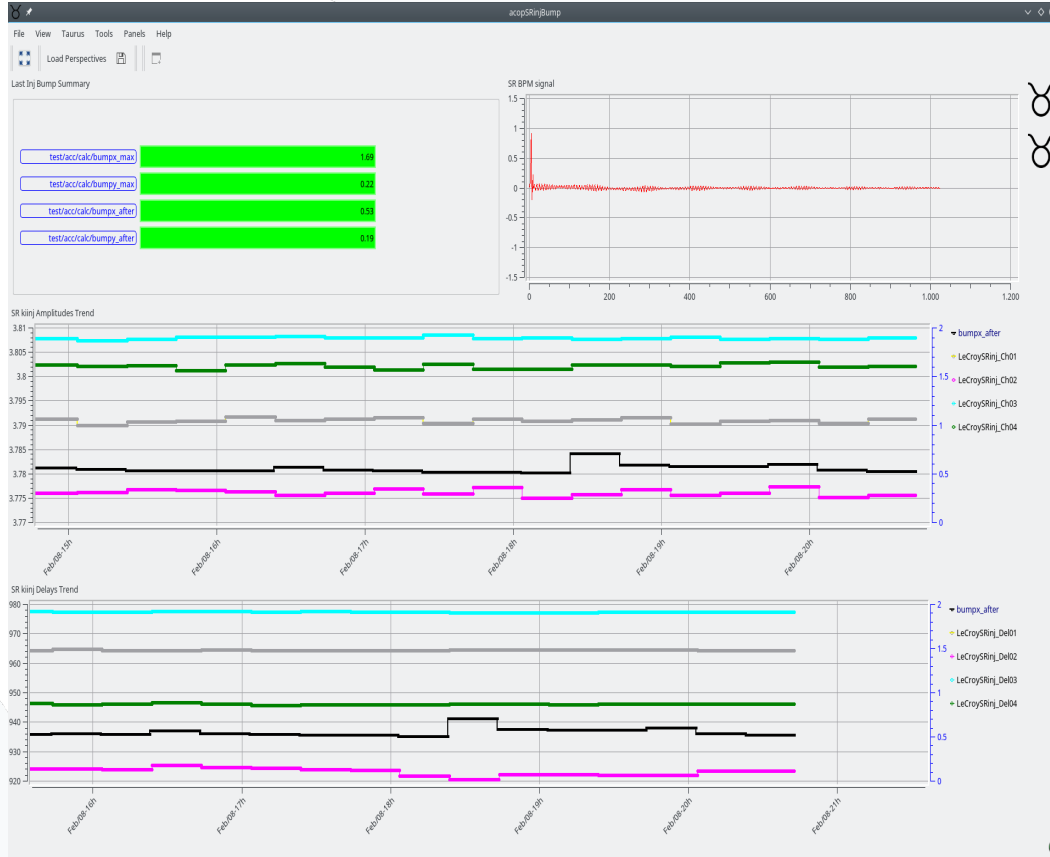
- **acoperationSR:**

- Used to check vacuum pressures, SR temperatures and Beam Loss Monitors.



Taurus SIG – ESRF 2023.

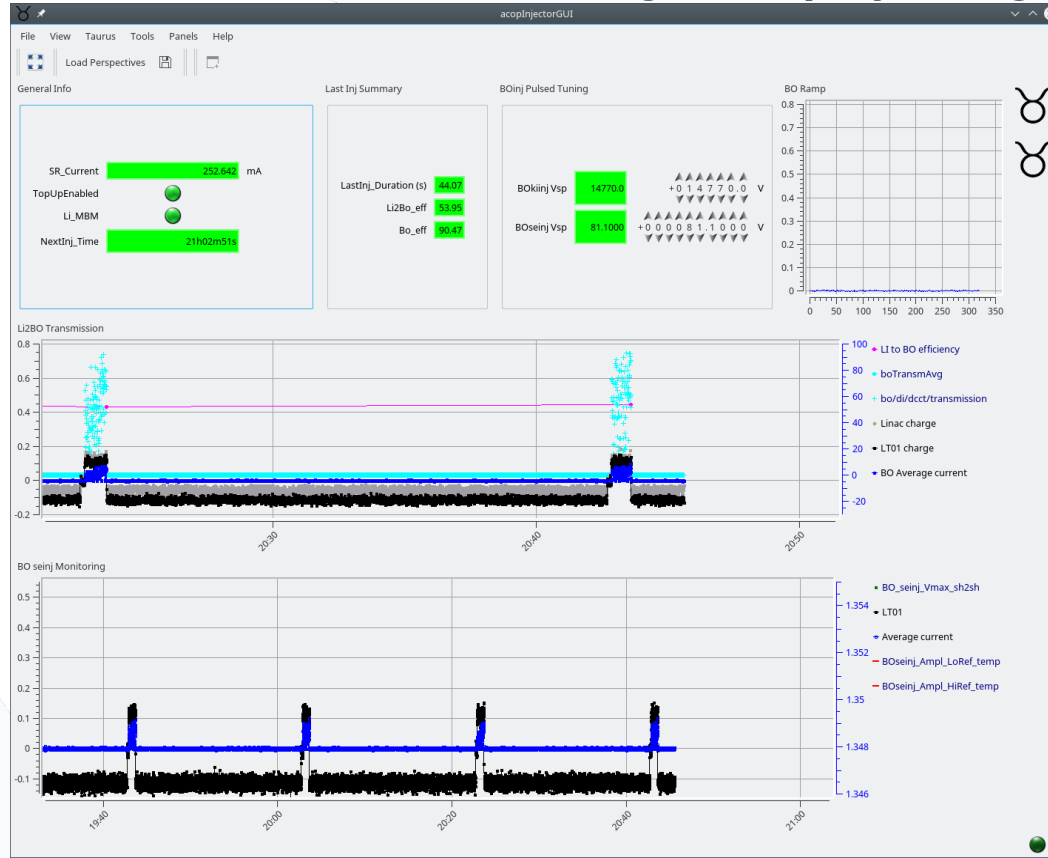
Taurusgui acosrinjbump.



• acopsrinjbump.

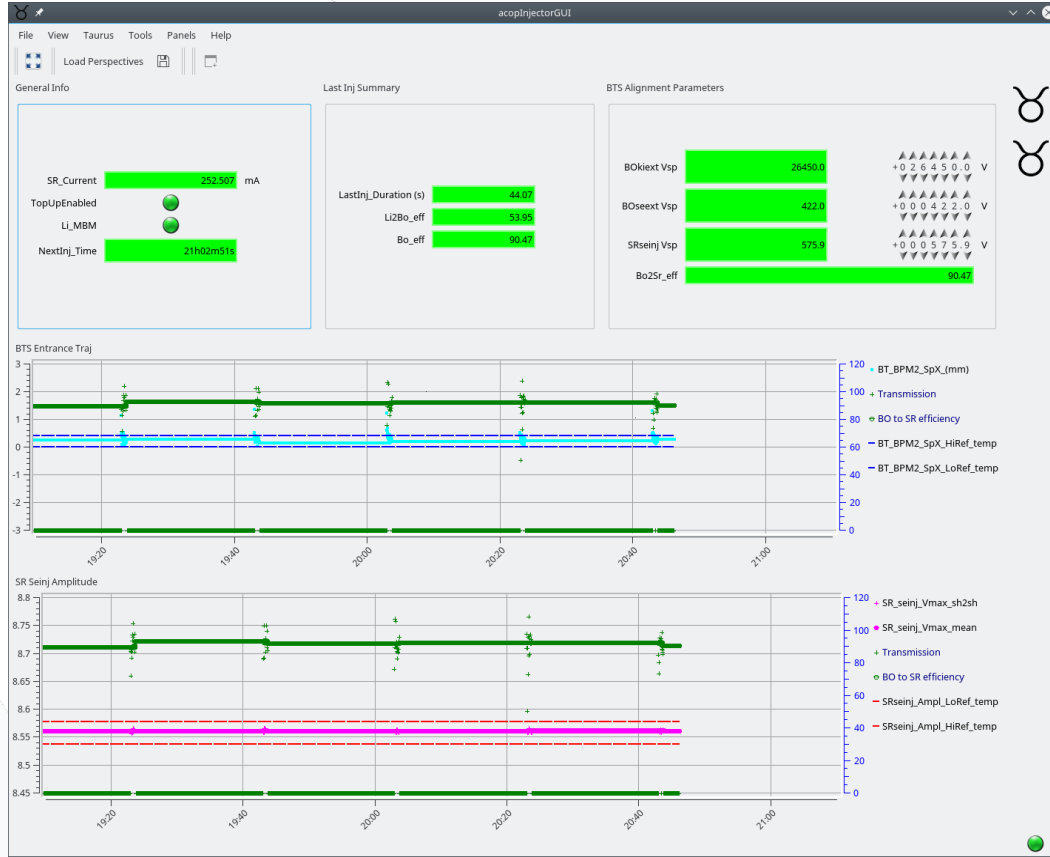
- This GUI is used to check the perturbation on the orbit that the pulsed magnets produce.

Taurusgui acopinjectorgui.



- Taurusgui also have the possibility of pre-save different lay-outs.
- acopinjectorgui has 3 layouts used in different operational situations.
- This layout is used to improve Linac to Booster transmission.

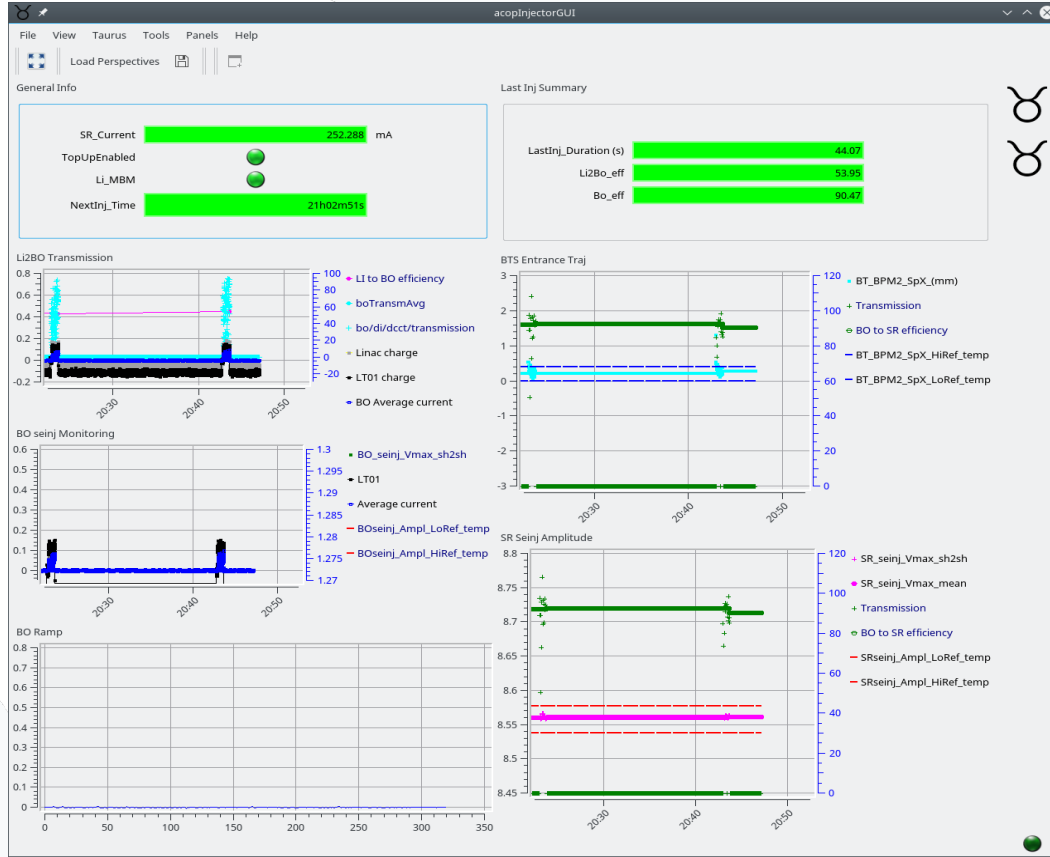
Taurusgui acopinjectorgui.



- This layout is used to improve Booster to Storage Ring transmission.

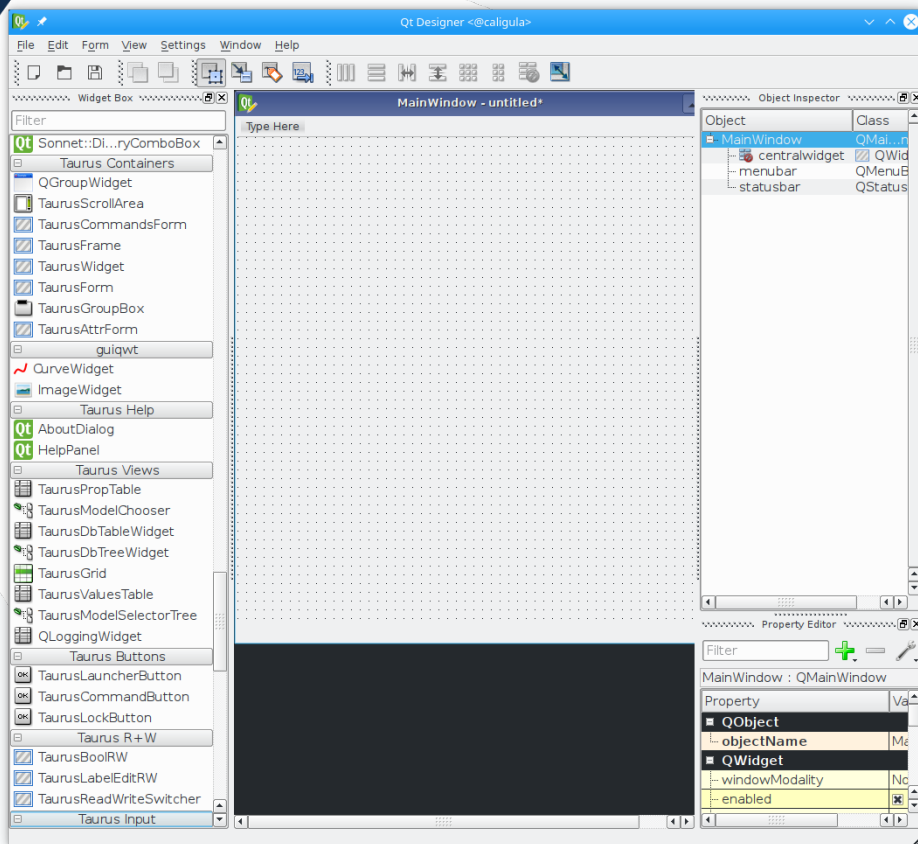
Taurus SIG – ESRF 2023.

Taurusgui acopinjectorgui.

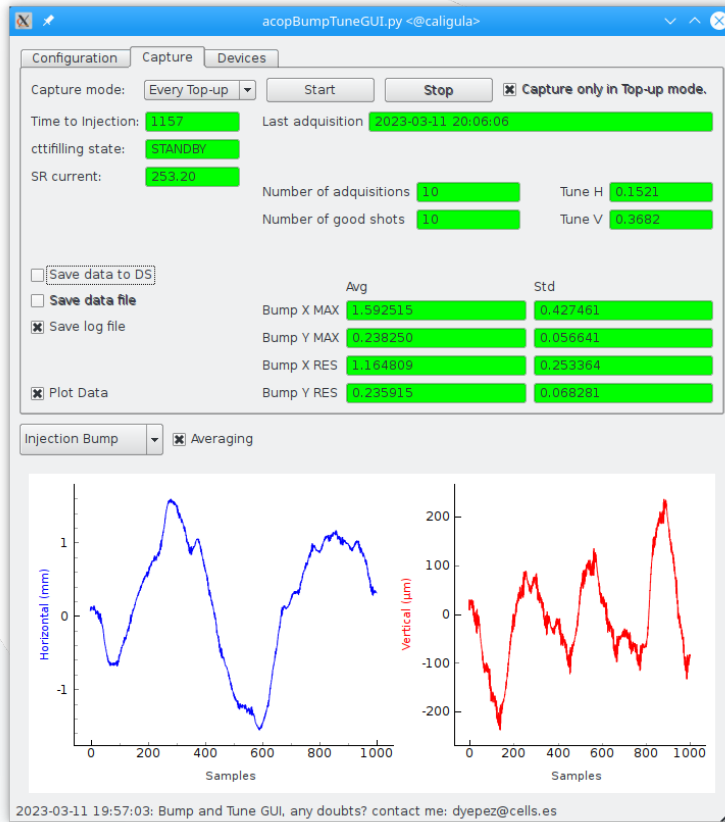


- This layout is used to check the machine during Top-Up mode.
- Taurusgui is ideal for users from basic to no programming experience.

Taurusdesigner + python.

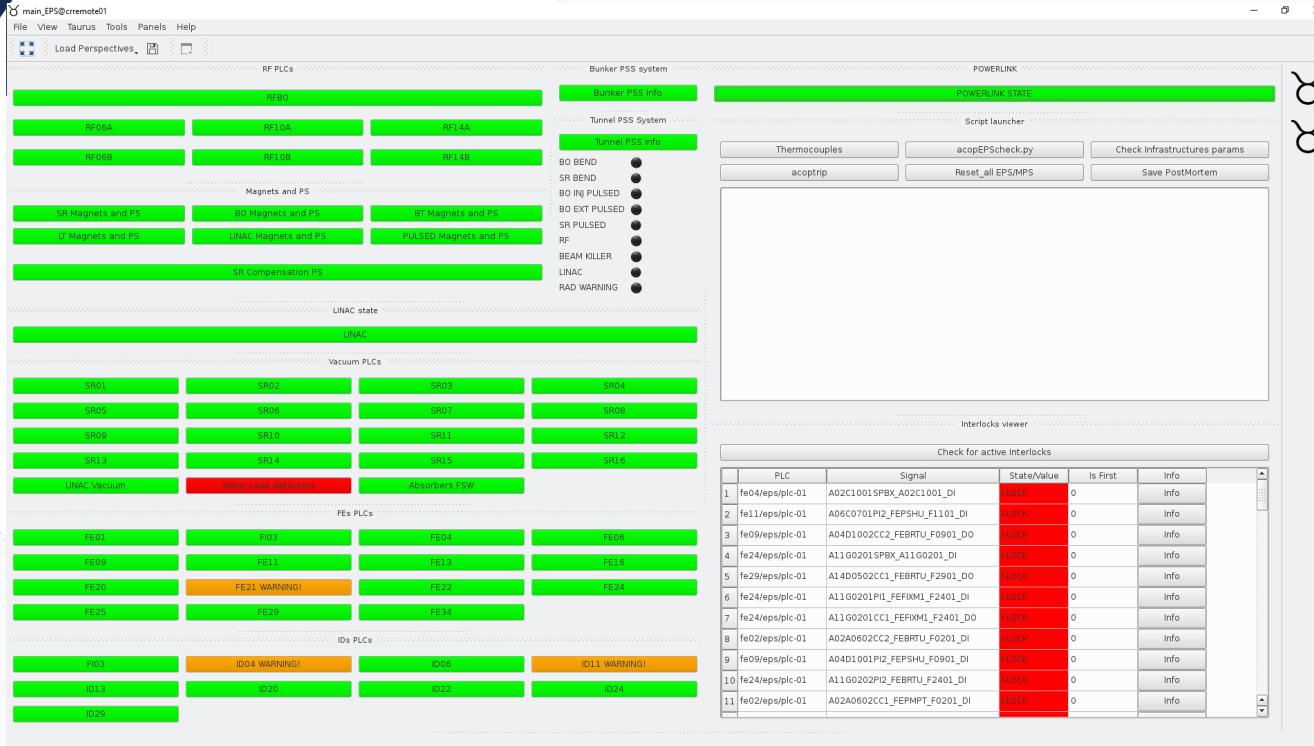


- Taurusdesigner is a qtdesigner tuned to use taurus widgets in an easy way.
- It allows to link the widgets with tango device servers simplifying the GUI design process.

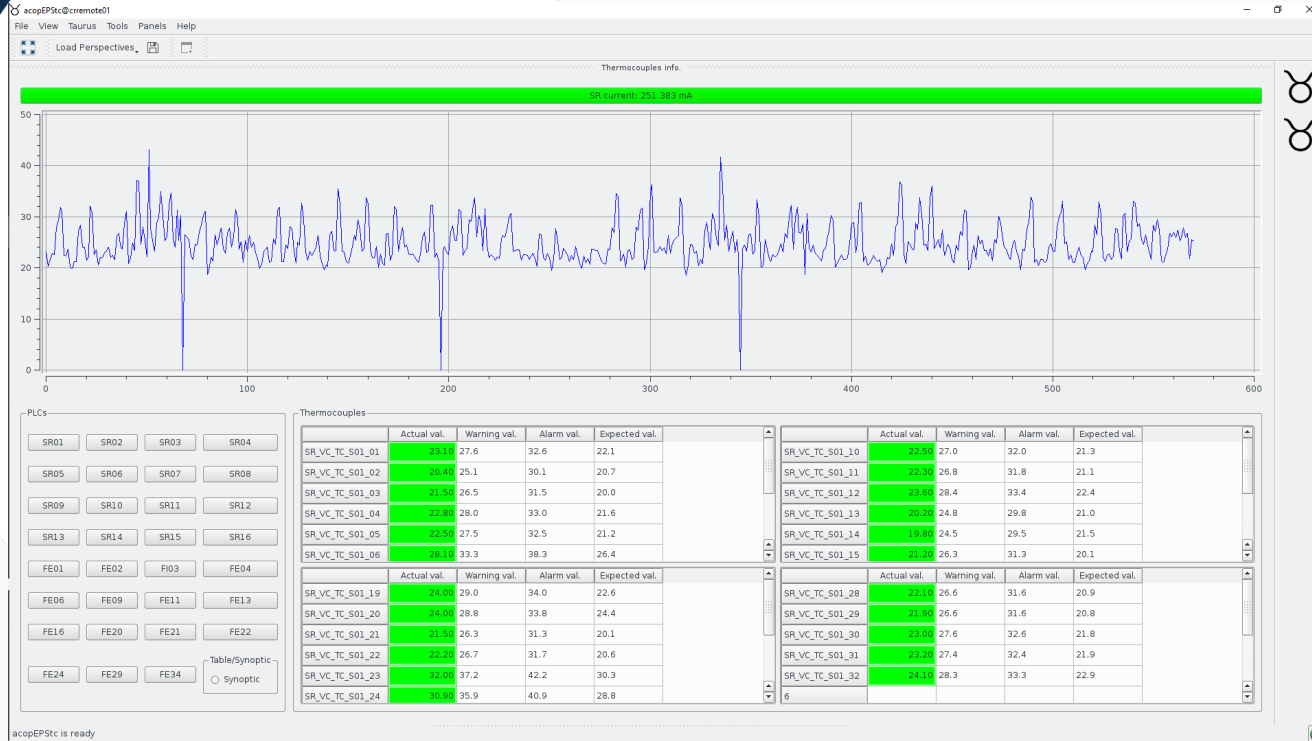


- acopBumpTuneGUI.py it's made with taurusdesigner and python3.
- Used to calculate the storage ring perturbations due to the injection kickers.

PyQt5 + Python GUIs



- main_EPS.py:
- This is a huge project, nearly 2 years in development, that simplifies the use of the Equipment Protection System.
- It uses taurusgui as a base gui, with custom made pyqt5 Widgets that work as different layouts.



- main_EPS.py:
- This layout shows all thermocouples on the machine.

widget_launcher.py

Checkers

☐ Check also RF PLCs

SR PLCs

SR01	SR02	SR03	SR04
SR05	SR06	SR07	SR08
SR09	SR10	SR11	SR12
SR13	SR14	SR15	SR16

FE PLCs

FE01	FE02	FE03	FE04
FE05	FE06	FE07	FE08
FE09	FE10	FE11	FE12
FE13	FE14	FE15	FE16

ID PLCs

ID04	ID05	ID11	ID13
ID20	ID22	ID24	ID28

Check PLCs

Reset form

Write Log

Scann report: Attribute historics: EPS BKs:

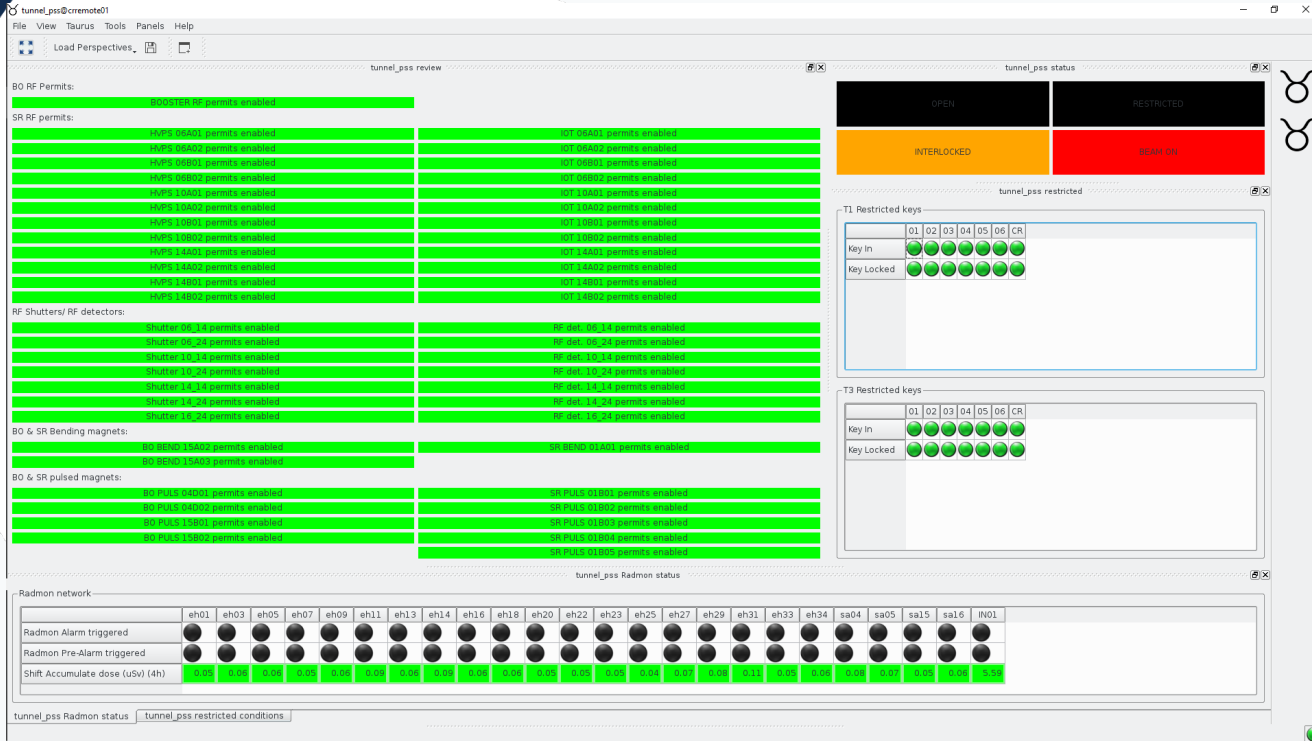
Test done on: 20221214_175325

All changes for each attribute since last BK update on date 2022-08-30 10:40:51 will be displayed.
For more information about historical changes, check it at 'Attribute historics' tab above.

SR04: DL_ACEL_A04_01_OUTPUT_AF changed parameter DISABLE from 1.00E+00 to 0.00E+00 by user mso on date 2022/11/22 at 04:34:17.
SR04: DL_ACEL_A04_01_OUTPUT_AF changed parameter DISABLE from 1.00E+00 to 0.00E+00 by user arubio on date 2022/12/02 at 14:40:32.
SR04: DL_ACEL_A04_01_OUTPUT_AF changed parameter ALARM UP from 1.40E+03 to 1.50E+03 by user arubio on date 2022/12/02 at 14:40:32.
SR04: DL_ACEL_A04_03_OUTPUT_AF changed parameter ALARM UP from 1.45E+03 to 1.50E+03 by user arubio on date 2022/12/02 at 14:40:32.
SR04: DL_ACEL_A04_03_OUTPUT_AF changed parameter ALARM UP from 1.45E+03 to 1.50E+03 by user arubio on date 2022/12/02 at 14:40:32.
SR04: DL_ACEL_A04_03_OUTPUT_AF changed parameter ALARM DOWN from 6.50E+02 to 6.00E+02 by user arubio on date 2022/12/02 at 14:40:32.
SR04: DL_ACEL_A04_03_OUTPUT_AF changed parameter ALARM DOWN from 6.50E+02 to 6.00E+02 by user arubio on date 2022/12/02 at 14:40:32.
SR04: DL_ACEL_A04_03_OUTPUT_AF changed parameter ALARM DOWN from 6.50E+02 to 6.00E+02 by user arubio on date 2022/12/02 at 14:40:32.
SR04: DL_ACEL_A04_03_OUTPUT_AF changed parameter ALARM DOWN from 6.50E+02 to 6.00E+02 by user arubio on date 2022/12/02 at 14:40:32.
SR10: A09B1001CC1_SR_VC_CCG_S10_02_AF changed parameter WARNING UP from 4.98E-08 to 4.98E-08 by user mso on date 2022/10/18 at 15:51:31.
SR10: A09B1001CC1_SR_VC_CCG_S10_02_AF changed parameter WARNING UP from 4.98E-08 to 4.98E-08 by user mso on date 2022/12/12 at 12:42:43.
SR10: A09B1001CC1_SR_VC_CCG_S10_02_AF changed parameter ALARM UP from 1.00E-07 to 1.00E-07 by user mso on date 2022/12/12 at 12:42:43.
SR10: A09B1001CC1_SR_VC_CCG_S10_02_AF changed parameter ALARM UP from 1.00E-07 to 1.00E-07 by user mso on date 2022/12/12 at 12:42:43.
SR10: A09B1001CC1_SR_VC_CCG_S1002A_AF changed parameter WARNING UP from 8.97E-07 to 8.97E-07 by user mso on date 2022/12/12 at 12:42:43.
SR10: A09B1001CC1_SR_VC_CCG_S1002A_AF changed parameter WARNING UP from 8.97E-07 to 8.97E-07 by user mso on date 2022/12/12 at 12:42:43.
SR10: A09B1001P11_SR_VC_PIR_S10_02_AF changed parameter ALARM UP from 6.00E-03 to 6.00E-03 by user mso on date 2022/12/12 at 12:42:43.
SR10: A09B1001P11_SR_VC_PIR_S10_02_AF changed parameter ALARM UP from 6.00E-03 to 6.00E-03 by user mso on date 2022/12/12 at 12:42:43.
SR10: A09B1002CC1_SR_VC_CCG_S10_03_AF changed parameter WARNING UP from 4.98E-08 to 4.98E-08 by user mso on date 2022/12/12 at 12:42:43.
SR10: A09B1002CC1_SR_VC_CCG_S10_03_AF changed parameter WARNING UP from 4.98E-08 to 4.98E-08 by user mso on date 2022/12/12 at 12:42:43.
SR10: A09B1002CC1_SR_VC_CCG_S10_03_AF changed parameter ALARM UP from 1.00E-07 to 1.00E-07 by user mso on date 2022/12/12 at 12:42:43.
SR10: A09B1002CC1_SR_VC_CCG_S1003A_AF changed parameter WARNING UP from 8.97E-07 to 8.97E-07 by user mso on date 2022/12/12 at 12:42:43.
SR10: A09B1002CC1_SR_VC_CCG_S1003A_AF changed parameter WARNING UP from 8.97E-07 to 8.97E-07 by user mso on date 2022/12/12 at 12:42:43.
SR10: A09B1002CC1_SR_VC_CCG_S10_04_AF changed parameter WARNING UP from 4.98E-08 to 4.98E-08 by user mso on date 2022/12/12 at 12:42:43.
SR10: A09B1002CC2_SR_VC_CCG_S10_04_AF changed parameter ALARM UP from 1.00E-07 to 1.00E-07 by user mso on date 2022/12/12 at 12:42:43.
SR10: A09B1002CC2_SR_VC_CCG_S10_04_AF changed parameter ALARM UP from 1.00E-07 to 1.00E-07 by user mso on date 2022/12/12 at 12:42:43.
SR10: A09B1002CC2_SR_VC_CCG_S1004A_AF changed parameter WARNING UP from 4.98E-08 to 4.98E-08 by user mso on date 2022/12/12 at 12:42:43.
SR10: A09B1002CC2_SR_VC_CCG_S1004A_AF changed parameter WARNING UP from 4.98E-08 to 4.98E-08 by user mso on date 2022/12/12 at 12:42:43.
SR10: A10C0801CC1_SR_VC_CCG_S10_01_AF changed parameter WARNING UP from 4.98E-08 to 4.98E-08 by user mso on date 2022/12/12 at 12:42:43.
SR10: A10C0801CC1_SR_VC_CCG_S10_01_AF changed parameter WARNING UP from 4.98E-08 to 4.98E-08 by user mso on date 2022/12/12 at 12:42:43.
SR10: A10C0801CC1_SR_VC_CCG_S10_01_AF changed parameter ALARM UP from 1.00E-07 to 1.00E-07 by user mso on date 2022/12/12 at 12:42:43.
SR10: A10C0801CC1_SR_VC_CCG_S10_01_AF changed parameter ALARM UP from 1.00E-07 to 1.00E-07 by user mso on date 2022/12/12 at 12:42:43.
SR10: A10C0801CC2_SR_VC_CCG_S10_05_AF changed parameter WARNING UP from 4.98E-08 to 4.98E-08 by user mso on date 2022/12/12 at 12:42:43.
SR10: A10C0801CC2_SR_VC_CCG_S10_05_AF changed parameter WARNING UP from 4.98E-08 to 4.98E-08 by user mso on date 2022/12/12 at 12:42:43.
SR10: A10C0801CC2_SR_VC_CCG_S10_05_AF changed parameter ALARM UP from 1.00E-07 to 1.00E-07 by user mso on date 2022/12/12 at 12:42:43.
SR10: A10C0801CC2_SR_VC_CCG_S10_05_AF changed parameter ALARM UP from 1.00E-07 to 1.00E-07 by user mso on date 2022/12/12 at 12:42:43.
SR10: A11C1010CC1_SR_VC_CCG_S10_06_AF changed parameter WARNING UP from 4.98E-08 to 4.98E-08 by user mso on date 2022/12/12 at 12:42:43.
SR10: A11C1010CC1_SR_VC_CCG_S10_06_AF changed parameter ALARM UP from 4.98E-07 to 4.98E-07 by user mso on date 2022/12/12 at 12:42:43.
SR10: A11C1010CC1_SR_VC_CCG_S10_06_AF changed parameter ALARM UP from 4.98E-07 to 4.98E-07 by user mso on date 2022/12/12 at 12:42:43.

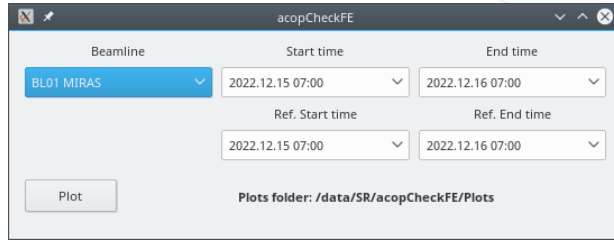
Scan finished. Press write log button for further info.

- main_EPS.py:
- This layout check all changes on the EPS PLCs.



- main_EPS.py:
- This layout shows all data from the Personnel Safe System.

PyQt5 + Python GUIs



acopCheckFE.py:

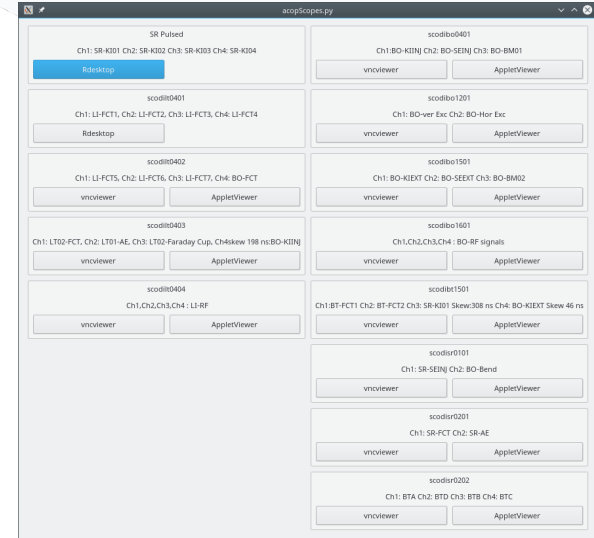
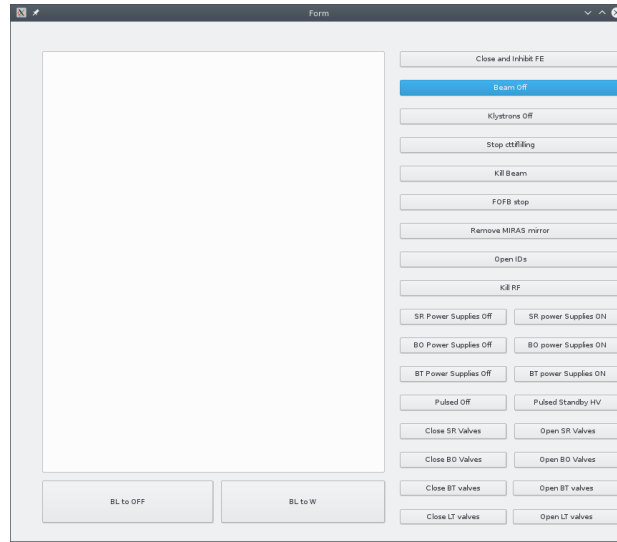
To compare the state of the FE diagnostics between two timespans.

acopScopes.py:

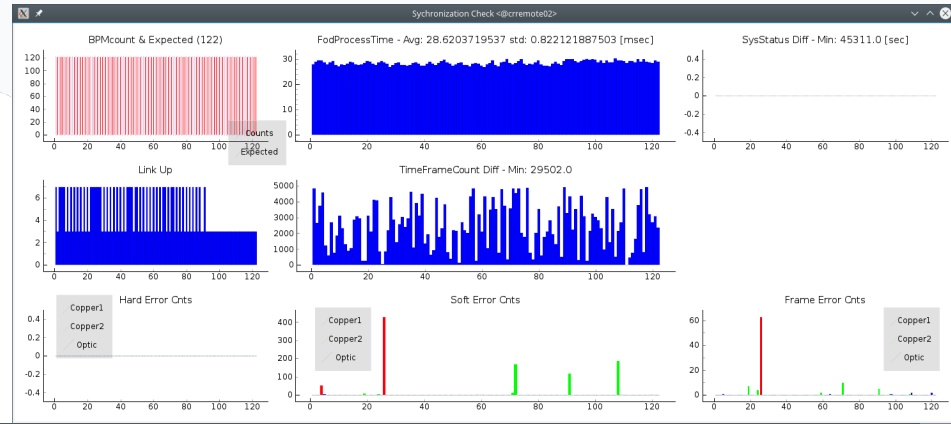
Used to launch the different scopes in the machine.

acopShutdown.py:

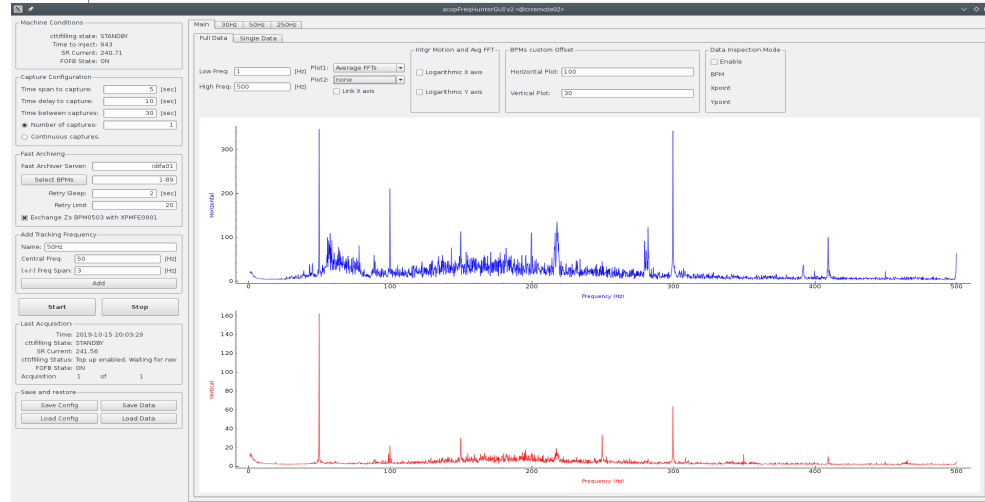
The shutdown of the machine automatized, step by step, with this GUI.



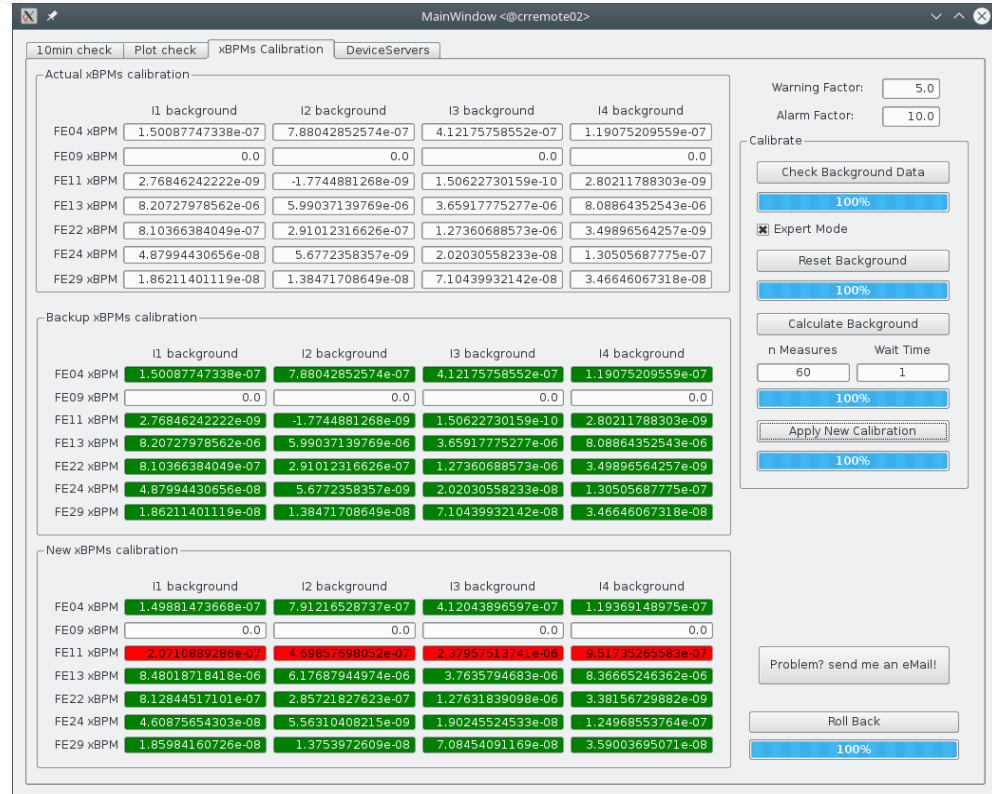
- `acopBPMsStatus.py`:
 - check and synchronize the BPMs



- `acopFrequencyHunter.py`:
 - uses the Fast Archiving data to look for instabilities of the beam



- `acopxbpmscheck.py`:
 - Check beam position at xBPMs and calibrates backgrounds currents from upstream bending magnets.



MainWindow <@crrremote02>

10min check Plot check xBPMs Calibration DeviceServers

Actual xBPMs calibration

	I1 background	I2 background	I3 background	I4 background
FE04 xBPM	1.50087747338e-07	7.88042852574e-07	4.12175758552e-07	1.19075209559e-07
FE09 xBPM	0.0	0.0	0.0	0.0
FE11 xBPM	2.76846242222e-09	-1.7744881268e-09	1.50622730159e-10	2.80211788303e-09
FE13 xBPM	8.20727978562e-06	5.99037139769e-06	3.65917775277e-06	8.08864352543e-06
FE22 xBPM	8.10366384049e-07	2.91012316626e-07	1.27360688573e-06	3.49896564257e-09
FE24 xBPM	4.87994430656e-08	5.6772358357e-09	2.02030558233e-08	1.30505687775e-07
FE29 xBPM	1.86211401119e-08	1.38471708649e-08	7.10439932142e-08	3.46646067318e-08

Backup xBPMs calibration

	I1 background	I2 background	I3 background	I4 background
FE04 xBPM	1.50087747338e-07	7.88042852574e-07	4.12175758552e-07	1.19075209559e-07
FE09 xBPM	0.0	0.0	0.0	0.0
FE11 xBPM	2.76846242222e-09	-1.7744881268e-09	1.50622730159e-10	2.80211788303e-09
FE13 xBPM	8.20727978562e-06	5.99037139769e-06	3.65917775277e-06	8.08864352543e-06
FE22 xBPM	8.10366384049e-07	2.91012316626e-07	1.27360688573e-06	3.49896564257e-09
FE24 xBPM	4.87994430656e-08	5.6772358357e-09	2.02030558233e-08	1.30505687775e-07
FE29 xBPM	1.86211401119e-08	1.38471708649e-08	7.10439932142e-08	3.46646067318e-08

New xBPMs calibration

	I1 background	I2 background	I3 background	I4 background
FE04 xBPM	1.49881473668e-07	7.91216528737e-07	4.12043896597e-07	1.19369148975e-07
FE09 xBPM	0.0	0.0	0.0	0.0
FE11 xBPM	2.0710889286e-07	4.69857698052e-07	2.37857513741e-06	8.51735265583e-07
FE13 xBPM	8.48018718418e-06	6.17687944974e-06	3.7635794683e-06	8.36665246362e-06
FE22 xBPM	8.12844517101e-07	2.85721827623e-07	1.27631839098e-06	3.38156729882e-09
FE24 xBPM	4.60875654303e-08	5.56310408215e-09	1.90245524533e-08	1.24968553764e-07
FE29 xBPM	1.85984160726e-08	1.3753972609e-08	7.08454091169e-08	3.59003695071e-08

Warning Factor: 5.0
Alarm Factor: 10.0

Calibrate

Check Background Data

100%

☒ Expert Mode

Reset Background

100%

Calculate Background

n Measures: 60 Wait Time: 1

100%

Apply New Calibration

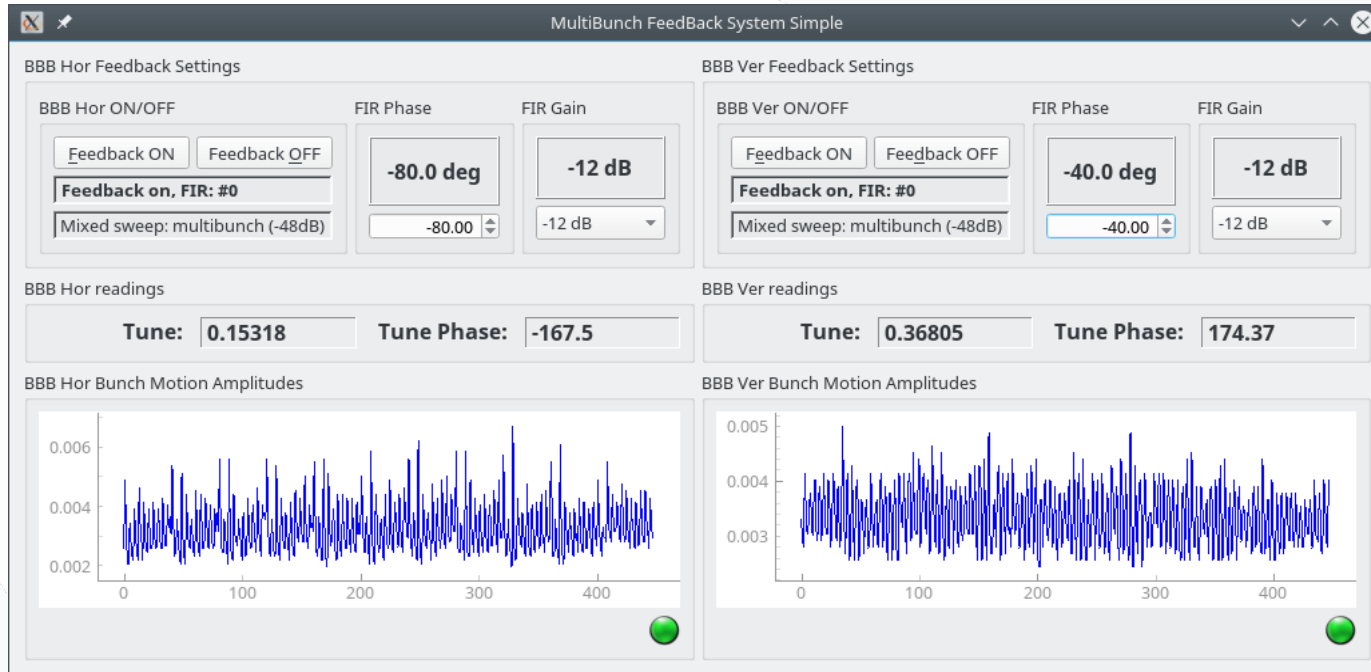
100%

Problem? send me an eMail!

Roll Back

100%

- acdiBBBFE.py:
 - Bunch By Bunch Feedback control.



Conclusions.



- Taurus has tools like taurusform, taurustrend and taurusgui that allow scientist and operations to make quick simple GUIs, leaving the controls group to work on more important projects.
- Taurusdesigner, for more advanced users, saves a lot of code, linking device server attributes and commands to taurus-widgets in an easy way.
- Qt is the ideal framework to create GUIs, as it is easy to use and has full integration with python, the programming language of choice at ALBA.
- Using Taurus maintains consistency between GUIs, all GUIs have the same look, feel, and behave in the same way.
 - For example the color coding for attributes:
 - Green: Stable.
 - Blue: Moving.
 - Yellow: Warning.
 - Red: Alarm.
 - Grey: Communication problem.
- Taurus as a way to access the device servers, on top of pytango, adds an additional safety layer to the code for advanced user.

Questions?

Taurus SIG – ESRF 2023.