# THE ALBA SYNCHROTRON LIGHT SOURCE

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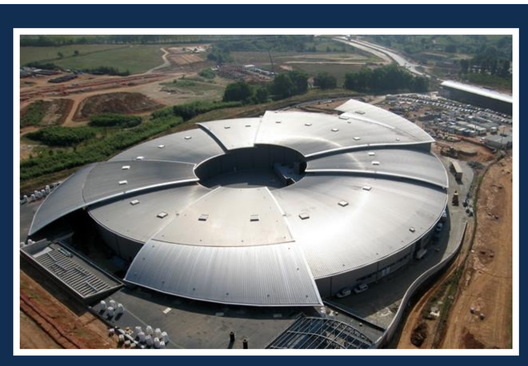
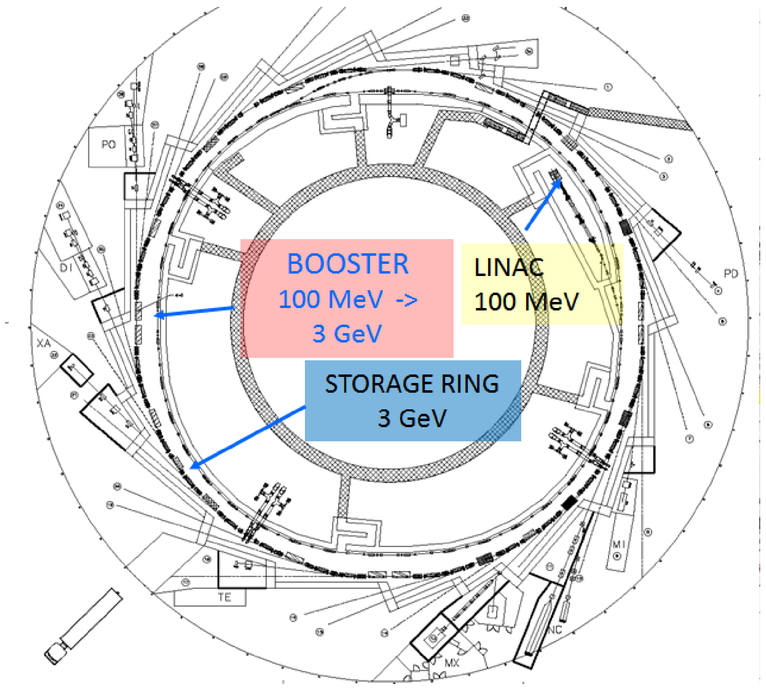


## Introduction

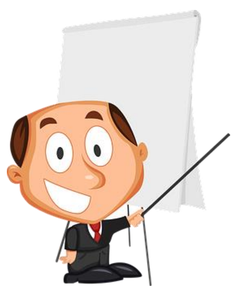
ALBA is a 3 Gev, third generation synchrotron light source located near Barcelona (Spain). The facility consists of three accelerators, a 100 MeV Linac, a full energy Booster and a 3.0 GeV Storage Ring, that provide synchrotron radiation to 8 BLs. At this moment there are 3 BLs under construction. The nominal current of the storage ring is 250 mA and the actual operational current is 200 mA. The accelerators are operated 6000 h a year, with 80% of the time dedicated to provide beam for users.

There are 7 operators for the accelerators that spend 50-55% of their time on shift and the rest of the time they are assigned to different accelerator sub-systems providing support.

One of the main task for operators these days is the developing of Python scripts and GUIs to improve and simplify both, a successful routine operation, and the tasks of their designated sub-system. These scripts mainly focus on automating operational issues and routine actions. This poster presents the most interesting ones from the point of view of ALBA operation.




## Summary of Scripts



| | Scripts name | Description |
|---|---|---|
| Operation Scripts | acdiScreensCali.py | Checks the CCD fluorescent screens parameters such as centroid, pixel size, etc. against a reference. |
| | acopCheckCCGs.py | Checks for disagreements between the digital and analog Cold Cathode pressure readings |
| | acopVate.py | Compares temperatures and pressures to a reference value |
| | acopCheckCalGUI.py | Checks the RF values discordances between LLRF and “real” measurements |
| | acopCheckFSS.py | Checks the motor movement of fluorescent screens and scrapers |
| | acopCheckFDL.py | Checks the RF Fast Data Logger calibration |
| Routine Scripts | acopIDclose.py / acopIDopen.py | Closes/opens all Insertion Devices gap, sets phases to 0º and turns on/off SCW |
| | acopRFcheck.py | Checks the main RF parameters |
| | Emergency.py | In case of emergency, kills the beam and switches OFF the critical subsystems like power supplies or RF |
| | acopShutdown.py | Switches OFF all subsytems to Shutdown mode |

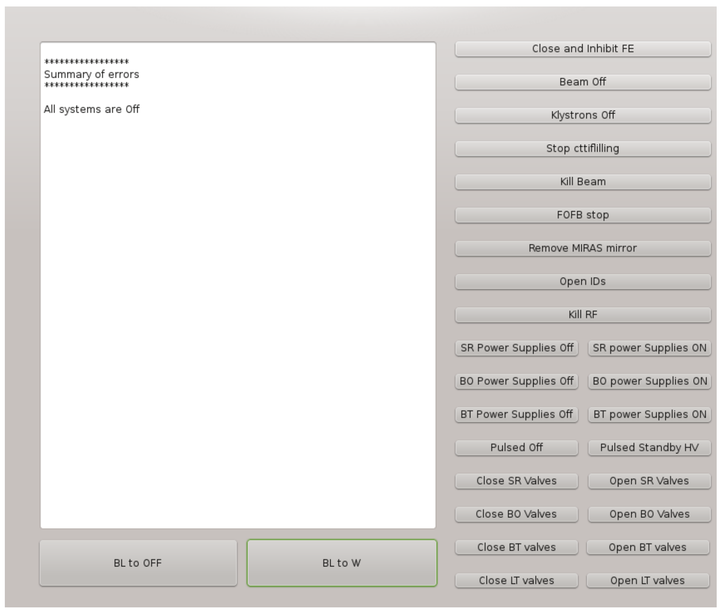
## EXAMPLE: acopShutdown.py

Use this script to stop all subsystems automatically by executing the following steps:

- Close the FE
- Switch off LINAC
- Change the user message
- Stop cttifilling (Injection GUI)
- Kill the beam
- Remove the MIRAS Mirror
- Switch off all PS
- Close all valves
- Check errors

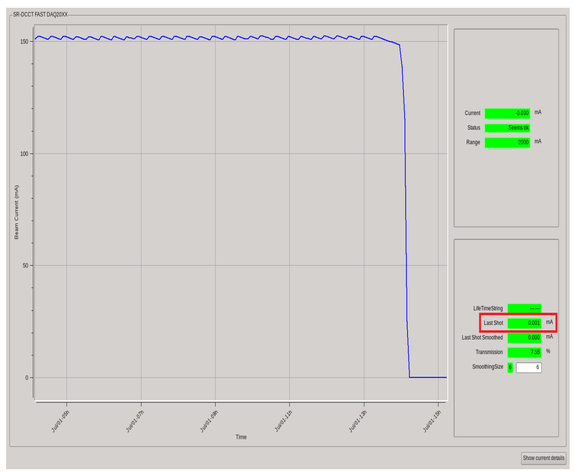
After all actions are completed, the systems checks that all systems are properly off.

In addition one can use the GUI to switch on /off the subsystems individually




**Details on how the beam is killed**

- Close the HOR scraper down to 2mm.
- While the beam current is higher than 2mA:
  - Check the beam current lost per second
  - Close the scraper in steps of 0.05mm until beam current lost per second is higher than 0.300mA
- If the beam current is lower than 2mA:
  - Close the scraper completely



## EXAMPLE: acopRFcheck.py

This script checks the following RF parameters:

In SR plants:

- Calculates Robinson detuning of cavities
- Checks the cavity voltage
- Checks if the RF goes to the cavity or to the load
- Checks the plunger position
- Checks the power forward reverse

- In addition, for the Booster:
  - Checks Control Bias is fixed
  - Field flatness
  - Mode circulator (automatic or manual)
  - Check if it’s ramping
  - Check the voltage when is in continuous wave

The script also calculates **the theoretical synchronous phase** and provides the changes to be done for better manual adjustment.

```
********************
 STATUS RF
********************
BO:     99.92 mV
SR06A: 499.72 kV  Sync. phase : 160.71 degrees
SR06B: 500.56 kV  Sync. phase : 159.96 degrees
SR10A: 497.97 kV  Sync. phase : 158.89 degrees
SR10B: 498.74 kV  Sync. phase : 148.97 degrees
SR14A: 499.60 kV  Sync. phase : 160.80 degrees
SR14B: 450.22 kV  Sync. phase : 160.45 degrees
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The IDs are open, the Total Voltage is 2.95 MV and the theoretical synchronous phase is 158.3
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********************
 RF PLANTS CHECKING
********************

BO     : OK
SR06B : OK
SR10A : OK
SR10B : Synchr. Phase is 148.97  and should be 158.31. The difference is 9.34
SR14A : OK

********************
SR10B : Change the "Cav Ph(Deg)" setting 9.34 degrees in ctrgen GUI and launch the program
```

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