Libera Experience at SESAME

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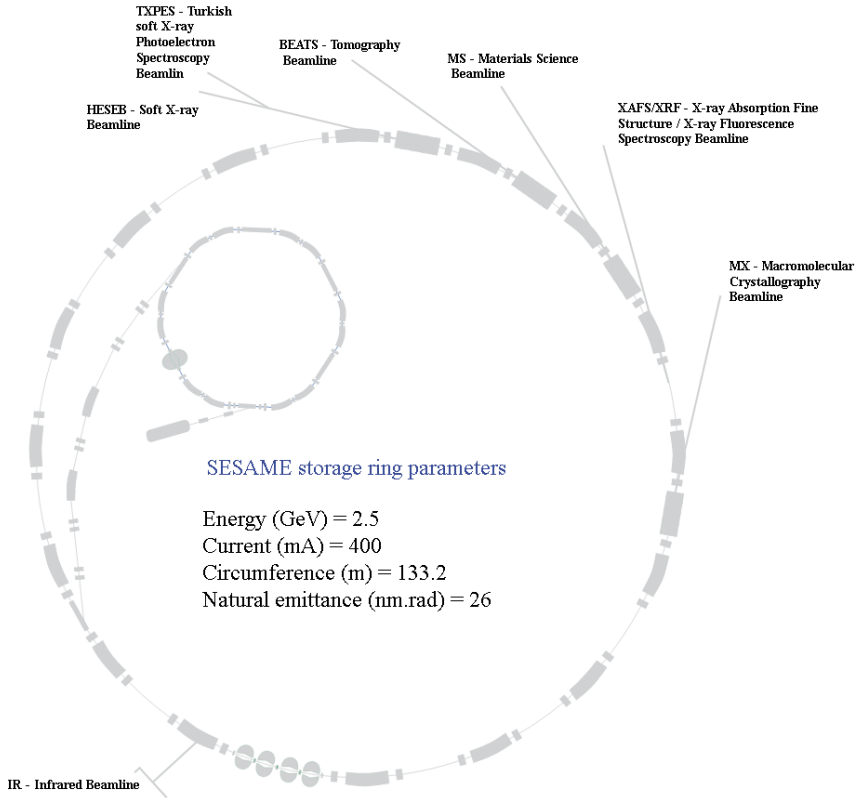
Libera Workshop 2022

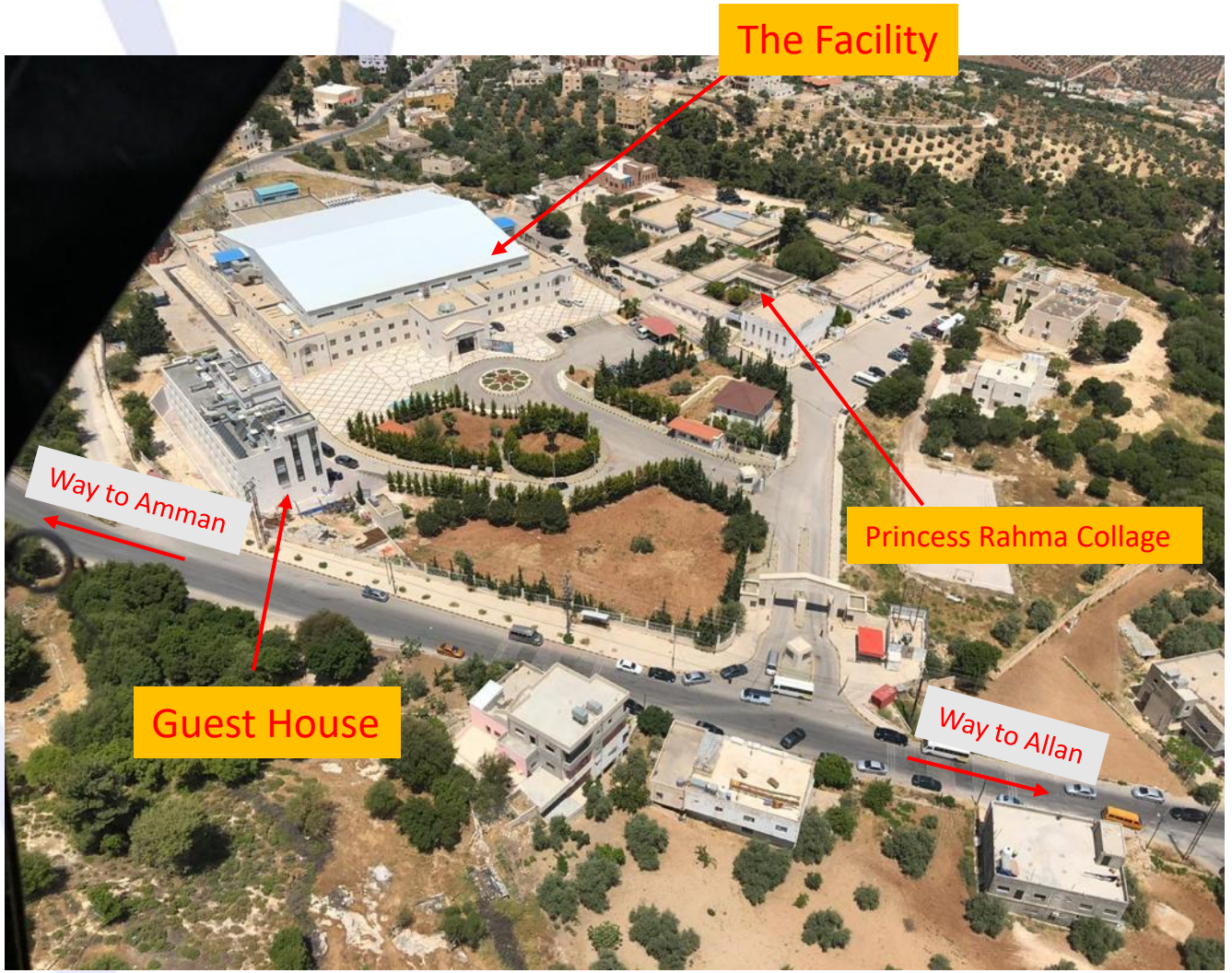
Outline

- **Introduction to SESAME**
- **Facility Status.**
- **Libera Devices**
- **FOFB**
- **FILK and PM**
- **Conclusion**

Introduction to SESAME

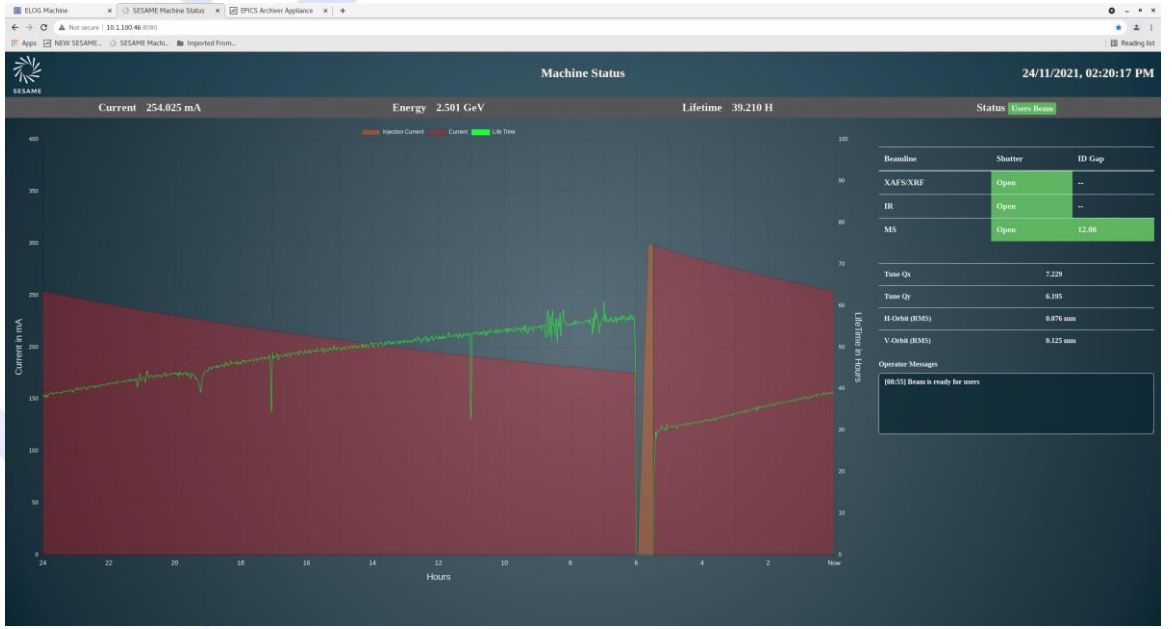
First 3rd Generation Synchrotron Light Source in Middle East, located in Allan, Jordan





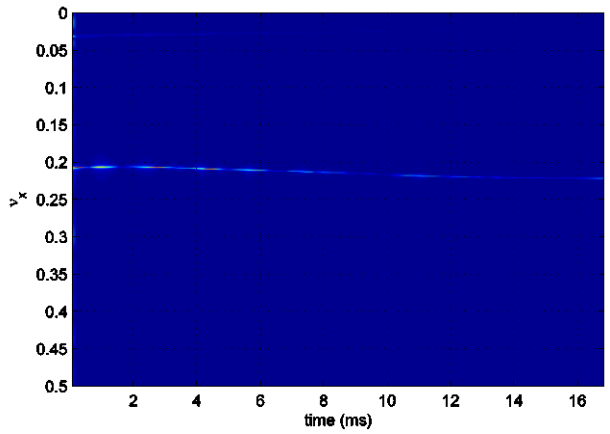
Facility Status

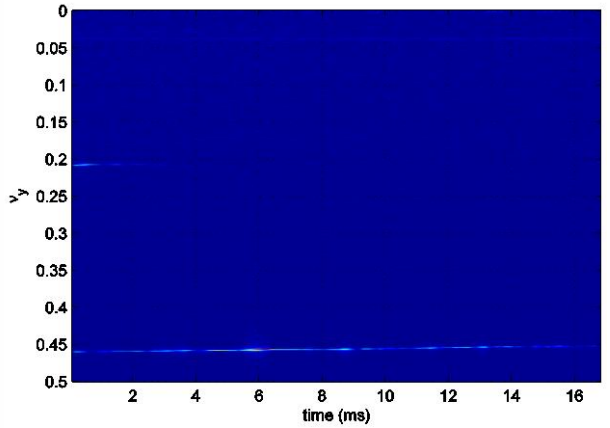
- New operational current 300mA @ 2.5GeV, studies for 350 mA.
- Decay mode, single injection a day.
- 3 Operating beam lines and another 2 by November this year. 2 BM and 3 IDs (MPW, 3PW,Udulator)
- Fully operated by solar energy



Electron in Booster

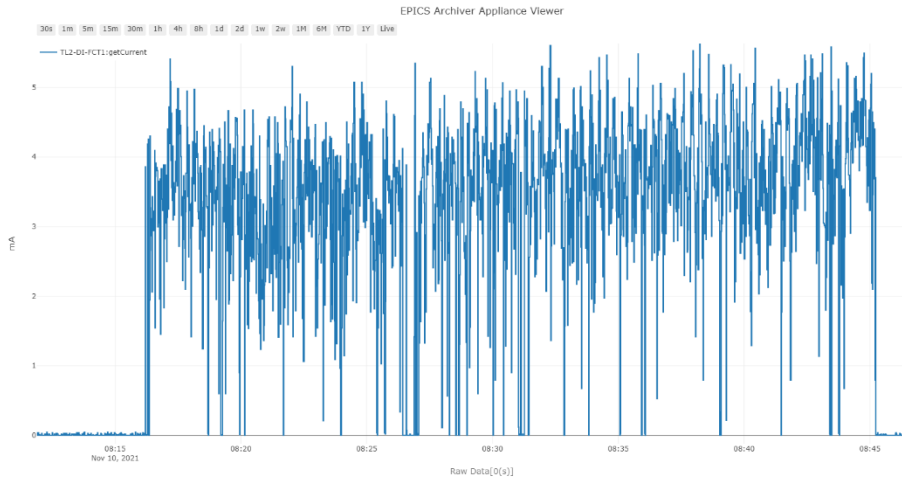
- 6 units with one Libera Clock Splitter are in operation since 2014.
- DLS EPICS driver and GUIs(EDM) and SESAME's CSS.
- No any failures recorded, long up-time >120 days
- Minor voltage alarm on the Virtex core power supply on two units
- Connected to 4 stripline BPMs and 2 button type.
- Works fine with booster.
- Recently we use them for another purposes !



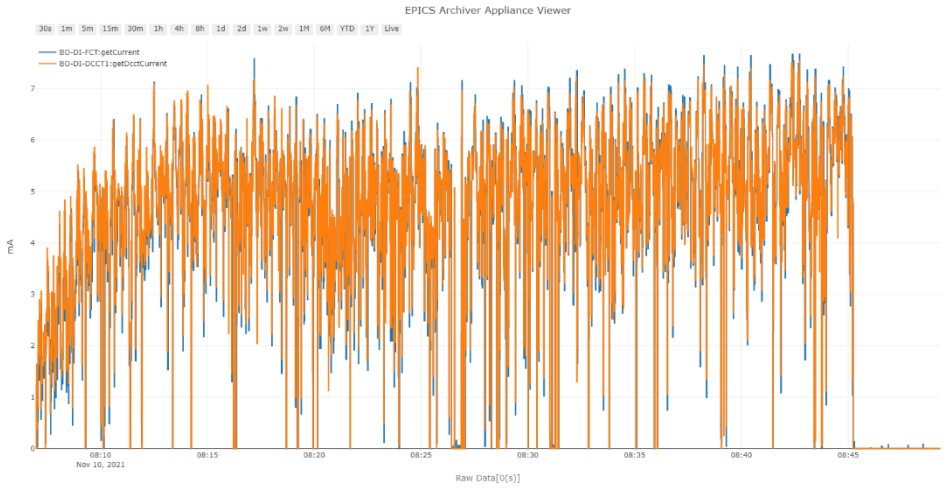


Electron in Booster

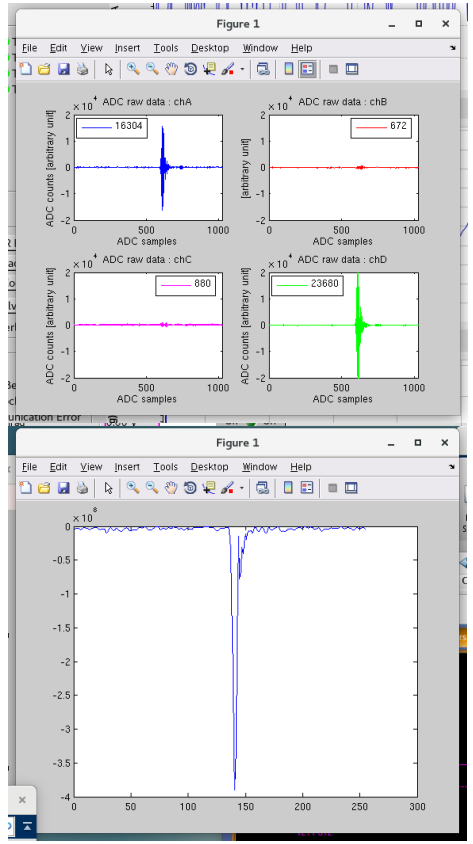
- Extraction, transmission and injection efficiencies are not optimized and measured from the injector to the ring, we don't have a "digital" value of these measurements, only the SR-DCCT/BO-DCCT.
- All FCTs are connected to scopes, to have a precise digital value a digitizer needed, so we use Libera Electron BPM electronics from the booster to use it as a digitizer.
- Calibration done with different power sweep and with beam.
- Extraction efficiency measured and improved from 60% to 73%



TL2-FCT1

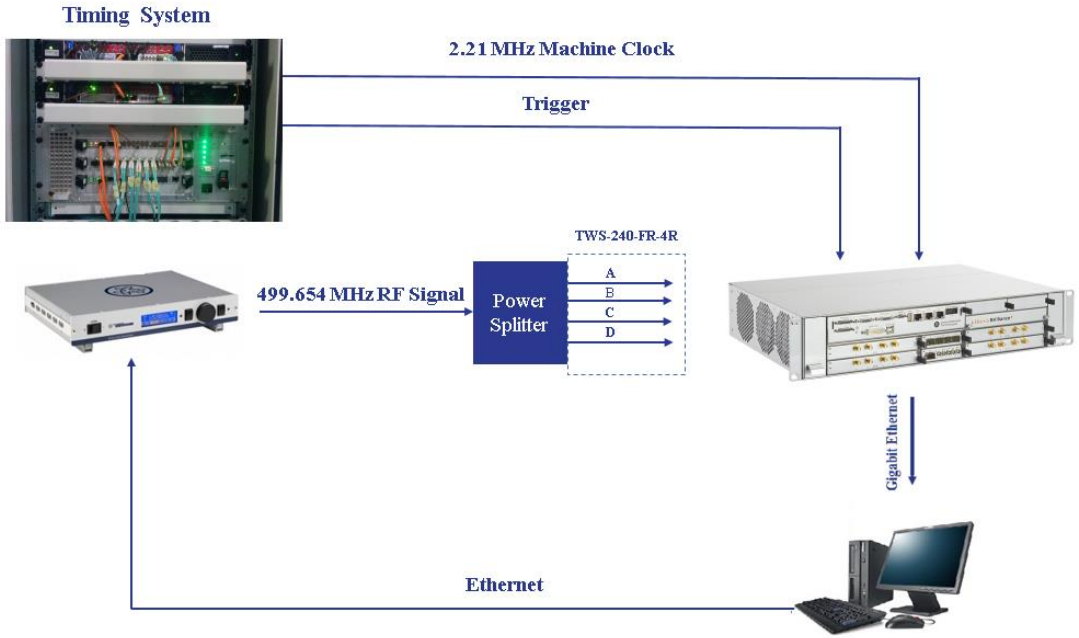


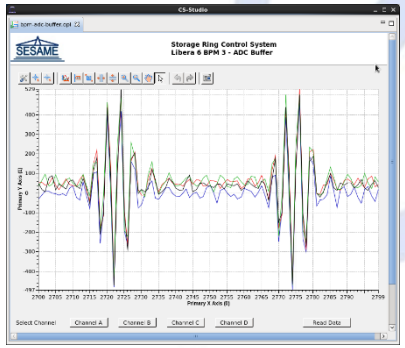
BO-FCT and BO-DCCT

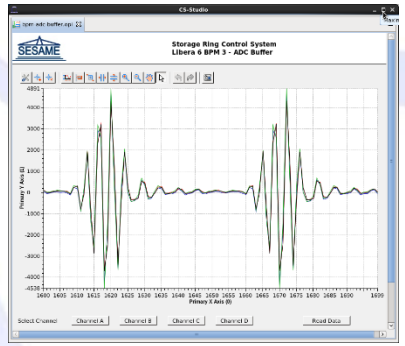


Brilliance + in SR

- 64 BPMs are in the SR, 48 are connected to the electronics (12 units).
- Another 2 instruments purchased this year with 2 BPMs and other one with one BPM as spare.
- In total 14 instruments, 13 in operation equipped with 8 GDX modules for FOFB.





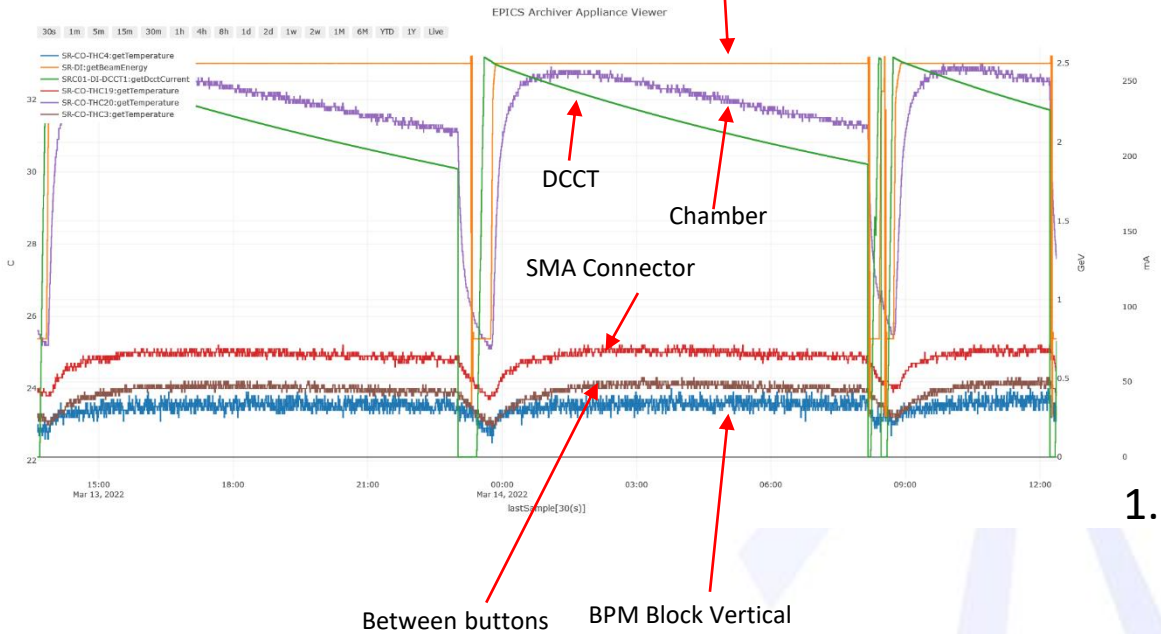


Brilliance + in SR

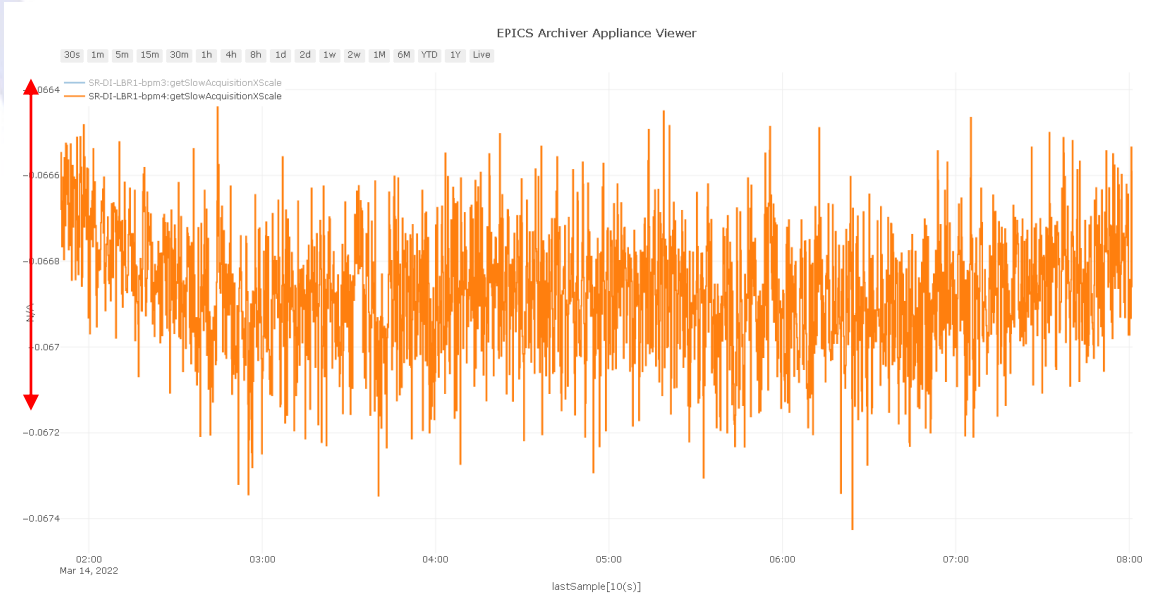
SESAME No any downtime in the machine due to Libera B+

	Failure / Issue	Comment/Solution
1	Unstable FA data with lots of jumps	The unit shipped to I-Tech, software wise in DSC parameters
2	Network disconnection	Replace all network cables
3	Freezing / Hanging	Solved with new software 3.2
4	Unit not responded and controlled	Not solved yet! Happened uncommonly not uniformed pattern
5	Grouping+ does not working probably in one unit	Noticed in one Libera have an old ICB, solved by I-Tech remote session, software issue.
6	High CPU loads	Unknown reason, solved by reboot the instruments rarely happened, one unit have older ICB does not have this issue
7	FA data synchronization with Grouping+	Solved if only unplug then plug the fiber cables or un plug SFPs
8	Spike removal not working correctly on FA data	Still under investigation, not all BPMs have same behavior
9	Sudden jump in one BPM module on single channel	Under investigation

Brilliance + in SR



1um



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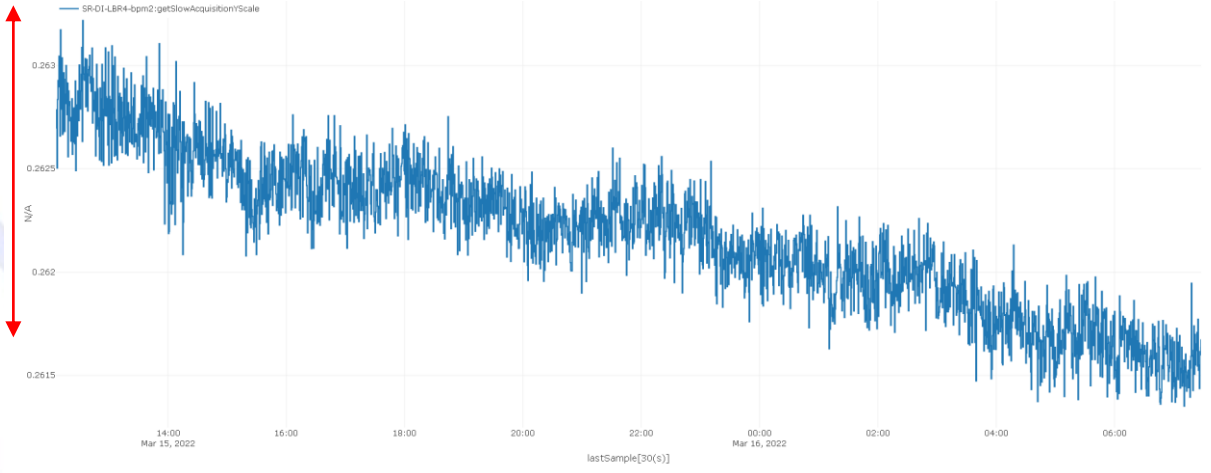
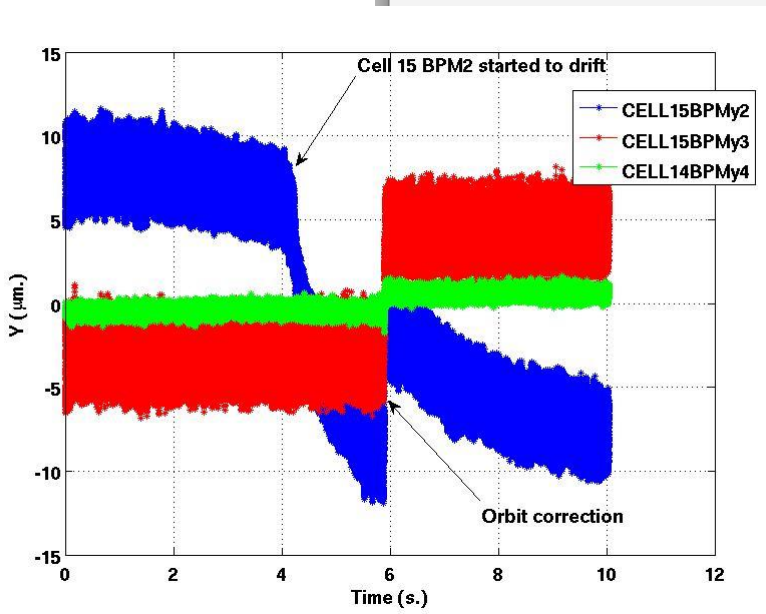
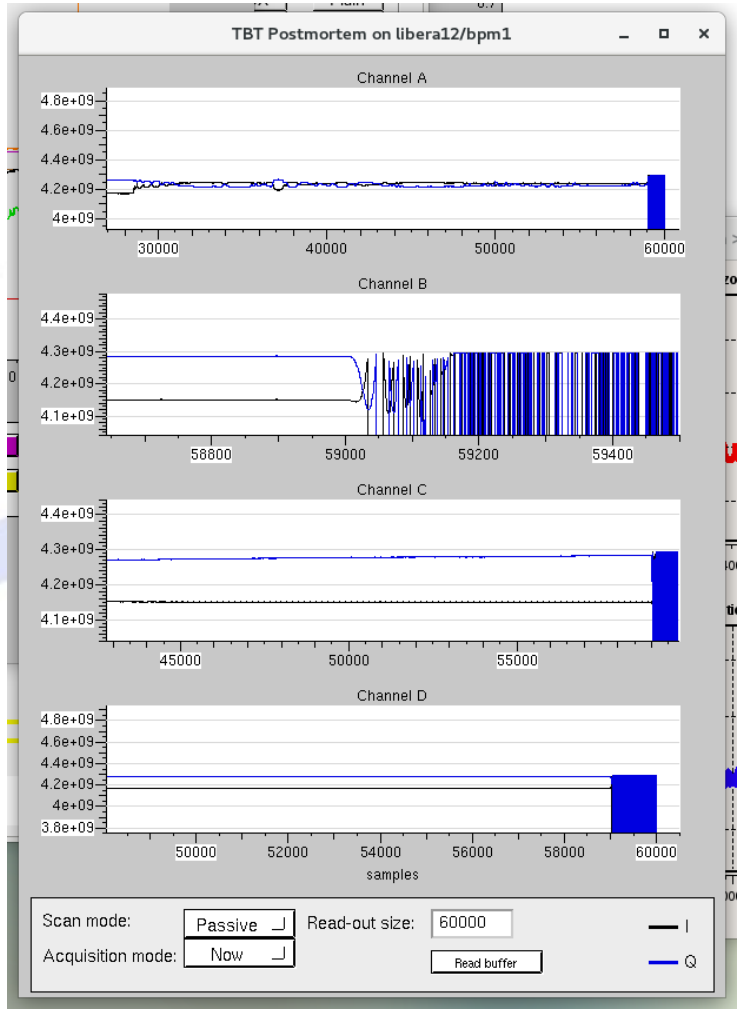


16 Hours

Brilliance + in SR





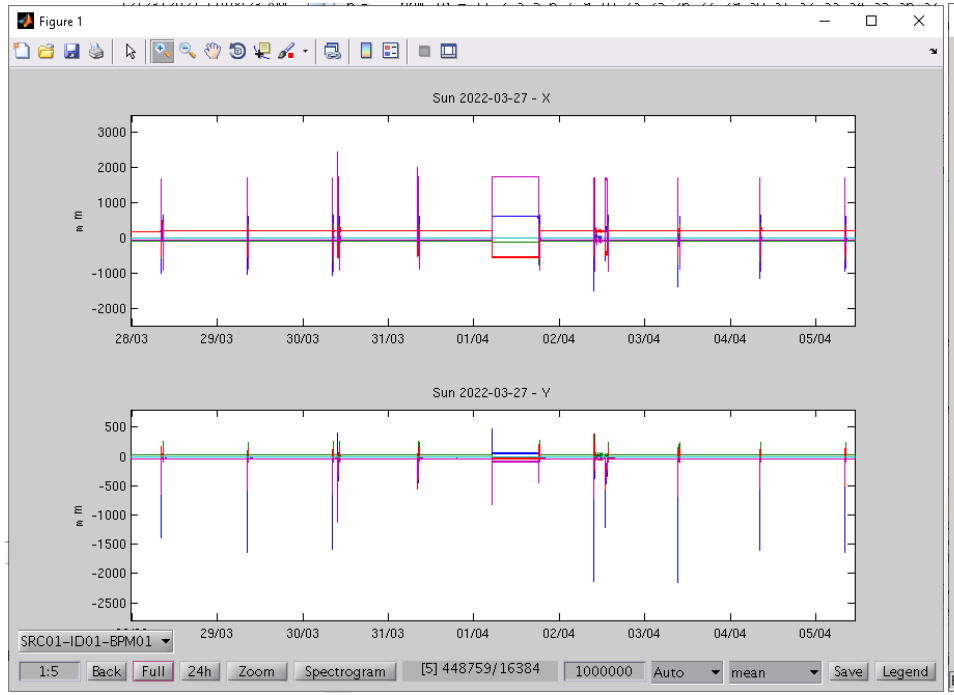
FOFB

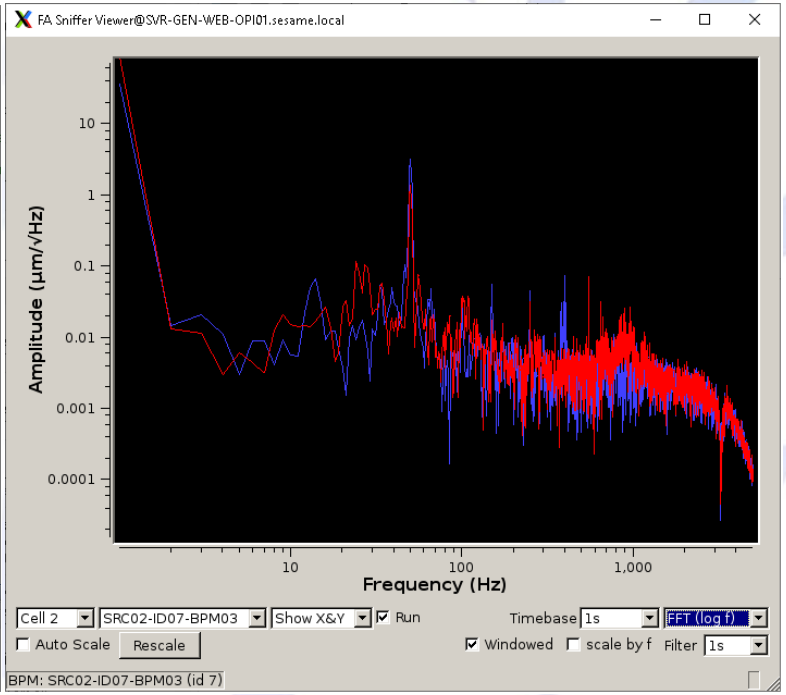
- The current orbit stability (<10%) does not require a FOFB system.
- From experience of other light sources, the feedforward tables will compensate the "instability in orbit at the ID" and not necessary to do it now.
- To be ready for the FOFB, project relaunched again with Control and PS groups.

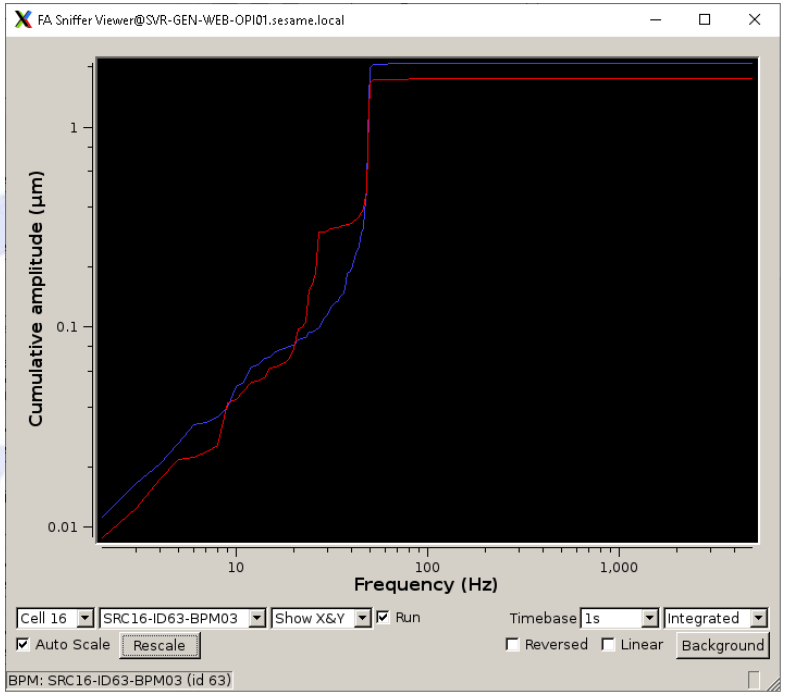
RMS in 1-100Hz		Horizontal			Vertical		
		Long Straight	Short Straight	Dipole	Long Straight	Short Straight	Dipole
Position (μm)	Target	82.59 (10%)	82.08 (10%)	23.23 (10%)	2.08 (10%)	1.42 (10%)	8.1 (10%)
	No FOFB (Current)	8.94 (1.08%)	9.4 (1.145%)	5.6(2.41%)	1.4 (6.73%)	0.46 (3.24%)	1.99(2.5%)

FOFB

- FA archiver from DLS ~ 12 days of stored data ☺

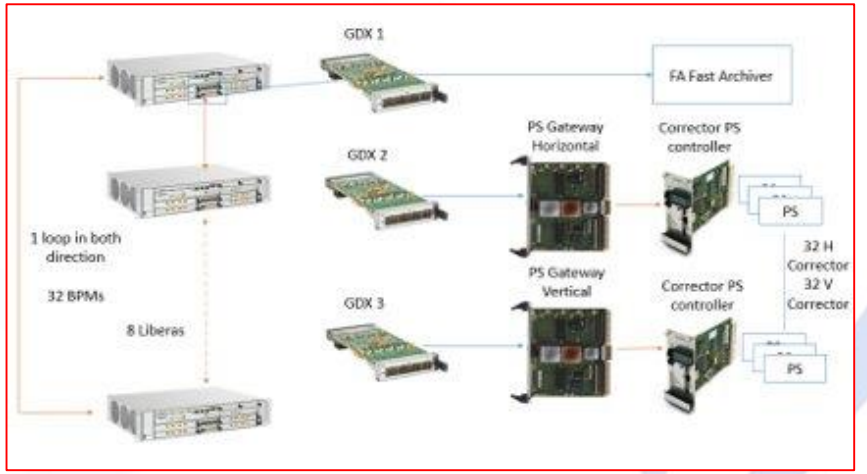




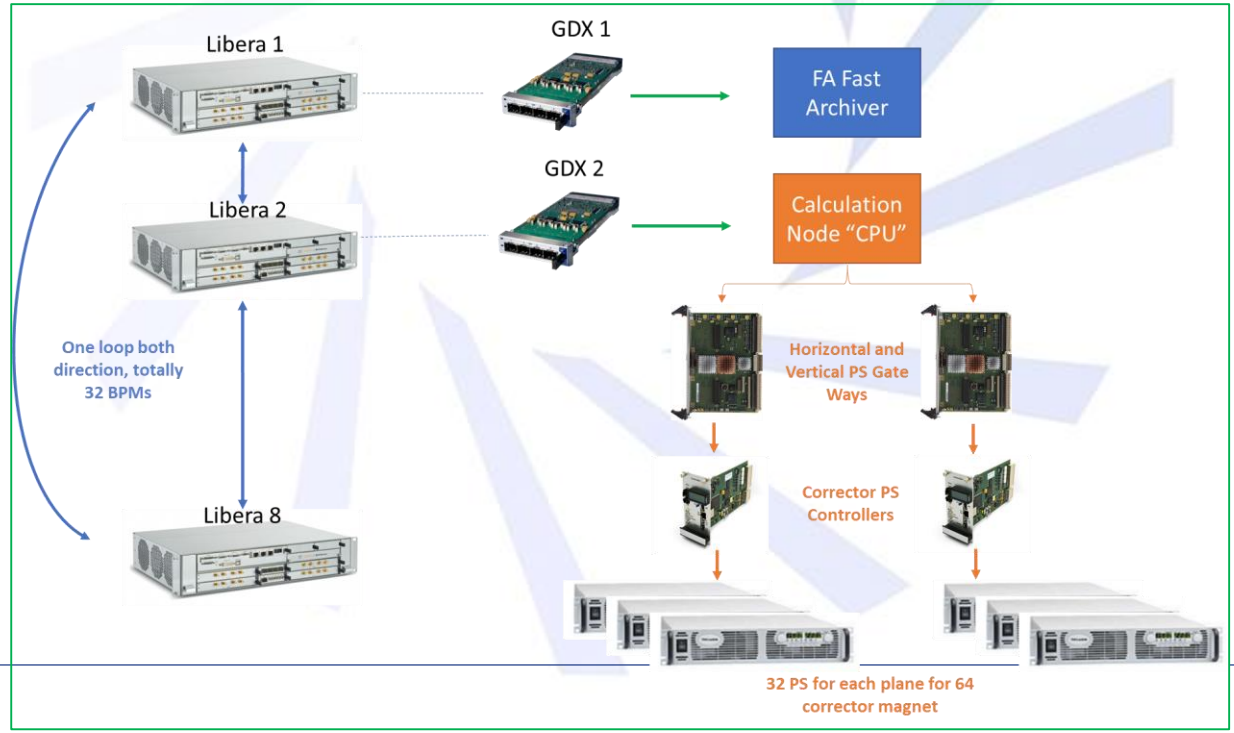


FOFB

1st Proposal

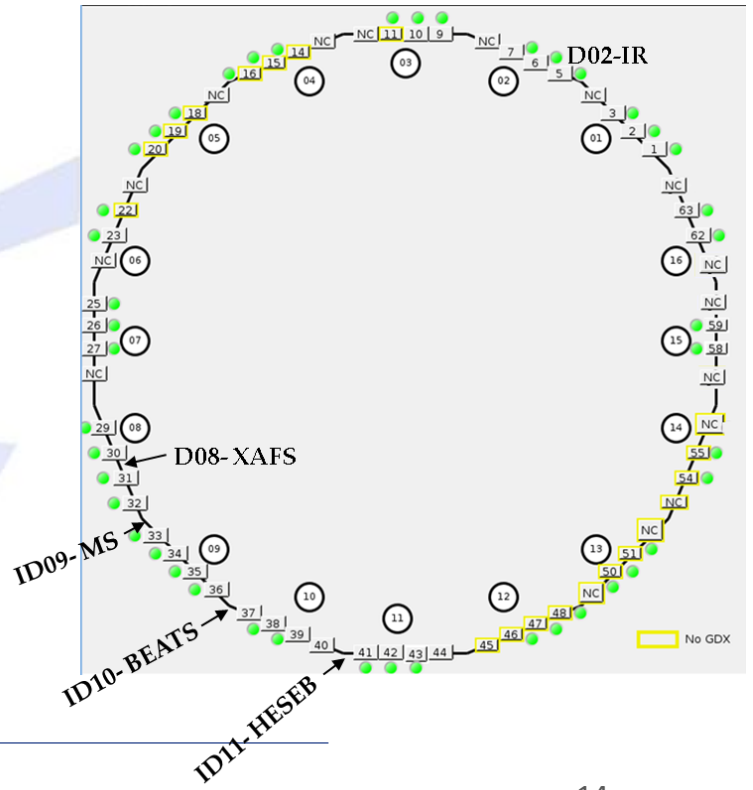


2nd Proposal



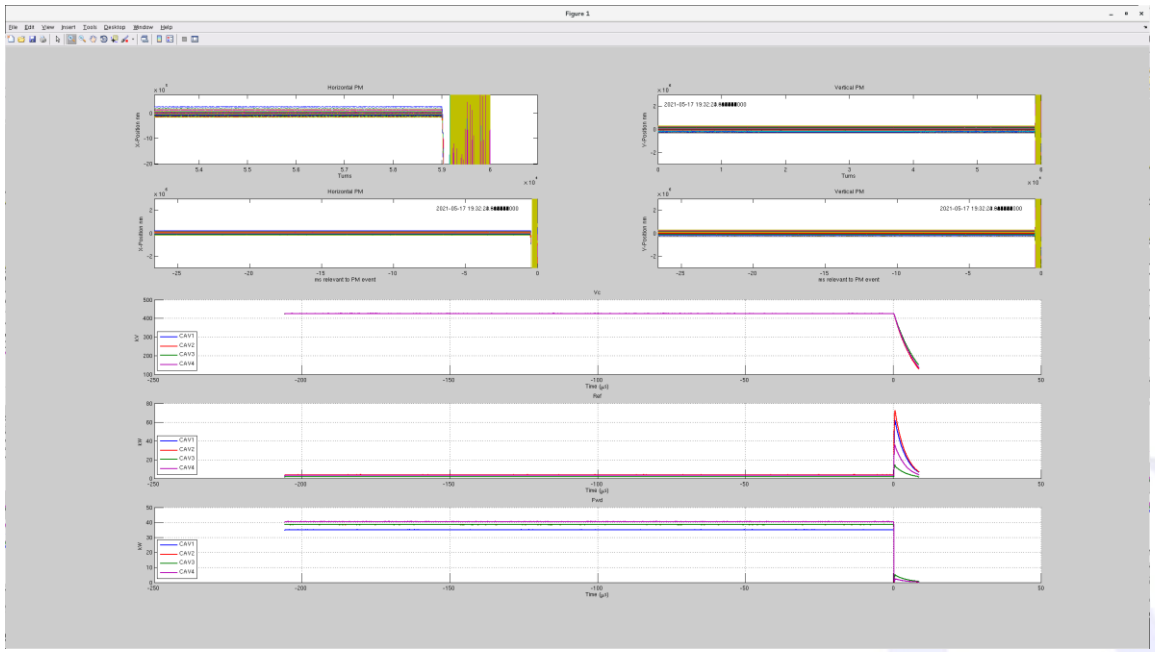
FOFB

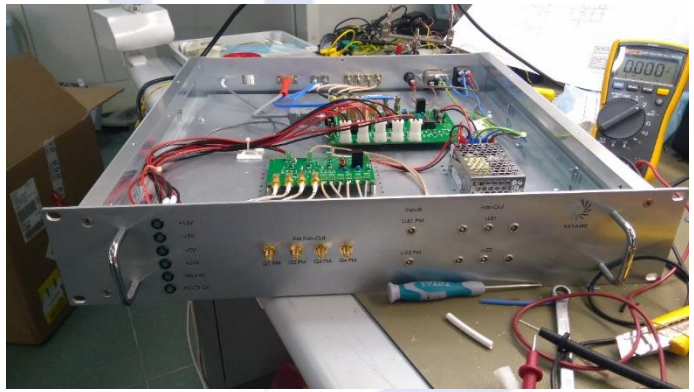
- We are trying to make the correction scheme simple.
- The GDXs are installed in the units that have a beamlines.
- We will start with 32 BPM and 32 correctors in each plane, the next step to fill the rest of the instruments with GDX.
- Followed the most method of other facilities to use hybrid mode “slow + fast” together without gap.
- The RF correction will be on slow feedback as the current state.
- The test in lab gives 100Hz of BW of PS with PSI controller.

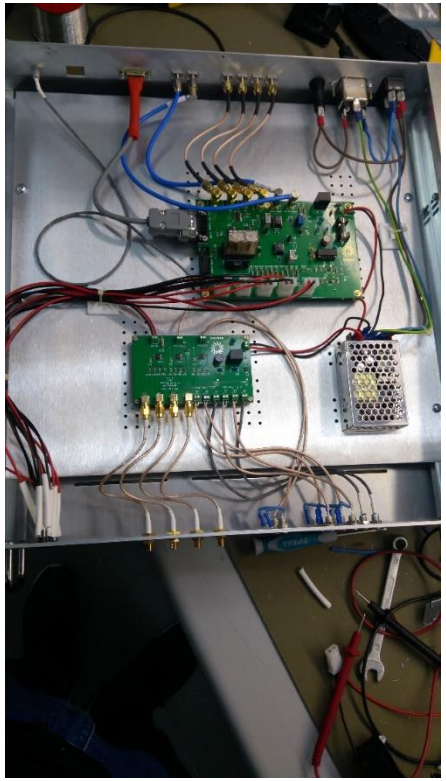


FILK and PM

- A simple, robust and low cost fast interlock system and Post Mortem were designed and assembled in house.
- The target of the system to achieve <600uS to interlock the RF system, the achievable latency of the system <22uS the over all from Libera response to kill the beam ~1.8mS.

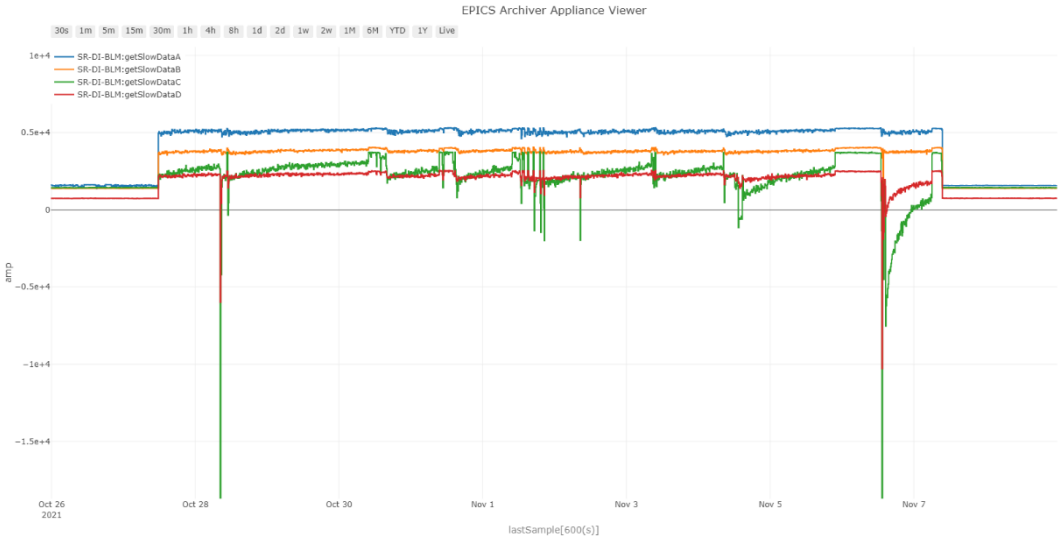


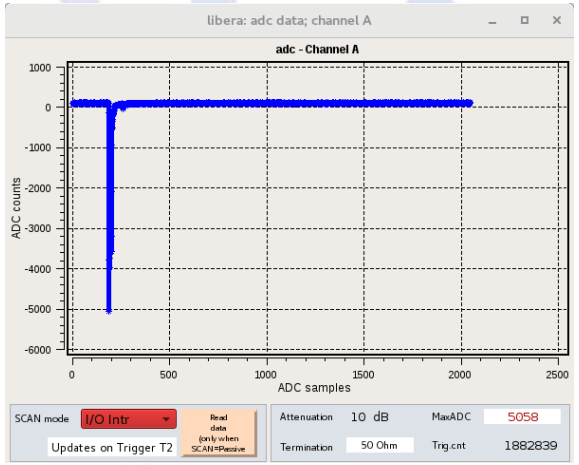


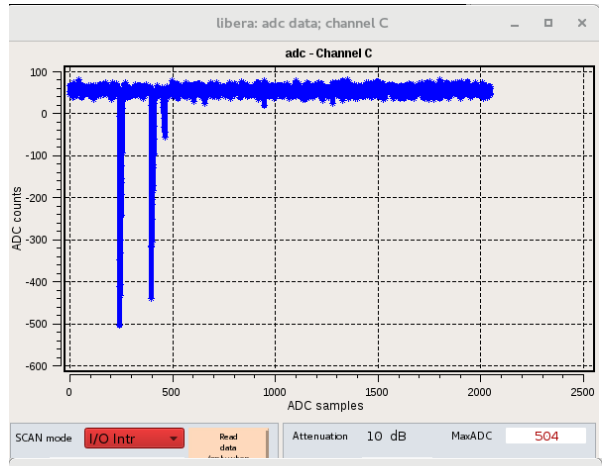


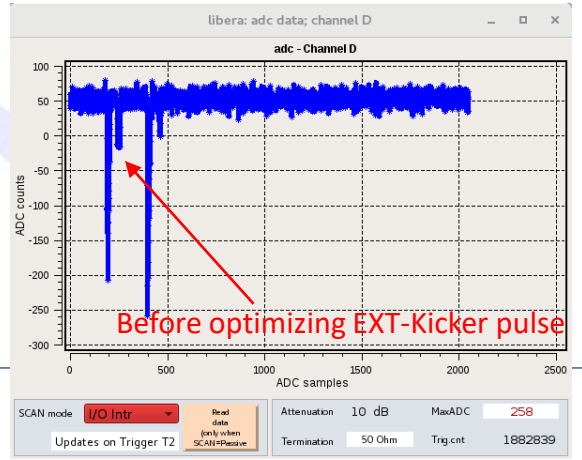
BLM

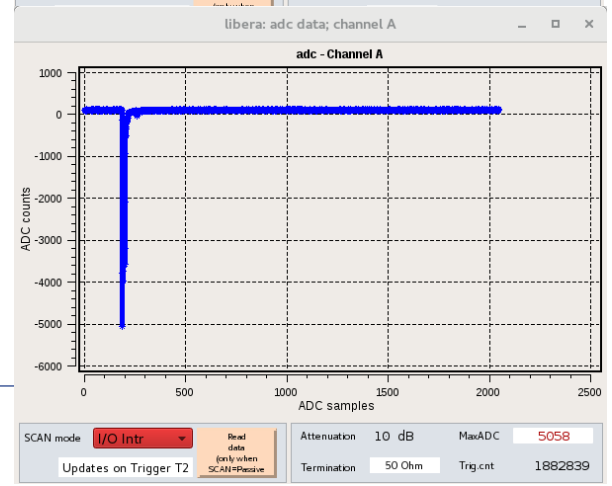
- Four Beam Loss Detectors (BLD) were installed in the machine and connected to one Beam Loss Monitor (BLM).
- The detectors from I-Tech, EJ-200 with Hamamatsu 10721-110 PMT
- The BLDs are installed in the machine in different locations from time to time, recently to have more studies in extraction, transmission and injection efficiencies.
- Very useful in the ID commissioning and Transfer Lines





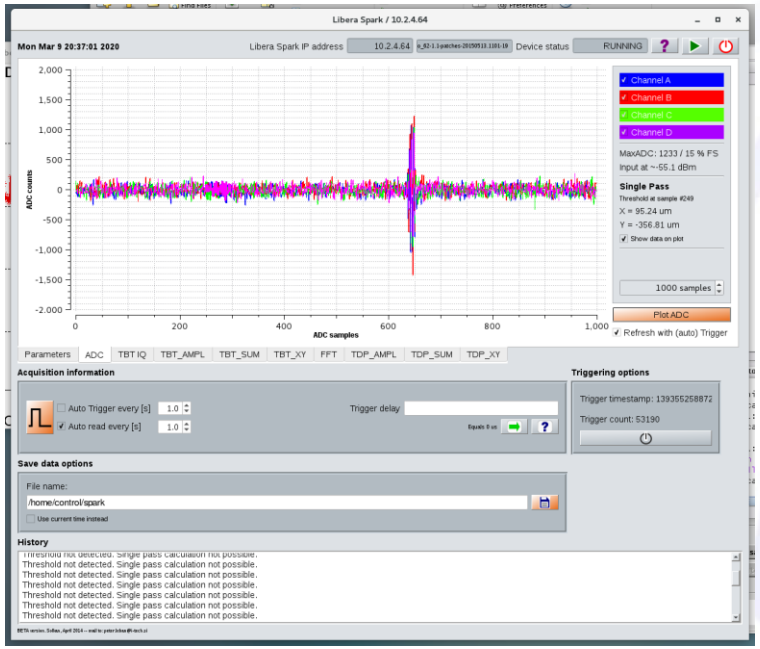


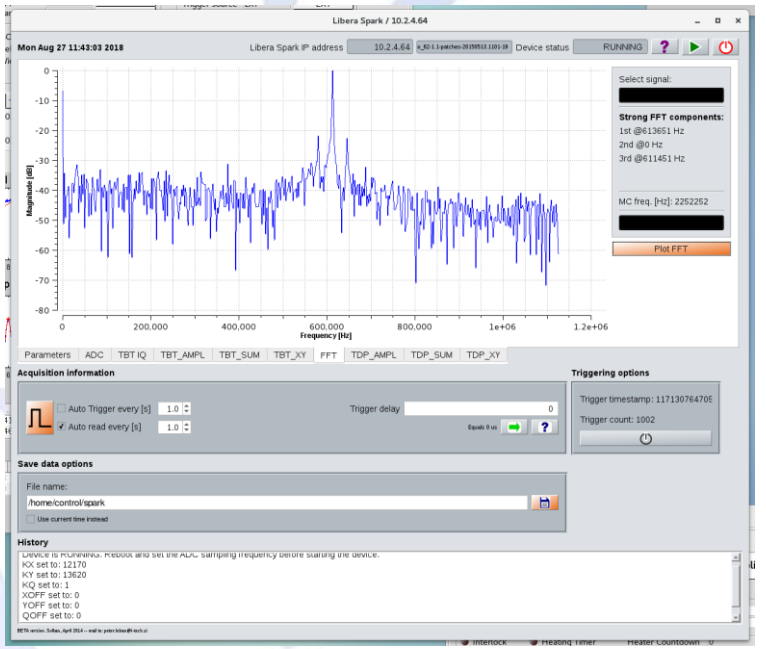




Spark in TL2

- Libera Spark (ER) > gift from DLS.
- Used for TL2-BPM.
- Will be used to measure the injection efficiency with compare to SR-BPM





Conclusions

- We are happy with Libera products and all of them are working fine.
- No major failures happened up to now.
- 50 BPMs are working fine in the SR and 6 in Booster and one in TL2.
- FOFB will be in operation by next year.
- Another upgrades will comes with time, especially for XBPMs


Thank You!