



LHC Injectors Upgrade

Status of the BI Work Package in the LIU-PSB frame

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Outline

- Actions & beam commissioning of new instruments
- Next milestones till LS2
- Budget scrutinized with APT
- Summary



Actions for HST

- **BTVs for foil inspection and beam size**
 - Open question: Stripping foil breakage
 - **Hypothesis:** Accumulated electrostatic charges on alumina screen
 - **Mitigation:** a 15 μ m metallic coating on the back to be tested on the permanent assembly {SF+BTV} in Linac4.
 - This fall
 - Beam commissioning of coated screen
 - VSC acceptance tests, following teething issues (mechanics) corrections.



2017: Status of BI commissioning (1)

- **BTMS: Ring trajectory**
 - Operational, still needs minor optimisation
- **Wide band BPM in BTP line**
 - Operational
- **BCTDC electronics upgrade**
 - Operational



2017 Status of BI commissioning (2)

- **BR.BCTI in 8L1: injection efficiency**
 - *Operational but for experts only (local signals)*
 - 2017
 - OP and BI: Finalise FESA + Watchdog Specs
 - Calibration
- **Flat ICs in L3 sections**
 - Commissioning w/ beam: on-going
 - 2017: Finalise firmware/software configurations, data logging, Setup Threshold DB (InCA)
- **Wire scanner: prototype in 4L1**
 - Commissioning w/ beam: ??????
 - TS3: replacement of encoding disk



On-going WUs: 2017 and next YETS


- **H⁰/H⁻ charge measurement from dump**
 - 4 operational installed in BSW beam pipes
 - Spares status: 3 ready (1 HST + 2 new), 1 spare to be repaired (broken by VSC)
 - **YETS**: series production of electronic board: **Can it be done sooner?**
- **Tune pick-ups**
 - BPM assembly
 - **This fall**: VSC acceptance tests
 - **YETS**: Installation.
- **Turn by turn meas. for injection matching**
 - **Grids assembly status ??**
 - Electronics: prototyping on-going
 - Vacuum tank in production
 - **October**: ECR submission
 - **YETS**: Installation and cabling (**should be in EN-EL's list**)
- **BR.BCTI in 8L1: injection efficiency**
 - **YETS**: from BCT budget left: OASIS & permanent lab test bench




New WU requests for LS2

- **Additional BPM upstream BI.SMV**
 - [LIU-PSB Meeting 199](#) : between the BI.DIS and the BI.SMV, ~18m of transfer line for vertical distribution w/o BPM.
 - New design: MME, ECR, DIC...
 - Budget : 50 kCHF (including spare)
- **Additional BPM upstream PI.SMH42**
 - [EDMS #1207510](#) : for optimum PS injection with $\pi/2$ phase advance
 - Installation of a spare monitor
 - Existing design: ECR, DIC
 - Budget : 20 kCHF (spare parts)
- **Manpower**
 - 1 man·month (BE-BI-PI section)
- **Funding**
 - 64 kCHF from BCTs to be postponed for 2018 and LS2.

● Installation for Linac4 connection

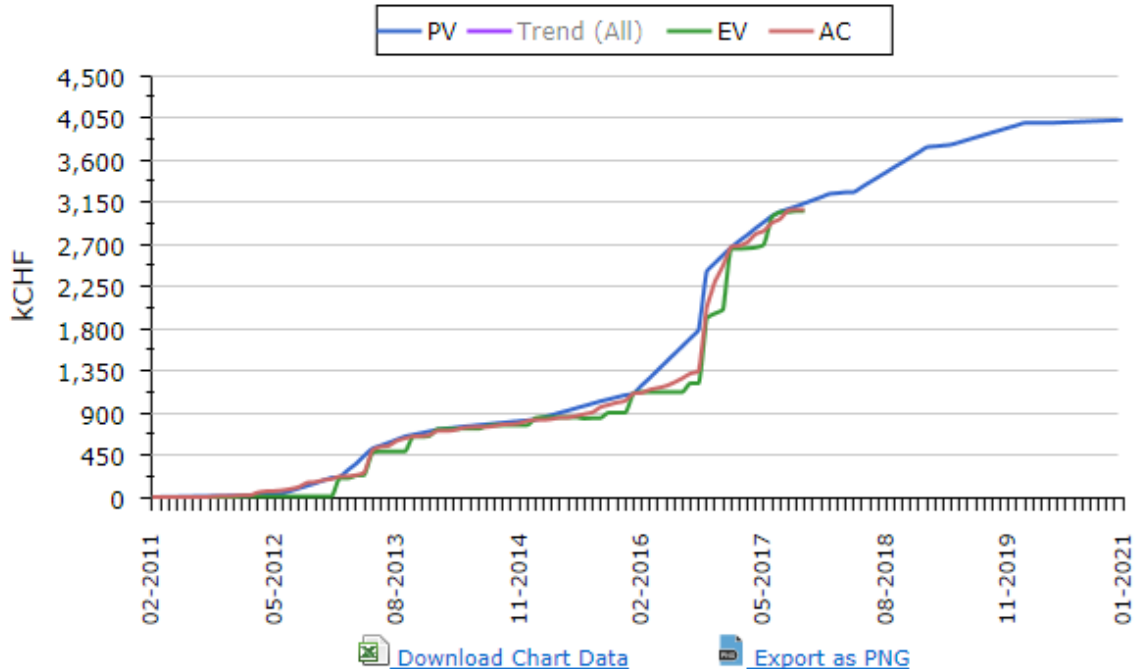
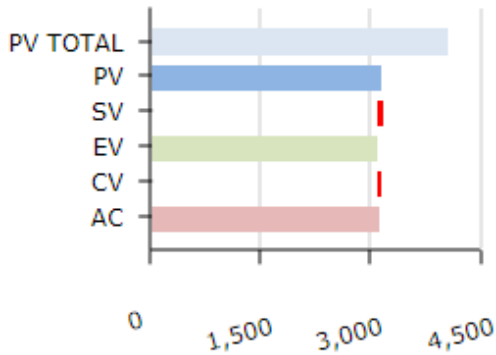
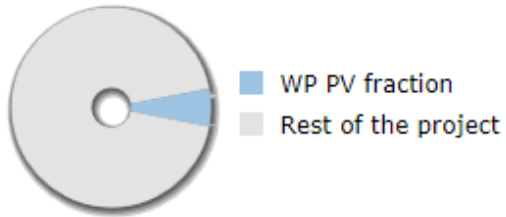
- Additional BPM upstream BI.SMV 
- BI.SMV position measurement plates
- BI.BTV30: Modification due to new septum
- BTVs: Beam Profile and SF Inspection
- H0/H- beam current monitor
- BLMs in injection line + Diamond types

● Readiness for PSB upgrade

- Additional BPM upstream PI.SMH42 
- BCTDC: power supply upgrade for ultimate intensities
- BT.BVT10: move the monitors from the septum their respective housings
- BLMs in extraction lines
- BWS: see Ray's presentation



LIU-PSB EVM Curves



Metrics on the 05-Sep-2017

PV (kCHF)	EV (kCHF)	AC (kCHF)	PV Total (kCHF)	Trend (All) (kCHF)	SV (kCHF)	SPI (%)	CV (kCHF)	CPI (%)	SV(t) (months)
3,108	3,052	3,067	4,023	3,135	-56	98	-15	100	N/A

On time

Within budget



Summary

- **Commissioning with beam**
 - BTMS, BCTDC, BT.BTV30, WB PU: **operational**
 - FICs, BCTI : **on-going tests**
 - BWS prototype : **upgrade of encoder disk**

- **YETS 17-18 activities**
 - BCTI watchdog, Tune PUs and TbT SEM grids : no show stopper

- **Two new WUs for LS2 to be included in BI work package**

- **Budget for 20 WUs**
 - BI workpackage is on time and within budget
 - From start to now: **Twelve WUs completed**
 - After 2018: Four WUs to be completed: BCTI, Tune, H0/H-, TbT SEM
 - After LS2: Four WUs to be completed: BLMs, BCTDC, 2x BTVs



LHC Injectors Upgrade

THANK YOU FOR YOUR ATTENTION!





Commissioning with beam (1)

- **BR.BCTI in 8L1: injection efficiency**
 - all 4 sensors refurbished
 - *Commissioning with beam: yes, local mode for experts only.*
 - *To do*
 - Calibration
 - FESA + Watchdog

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User : LHC INDIV

CH.1 : OUT Splitter 8L1 FAST

CH.2 : Range 3 8L1 TMD

Trigger ext : C275 Injection

Zoom IN.



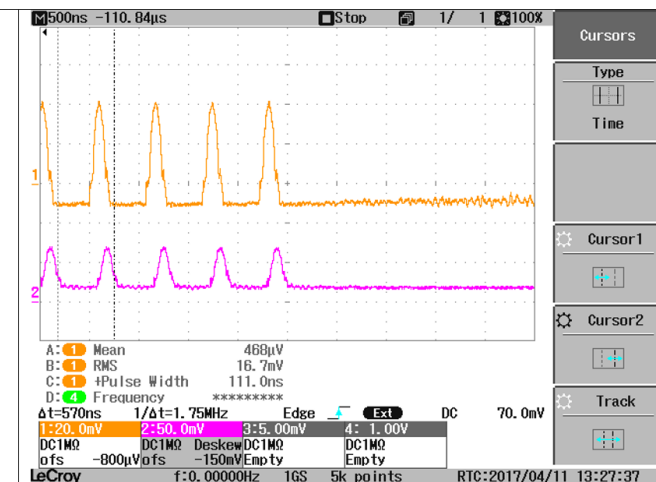
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User : ISOGPS

CH.1 : OUT Splitter 8L1 FAST

CH.2 : Range 1 8L1 TMD

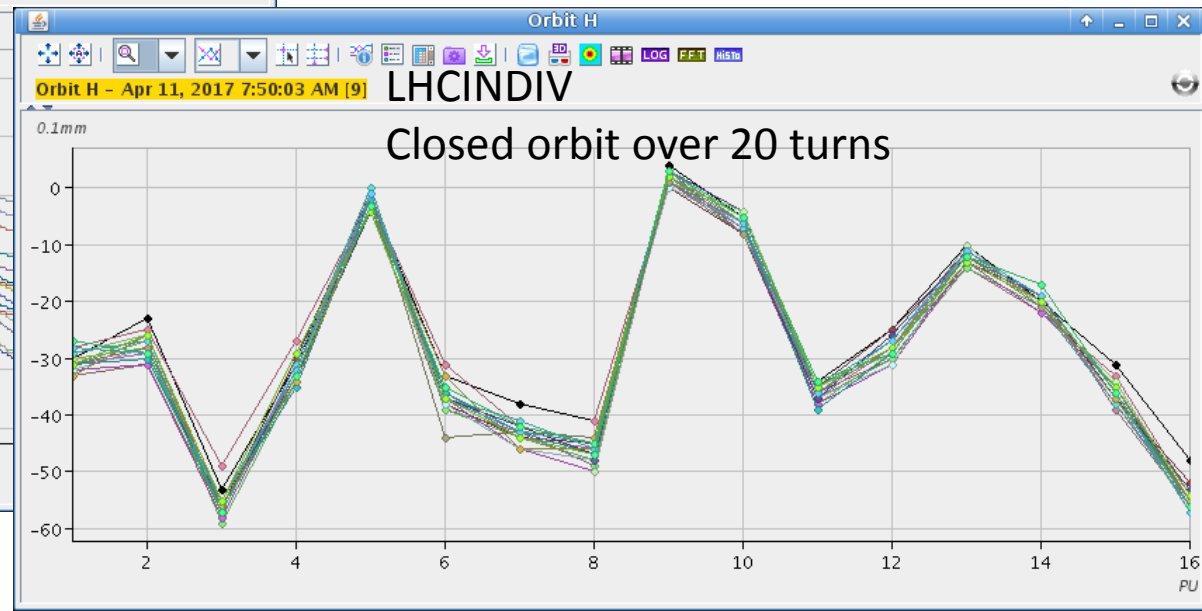
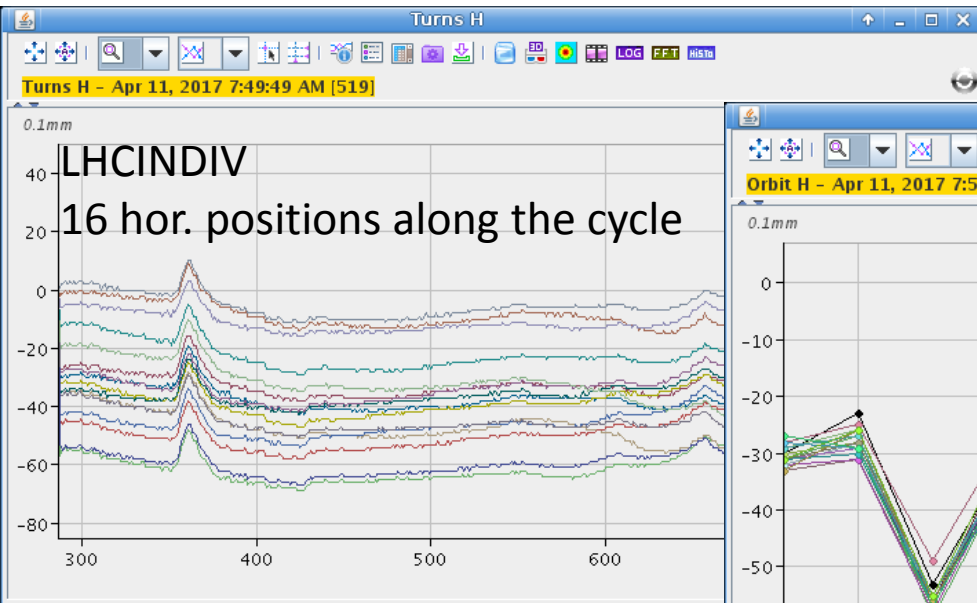
Trigger ext : C805 Ejection





Commissioning with beam (2)

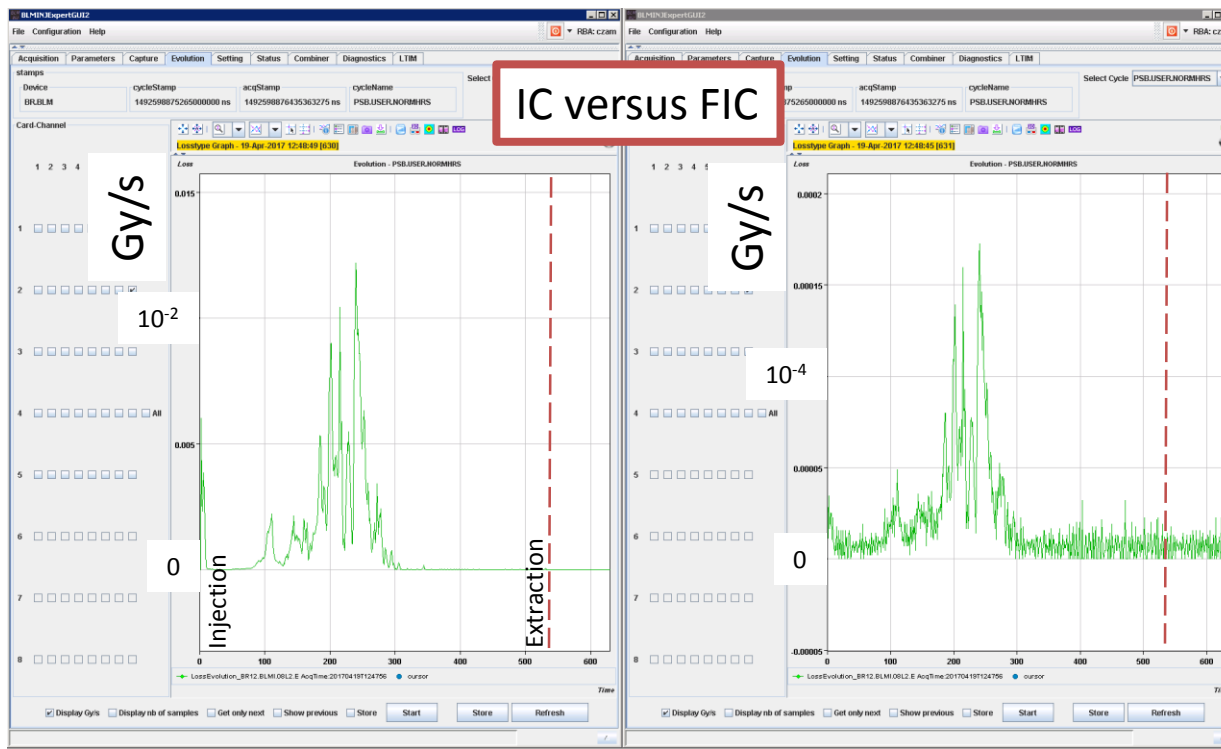
- **BTMS: Ring trajectory: Installed**
 - Commissioning w/ beam: **operational, needs optimisation**
 - Low intensity resolution measured to 0.6mm with $8E9$ charges.
 - Gain change along cycle: so far so good
 - **To do in 2017**
 - Setting up of individual config files (PS like) on going
 - Calibration system





Commissioning with beam (3)

- **Flat ICs in L3 sections: 32 installed**
 - Commissioning w/ beam: **on-going**
 - Status in April 25th : <https://indico.cern.ch/event/630894/>
 - **To do in 2017**
 - Finalise Firmware/ software configuration
 - Data logging
 - Setup Threshold DB (InCA)



Courtesy C. Zamantzas