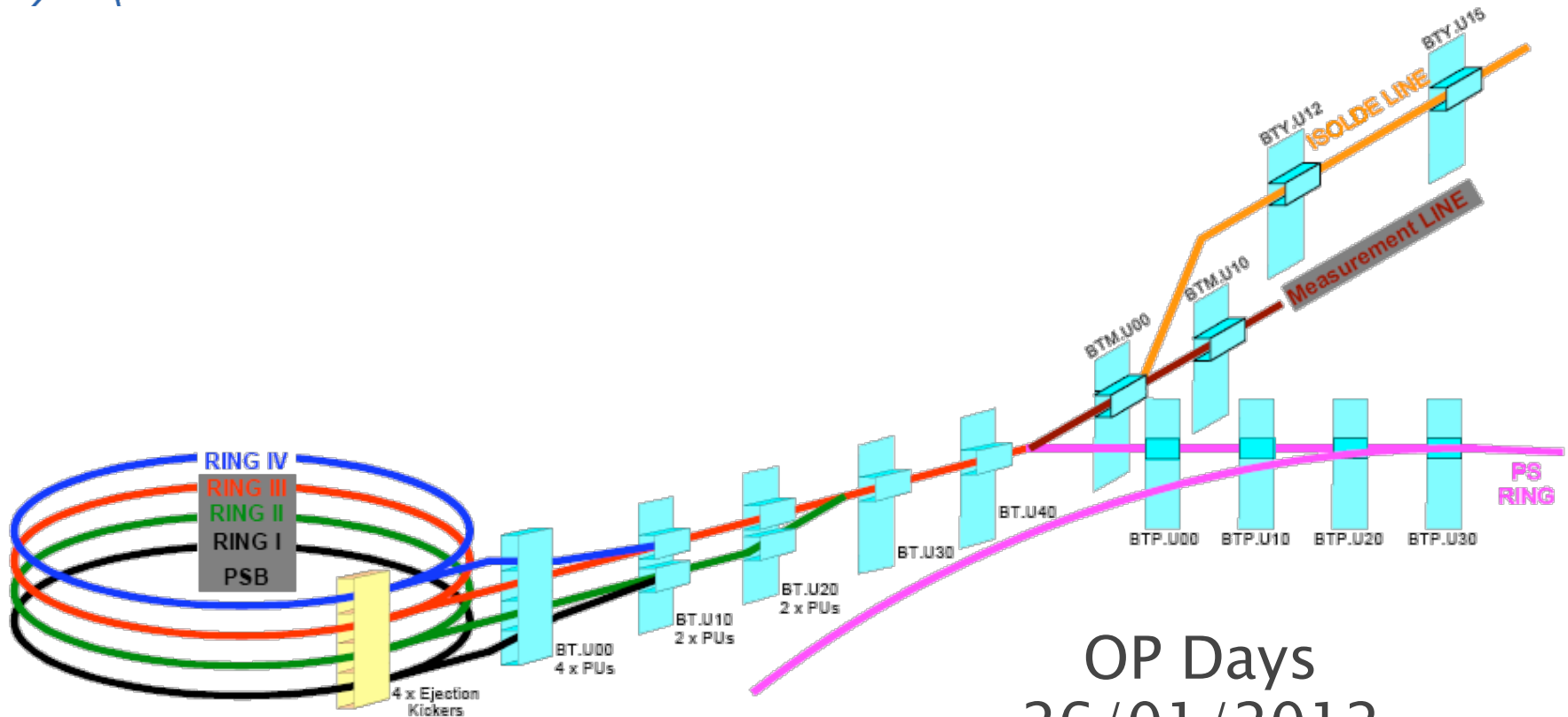




PS Booster 2011

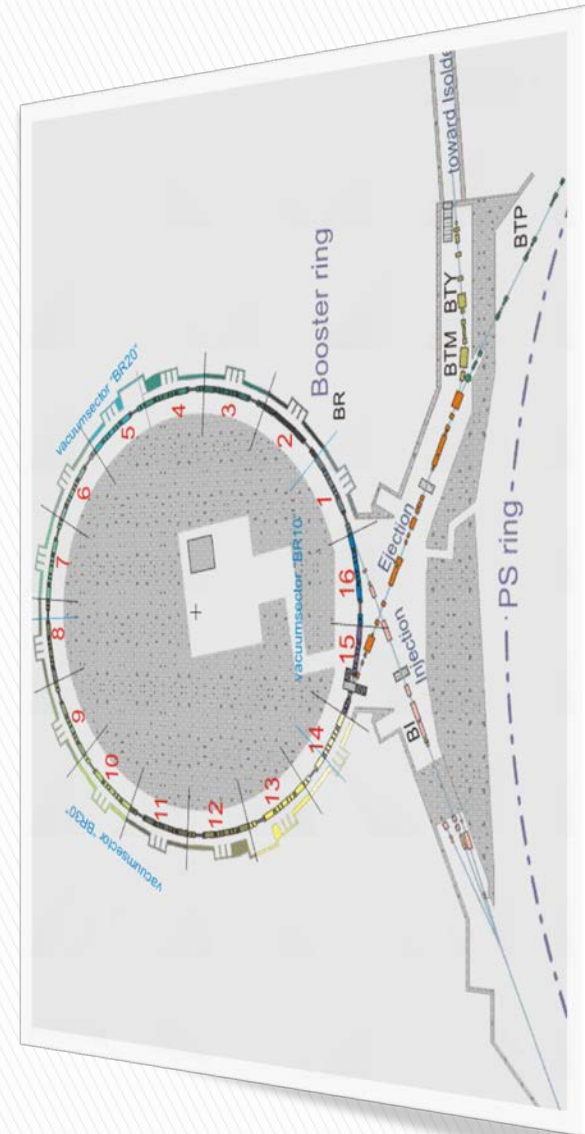


OP Days
26/01/2012

Abdelouahid AKROH
BE/OP-PSB

2011 PSB Operation

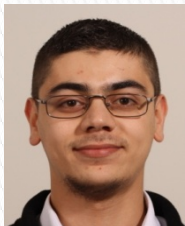
- 2011 : Long year
- Highest beam availability & quality
- Control in PSB
- PSB MDs in 2011
- Beam Instrumentation in PSB
- Physics and optimized beams for LHC
- Next steps



2011: Long Year

PSB TEAM

▶ 2 Arrivals in 2011:



Abdel AKROH

02/05/2011



Celine BIDAUT

01/11/2011

▶ 2 Departures :



Yannick RIVA

31/05/2011



Julien BALDY

31/08/2011

KEY DATES

31/01/2011

- Test Hardware
- Audiovisual Patrols

02/02/2011

- End of MPS tests

03/02/2011

- PSB cold check-out starting

08/02/2011

- Beam permit signed by Mike
- Setting up

21/02/2011

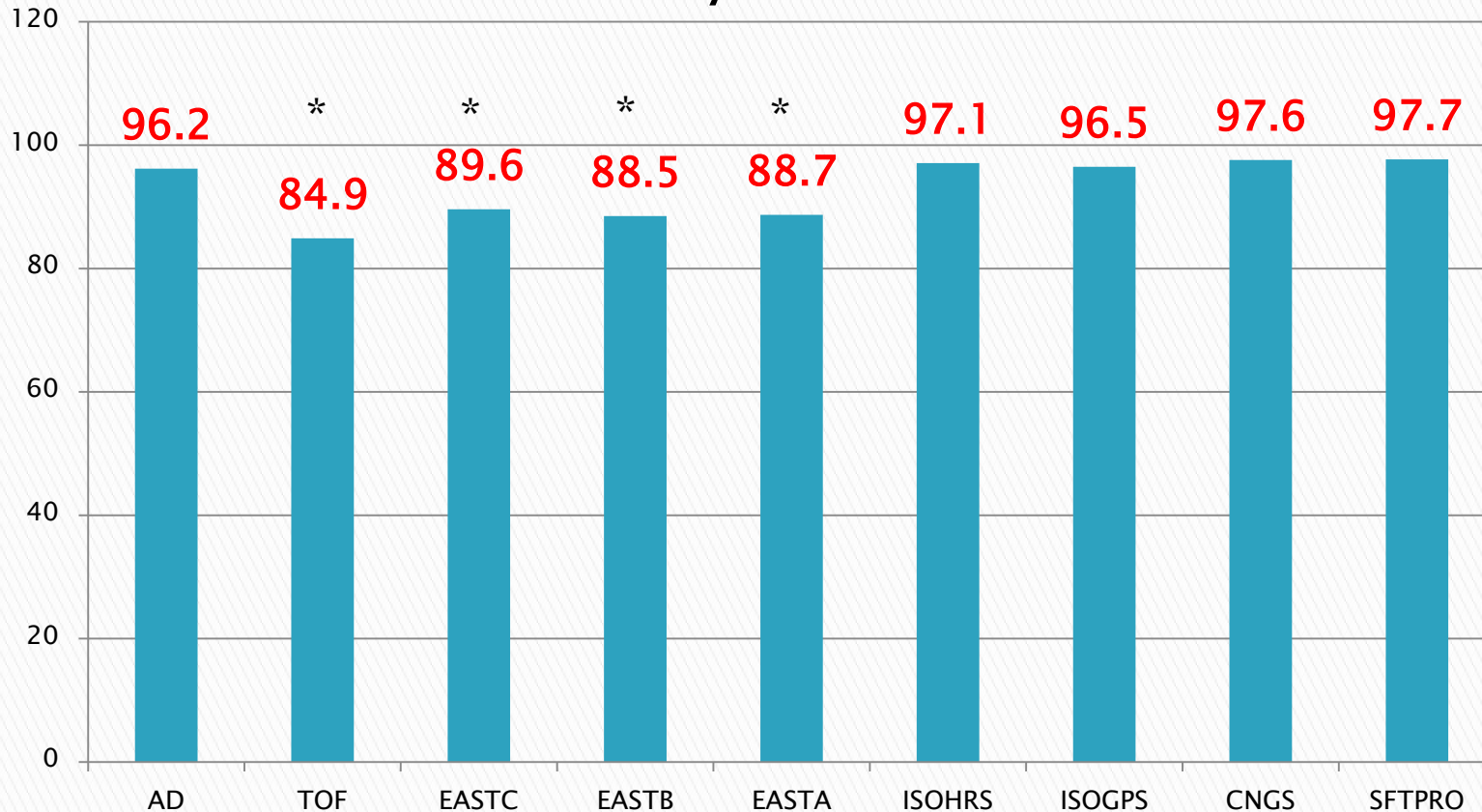
- START OF RUN!!!

21/11/2011

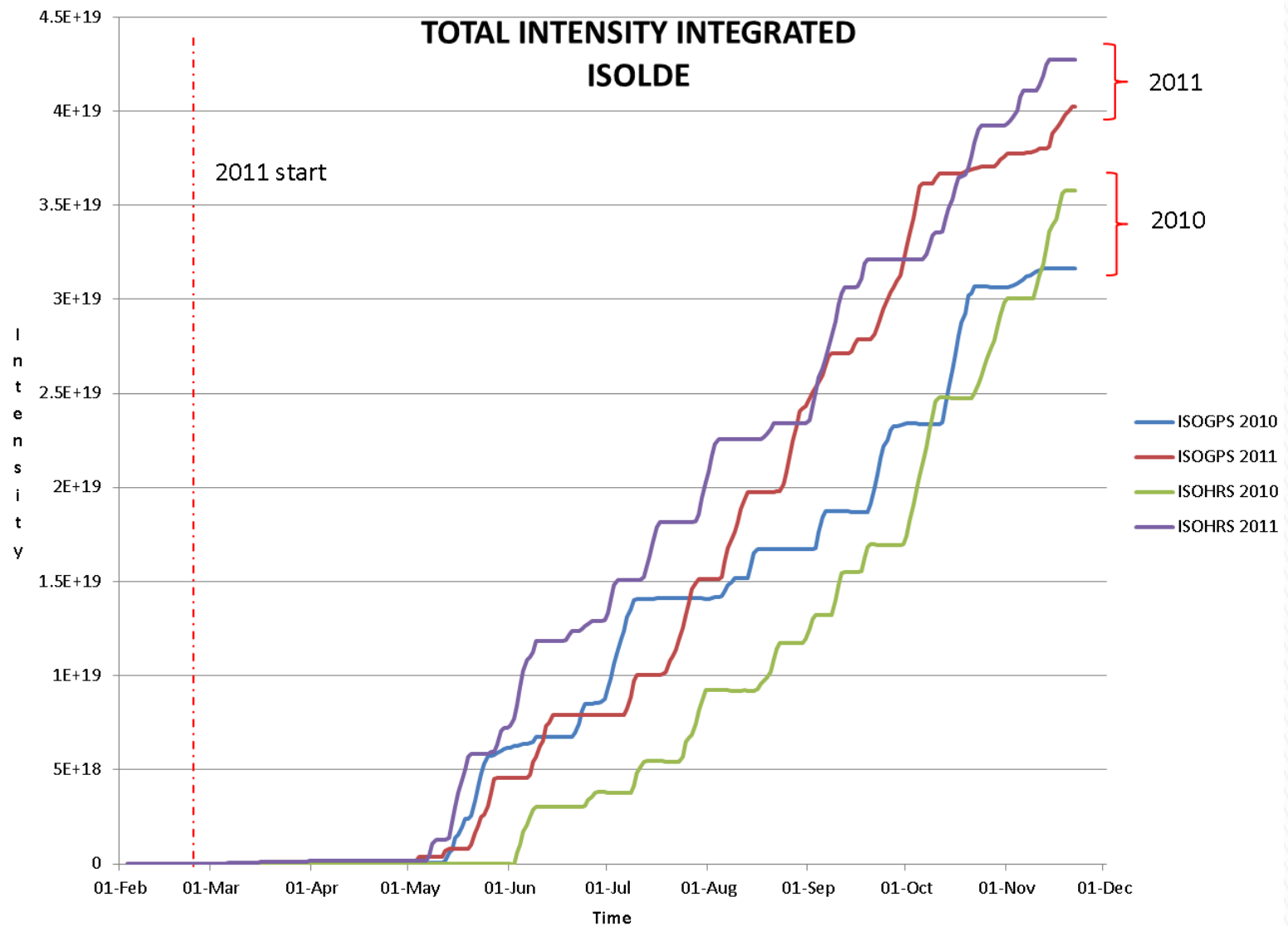
- END OF 2011 RUN

Highest beam availability & quality

Beam availability in 2011 for all users

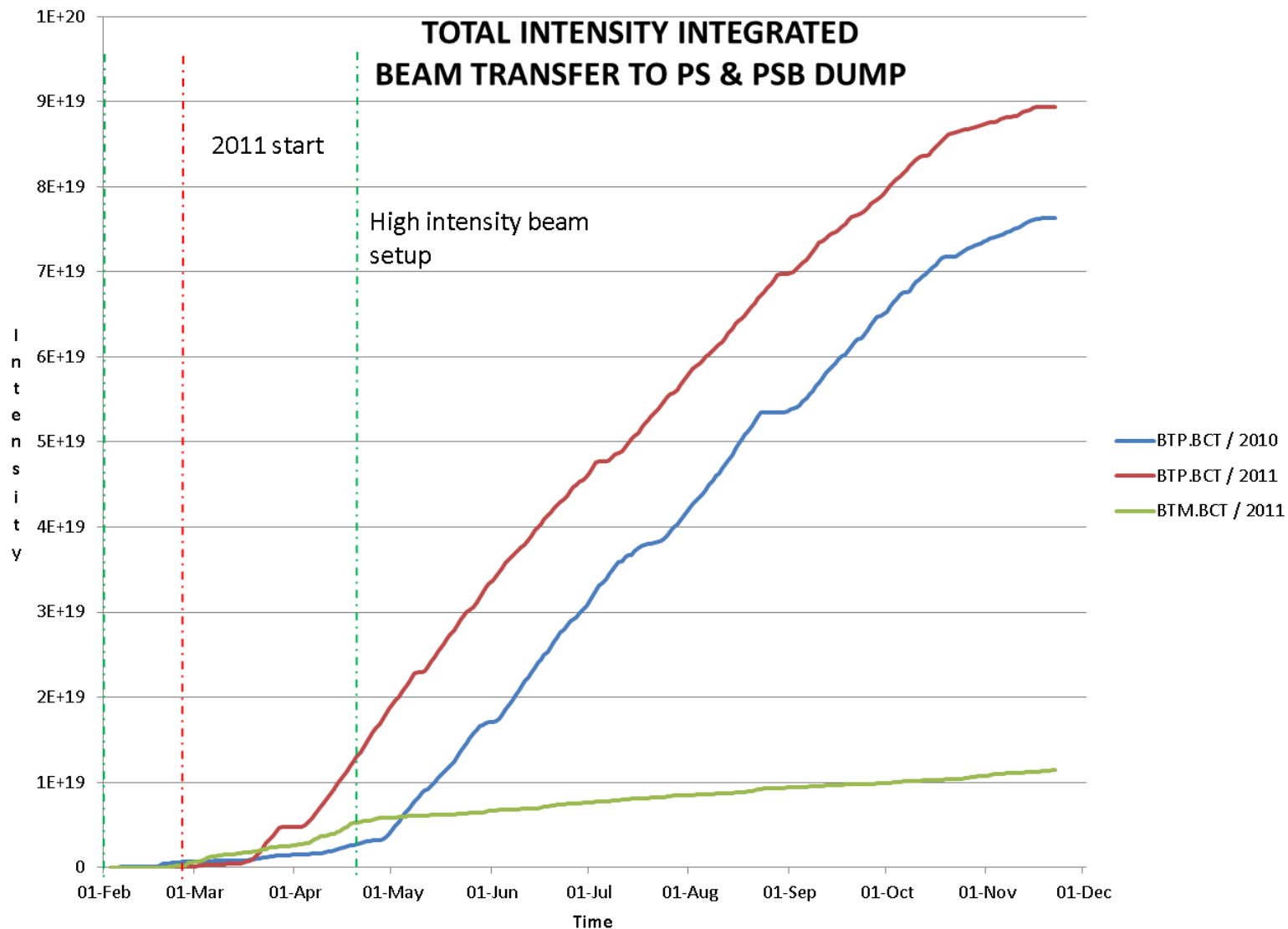


* values for TOF and EAST underestimated for technical reasons



ISOLDE GPS: BTY.BCT213: **4.0239E19** (+27% compared to 2010) = 21.2% of BT intensity

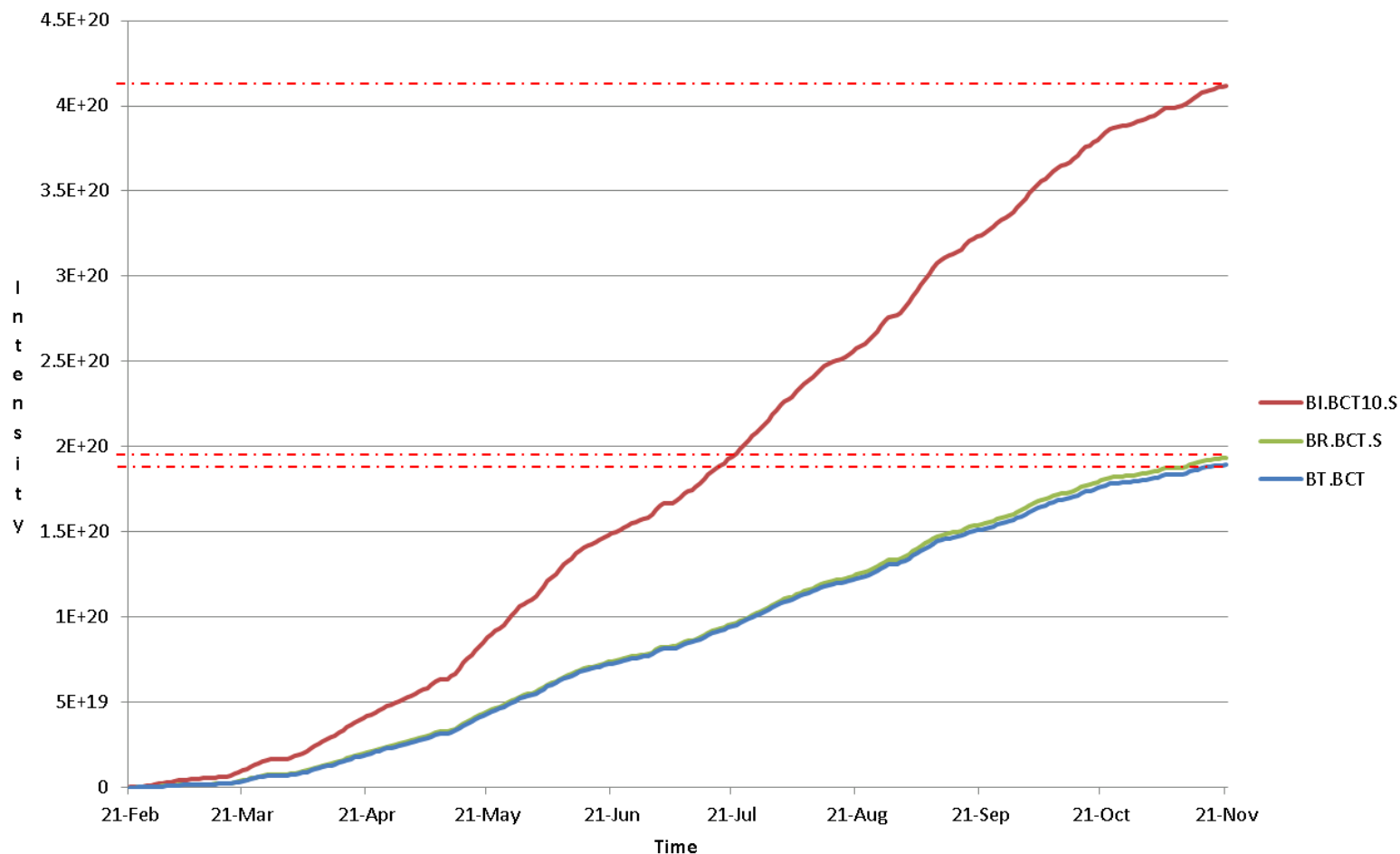
ISOLDE HRS: BTY.BCT325: **4.2754E19** (+19% compared to 2010) = 22.6% of BT intensity



BTM.BCT: $1.141E19$ = 6.0% of BT intensity

BTP.BCT: $8.9404E19$ (+17% compared to 2010) = 47.2% of BT intensity

TOTAL INTENSITY INTEGRATED INJECTION - RINGS - TRANSFER LINE IN 2011



- BI.BCT10.S: **4.1196E20** (+10% compared to 2010)

- BR.BCT.S: **1.9357E20** = 47.0% of BI intensity

- BT.BCT: **1.8944E20** = (+13% compared to 2010) = 97.9% of BR intensity

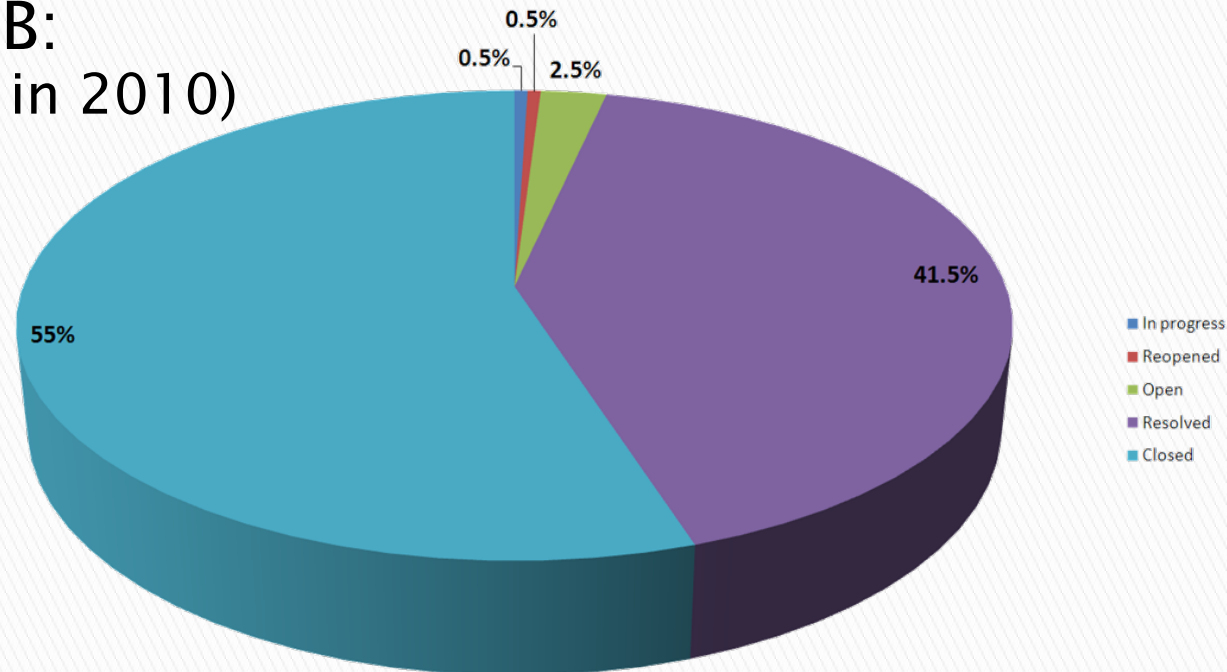
☞ Sum of BTM, BTP, GPS and HRS in percent of BT intensity: 97.0%

(Remark: quite some uncertainty in the transfer line transformer calibration...)

Control in PSB

- ▶ Successful **INCA** deployment: 12/07/2011
 - Several problems, but mostly resolved
 - Easier and faster to set up **MD beams**:
 - Before: Only 24 users name & difficult archives handling
 - Now : 24 users but infinite LSA cycles on each user
 - Ideal to load settings of a beam

- ▶ OP Issues in PSB:
 - 110 in 2011(35 in 2010)
 - Reactive team



Operation Issues in PSB 2011

PSB MDs in 2011

INCA deployment (CO)

LHC beams

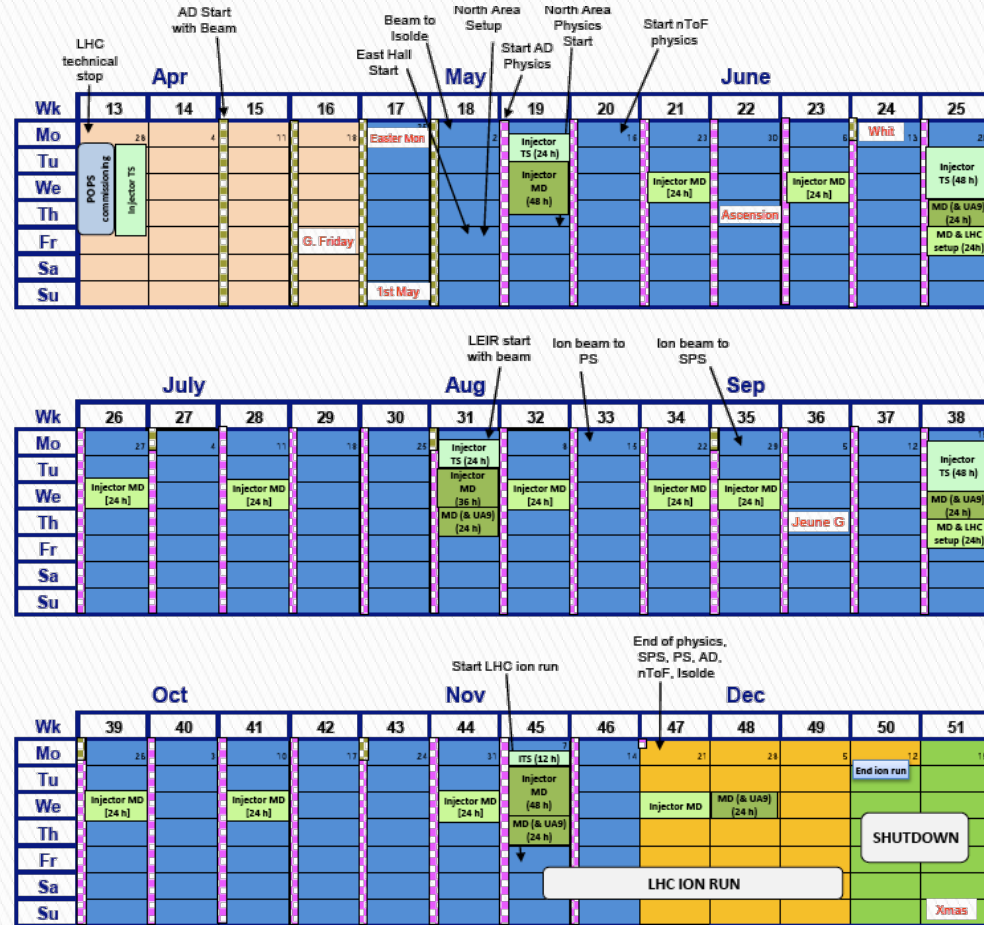
- ▶ Steady effort to maximize LHC beam brilliance
- ▶ Studies on restoring pure H₂ beams in the PSB
- ▶ Prepared 8 PSB bunches (4x H₂) to be transferred into 9 PS buckets (H₉) with H₂+1 bunch spacing
- ▶ LIU: prepared special low-intensity low-emittance test beam

Performance/Linac4 connection

- ▶ Test digital RF control system
- ▶ Injection bump MD
- ▶ Linac2 high current MD

Hardware/instrumentation

- ▶ New PUs in extraction line
- ▶ LHC-type BLMs at extraction septum and in dump line
- ▶ MDs for BI with different loss monitors in dump line for LHC



Beam Instrumentation in PSB

shutdown 2010-2011 :

- 4 new PUs in BT.UES00
- 2 new in ISOLDE line (GPS + HRS)

Year 2011 :

Pick-ups:

- New ADCs + controls system
- Teething issues solved

Wi rescanners:

- filters Ring 3 & 4 staid blocked

SEMgrid in mesurment line:

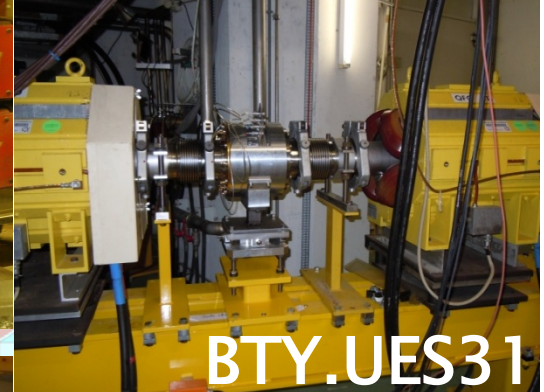
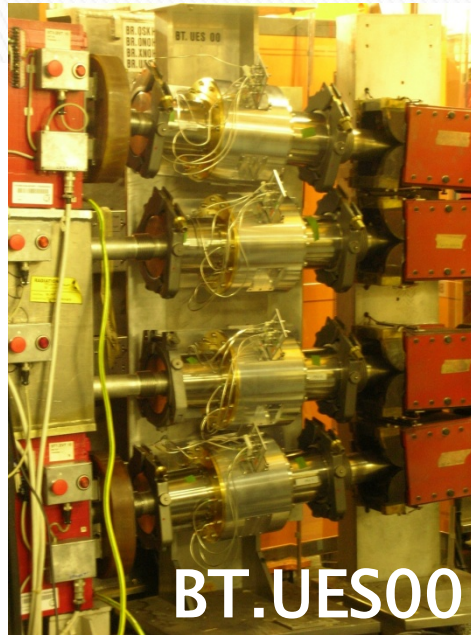
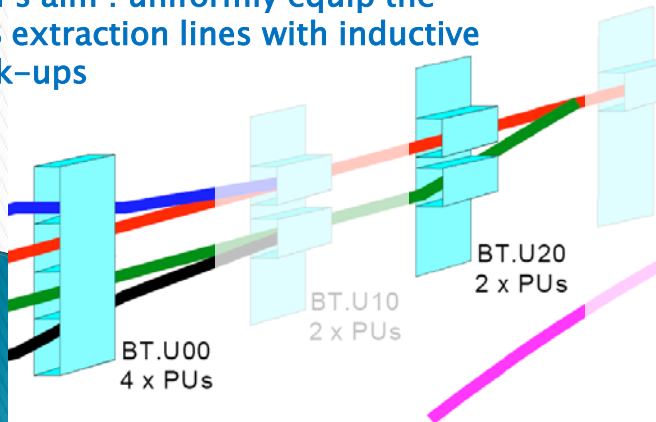
- Old electronics (To be consolidated)
- With good support almost all channels could be recovered

shutdown 2011-2012 :

- 4 new PUs in BT.UES20, 30, 40

LS1

- Complete the recombination line :
BT.UES10
- BI's aim : uniformly equip the
PSB extraction lines with inductive
pick-ups

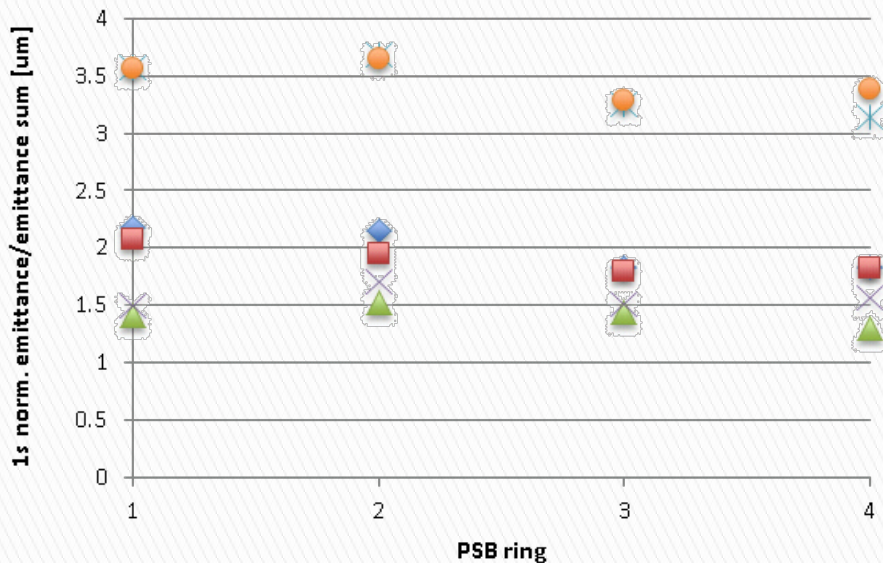


15 December 2011:
Installation of inductive
PUs in BT.UES20

Physics and optimized beams for LHC

- LHC PROBE – before filling the LHC – For setting up
- LHC INDIV – before filling the LHC – For setting up
- LHC50ns Single Batch – 2 b/ring – only 3 rings on 1 timing user (LHC_A)
- LHC50ns Double Batch – 1 b/ring – 2 timing users (LHC_MD_A, LHC_MD_B)

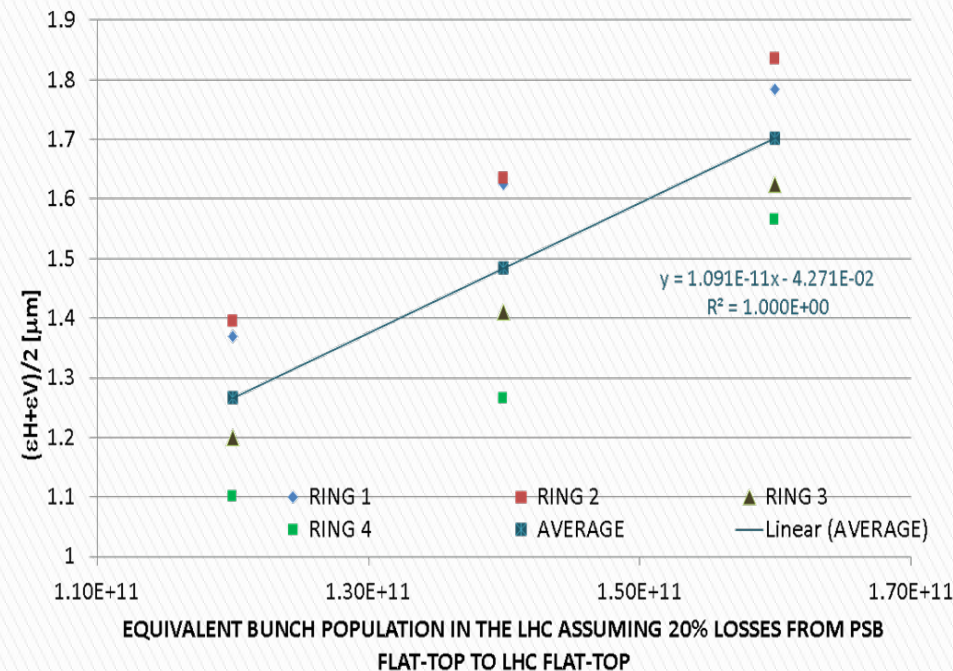
➤ LHC beam emittances in 2011:



- ◆ hor. emittance (FWS)
- ▲ vert. emittance (FWS)
- ✕ hor. emittance sum (FWS)
- hor. emittance (SEMgrid)
- ✕ vert. emittance (SEMgrid)
- vert. emittance sum (SEMgrid)

Emittance measurement of LHC50ns DB high-intensity beam A. Akroh and B. Mikulec

PSB Emittance Evolution



- After a lot of effort from BI, both FWS and SEMgrids give good and consistent results
- The slope equals one which means that the brilliance in the PSB is space charge limited.

Next steps

▶ Linac 4

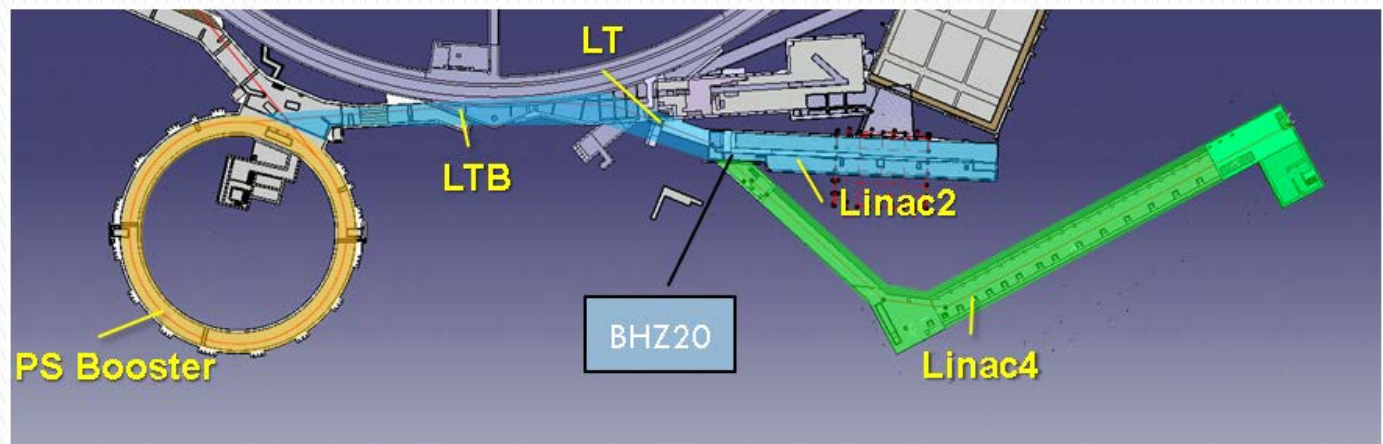
- H^- and chopping will reduce drastically the injection and capture losses and will increase the beam brilliance



▶ PSB Energy Upgrade

- Reduce space charge effects @ the PS injection

- ▶ It was decided to not go further with the RCS (August 2011)





Thanks for your attention

Thanks to:

- A. Findlay
- G. Rumolo
- J. Tan
- B. Mikulec
- A. Guerrero
- And those I forgot

Questions?

