30/04/2010

- 09:00 – 13:30 Access:
  - Power converter RB.A78: card replaced ➔ to be monitored closely
  - Energy extraction switch fixed
  - UPS RE12 verified: OK
  - RQTD.A78: water circuit purged
  - Intervention on generator for MKD
  - CMS solenoid ramped up
  - Access for the experiments until 14:30
  - 13:50 Machine closed
  - 15:45: Machine ready for injection
  - 16:00 : starting validation of injection setting up for high intensity
    - Got delayed by the difficulties switching back and forth between LHCPROBE and INDIV
    - Some problems in copying the transfer line settings from one user to the other

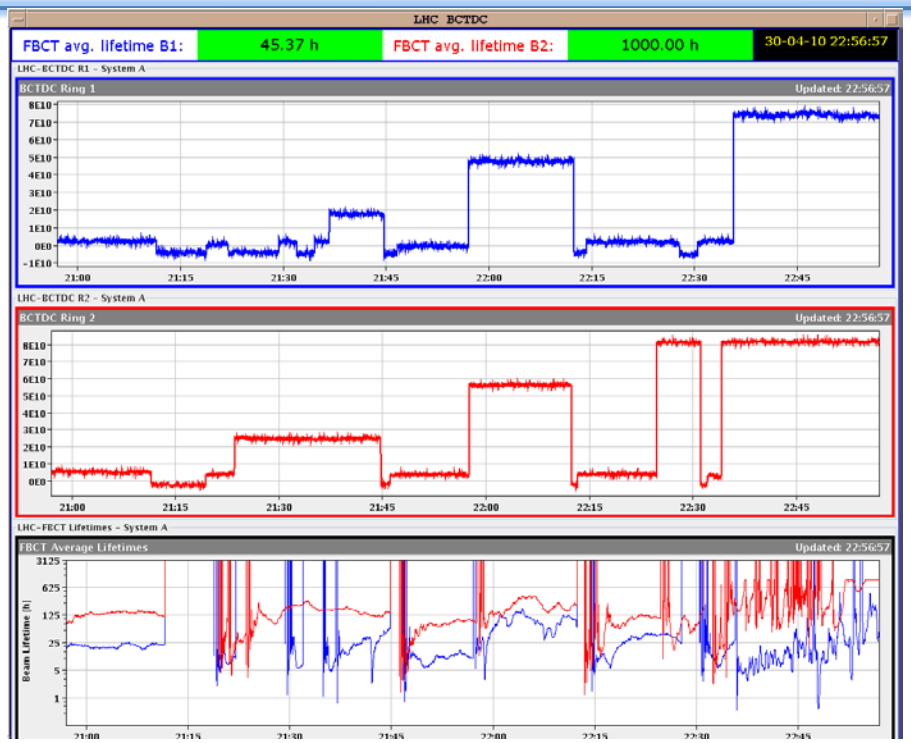
Until 01:00 - Injection and protection device studies –
Brennan Goddard and team

- Corrected the LHC orbit back to golden
- Corrected the injection oscillation of beam 1 and beam 2
- Took some statistics over 10 injections, both lines
  - Reproducibility seems to be better: EPC worked on PC of MSE LSS4 – it improved much the reproducibility of the TI 8 trajectory
- All TL & LHC collimators put to nominal settings : Checked losses with LHCINDIV at 1e10.
- Over-injection of both beams on the LHCPROBE at 5e9 done by step in intensity to nominal 1e11
- Have to mask some BLMs at TDI – seems low threshold level

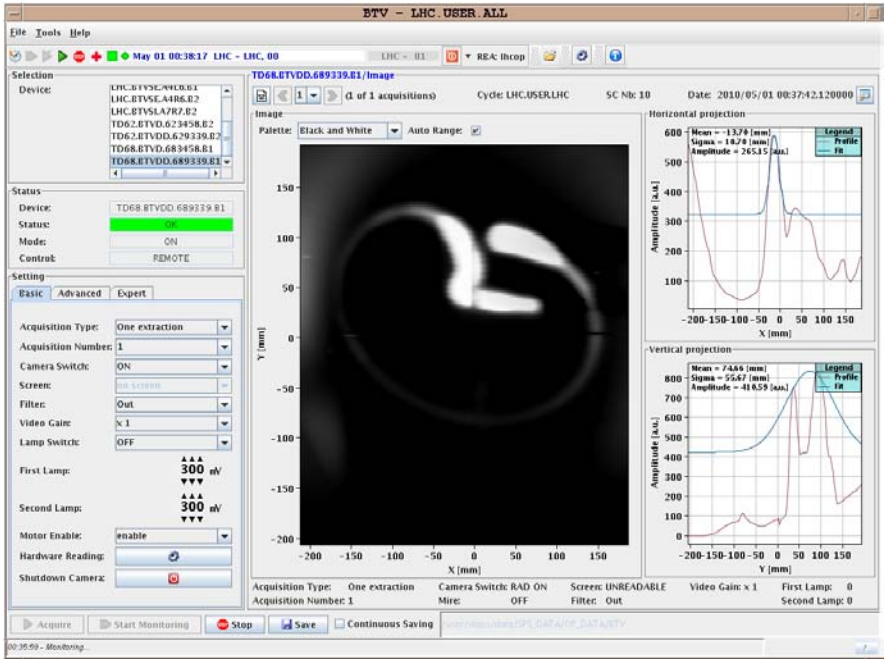
30/04/2010

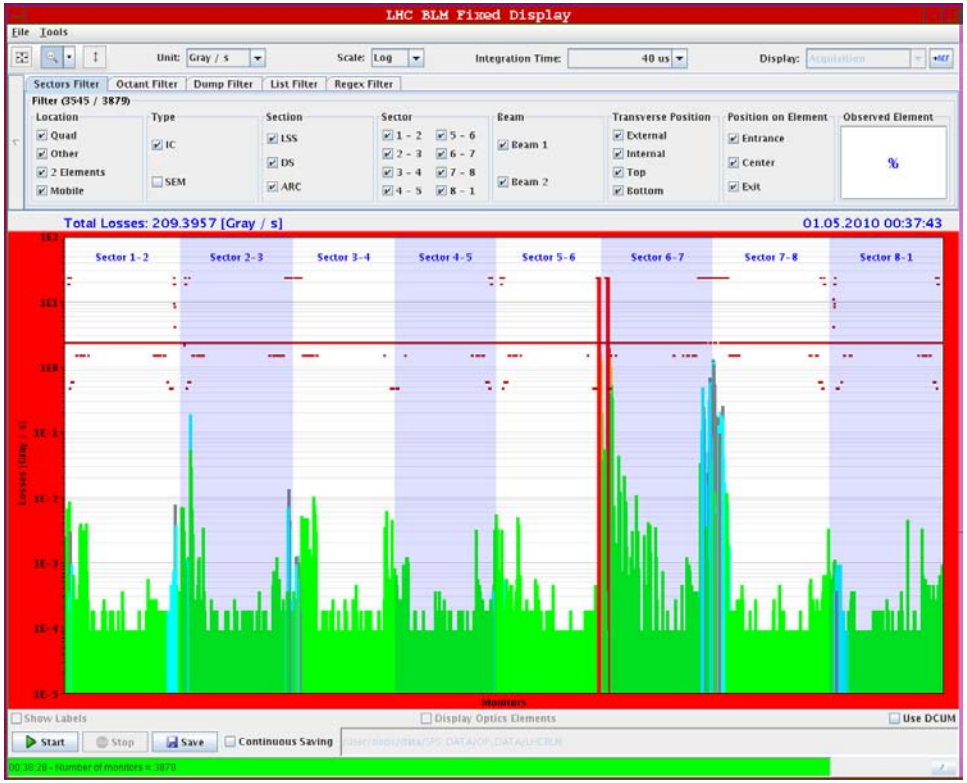
- Asynch dump tests made with 1e11 per beam, separately for B1 and B2. Loss maps all look OK and **no problem for stable beams at a few e11 intensity for 450 GeV**
- No injection protection validation measurements made
- It was noted that the B1 lifetime was consistently worse than the B2 lifetime, and was generally low.

30/04/2010


LHC BCTDC
FBCT avg. lifetime B1:
45.37 h
FBCT avg. lifetime B2:
1000.00 h
30-04-10 22:56:57
LHC-BCTDC R1 - System A
BCTDC Ring 1
Updated: 22:56:57
LHC-BCTDC R2 - System A
BCTDC Ring 2
Updated: 22:56:57
LHC-FBCT Lifetimes - System A
FBCT Average Lifetimes
Updated: 22:56:57
Beam Lifetime [h]

30/04/2010


BTV - LHC.USER.ALL
File Tools Help
Selection
Device:
LHC.BTVSE.A4R6.B2
LHC.BTVSLA7R7.B2
TD62.BTVDD.623458.B2
TD62.BTVDD.629339.B2
TD68.BTVDD.683458.B1
TD68.BTVDD.689339.B1
Status
Device: TD68.BTVDD.689339.B1
Status: OK
Mode: ON
Control: REMOTE
Setting
Basic Advanced Expert
Acquisition Type: One extraction
Acquisition Number: 1
Camera Switch: ON
Screen:
Filter: Out
Video Gain: x 1
Lamp Switch: OFF
First Lamp: 300 mV
Second Lamp: 300 mV
Motor Enable: enable
Hardware Reading:
Shutdown Camera:
TD68.BTVDD.689339.B1/Image
Cycle: LHC.USER.LHC
Image
Palette: Black and White
Auto Range:
Horizontal projection
Vertical projection
Acquire
Start Monitoring
Stop
Save
Continuous Saving

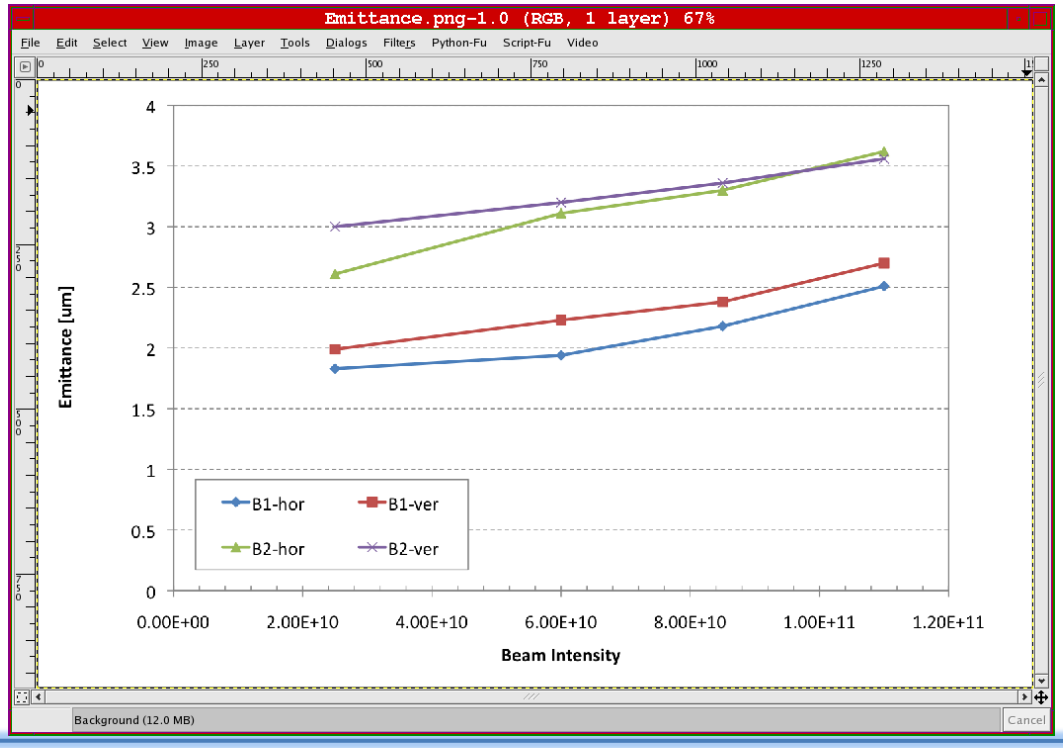

LHC BLM Fixed Display
File Tools
Unit: Gray / s
Scale: Log
Integration Time: 40 us
Display:
Sectors Filter
Octant Filter
Dump Filter
List Filter
Regex Filter
Filter (3545 / 3879)
Location
Quad
Other
2 Elements
Mobile
Type
IC
SEM
Section
LSS
DS
ARC
Sector
Beam
Beam 1
Beam 2
Transverse Position
External
Internal
Top
Bottom
Position on Element
Entrance
Center
Exit
Observed Element
Total Losses: 209.3957 [Gray / s]
01.05.2010 00:37:43
Sector 1-2
Sector 2-3
Sector 3-4
Sector 4-5
Sector 5-6
Sector 6-7
Sector 7-8
Sector 8-1
Losses [Gray / s]
Monitors
Show Labels
Display Optics Elements
Use DCUM
Start
Stop
Save
Continuous Saving

Emittance evolution over the sequence of over-injection – emittances remain below nominal although larger than in the past

B1: emittance increased by a factor 1.4 from 2.5E10 to 1.1E10 in H&V

B2: emittance increased by a factor 1.4 in H and 1.2 in V

B2: emittances of B2 larger than those of B1➔need further investigations



Aperture measurements Massimo Giovannozzi and team

Local Bumps at suspicious magnets which had been identified during measurements in March verified and aperture looks according to specs

01:15 – 4:45: Loss Maps – Stefano Redaelli and Daniel Wollmann

- Preliminary summary of collimator setting verification at 450GeV (for setup achieved at 07.03.2010), with bunch intensity of ~1e11 / beam
  Performed loss maps – 3rd order resonance and RF change (+-500Hz).
  - **B2** shows comparable results to the verification after the March setup
    Correct hierarchy of collimators (in IR3 and IR7)
    No losses at TCTs in experimental IRs
    Cleaning good in all cases (BLM signals outside of cleaning IRs are about a factor 10000 smaller than the signals at TCPs)
  - **B1** performance of B1 setup is less good than B2 – as seen in March.
    Setting of TCLA.7R3.B1 to be checked.
    TCTs in IR8, IR1 and IR5 show up in the loss maps for horizontal betatron losses

01/05/2010

Summary Collimation Check (Ralph & Stefano):

- Loss map problem of last night (off-momentum losses B1) could not be reproduced. Losses for beam1 in IR3 are fine.

- Observation of last night might be either due to insufficiently corrected orbit, out of tolerance for the collimation or due to noise in BLM's (we know that there is a noise issue in LSS3R). Maybe also there is an intensity effect on orbit correction (e.g. BPM calibration at high intensity not yet done)? To be checked.

- In the difference to the golden orbit today: We see an energy offset of 0.11 per-mille in the H orbit of beam1, factor 2 larger than explainable by tides. Also some possible local bumps are visible in the region of interest (0.2-0.5mm amplitude possible?). No effort to correct orbit much better.

- As a temporary measure we open the TCLA.7R3.B1 by +-1 sigma (sigma as determined in collimator beam-based alignment). Provides some more room to operation.

- Collimation from early setup (March 7) OK for up to 100 kJ stored energy (~1e12p at 450 GeV), as given before. Collimation also OK for stable beams at 450GeV. This assumes that golden orbit and reference optics is well re-established.

- More accurate set-up with 2e11 p per beam (planned for next days) will provide more accurate set-up and larger intensity reach of collimation.

01/05/2010

- While preparation of the material for access test injection of two bunches with 6x10^10 p:
  - injected pilots B1 and B2 at 5-6e9 - all O.K.
  - overinjected LHCINDIV 6e10 into pilots - all O.K. (but BLMs in IP2 and IP8 were masked)
  - injected 2nd bunch of each beam bucket 17851 and bucket 8911 with 6e10 for each one - All O.K.
  - Good lifetime at injection tunes
  - Set tunes to collision values in the process lost some beam 1 due to mistyping in the trim editor…otherwise 25 hours lifetime
  - Issues remaining: calibration of BPMs in LSS6 vs. intensity and BLMs at TDI

- During the afternoon we had also two trips of the ALICE solenoid. ALICE in contact with piquet

01/05/2010

- Several problems during the day:
  - Collimator control problem in point 7 2 collimators in unknown position ➔ Access from 12:00 to 14:00
  - Found faulty power supply on collimator controller ➔ Replaced
  - QPS communication problem access from 19:00 to 23:00
  - In the shadow access to fix problem with triggers for bunch length measurements on beam 1 (CO+RF) ➔ fixed
  - Two trips of the ALICE solenoid. Power converter over-temperature detection
  - 03:00 : 400 kV drop.

01/05/2010

- While preparation of the material for access test injection of two bunches with 6x10^10 p:
  - injected pilots B1 and B2 at 5-6e9 - all O.K.
  - overinjected LHCINDIV 6e10 into pilots - all O.K. (but BLMs in IP2 and IP8 were masked)
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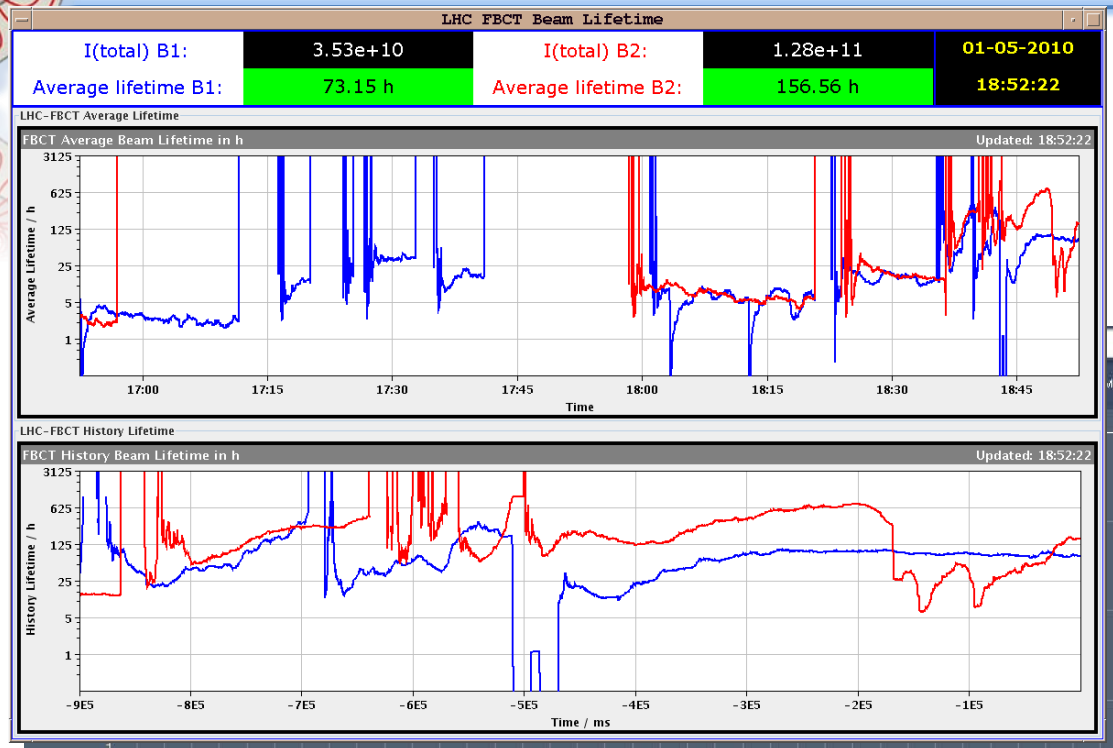
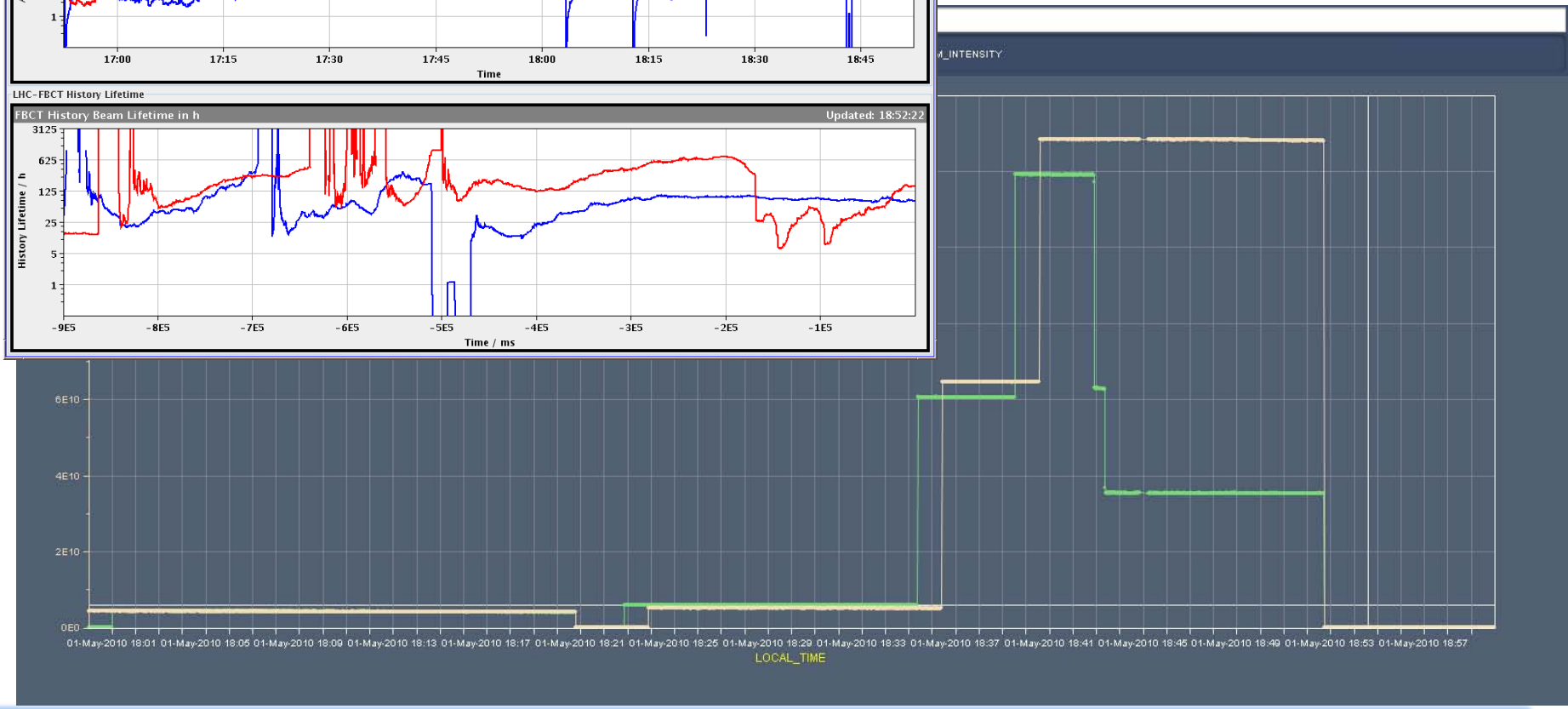
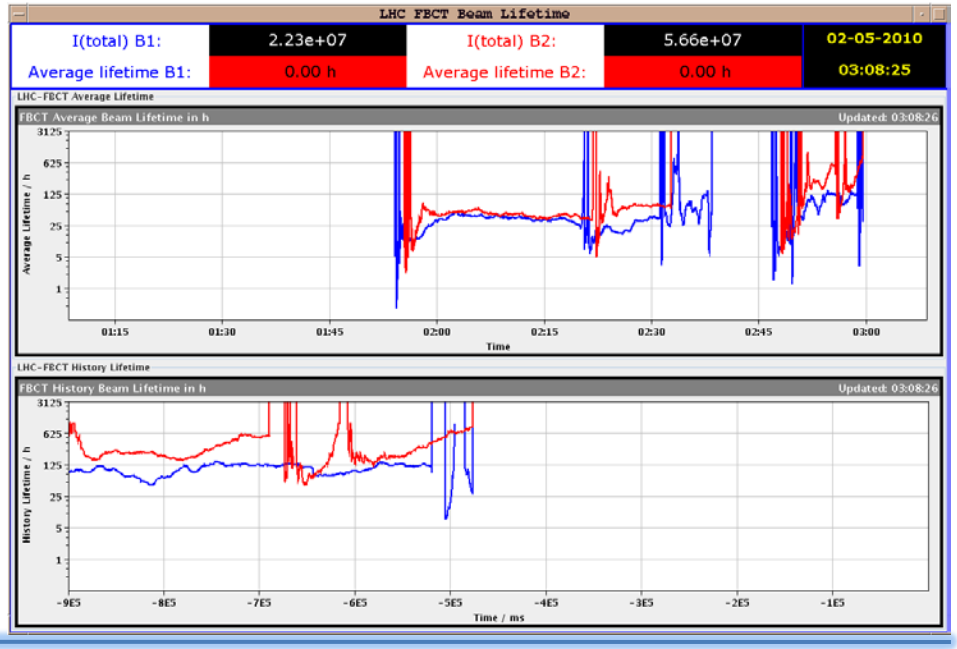
01/05/2010


LHC FBCT Beam Lifetime
I(total) B1:
3.53e+10
I(total) B2:
1.28e+11
01-05-2010
Average lifetime B1:
73.15 h
Average lifetime B2:
156.56 h
18:52:22
LHC-FBCT Average Lifetime
FBCT Average Beam Lifetime in h
Updated: 18:52:22
Average Lifetime / h
3125
625
125
25
5
1
17:00
17:15
17:30
17:45
18:00
18:15
18:30
18:45
Time
LHC-FBCT History Lifetime
FBCT History Beam Lifetime in h
Updated: 18:52:22
History Lifetime / h
-9E5
-8E5
-7E5
-6E5
-5E5
-4E5
-3E5
-2E5
-1E5
Time / ms

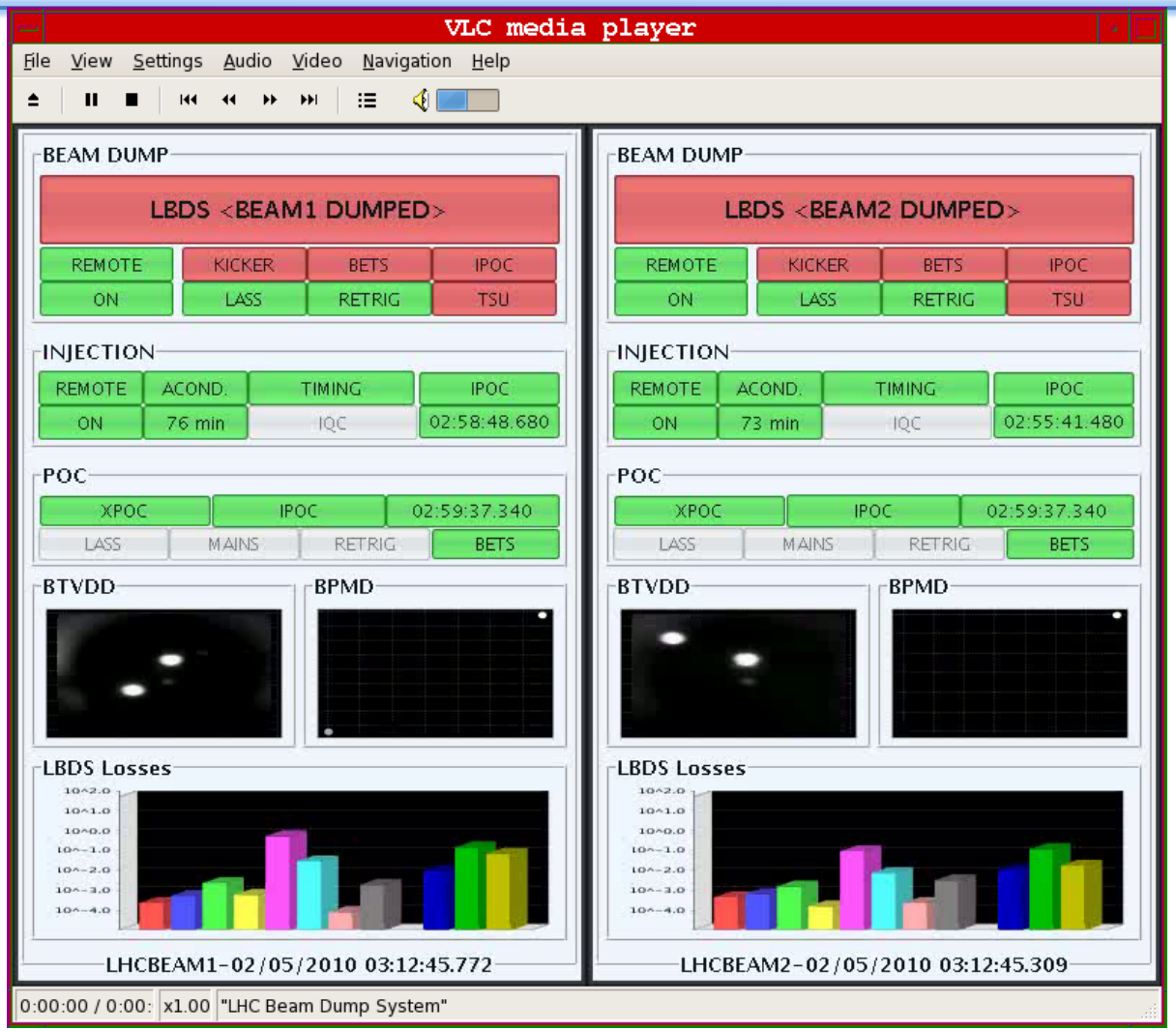

M_INTENSITY
6E10
4E10
2E10
0E0
01-May-2010 18:01 01-May-2010 18:05 01-May-2010 18:09 01-May-2010 18:13 01-May-2010 18:17 01-May-2010 18:21 01-May-2010 18:25 01-May-2010 18:29 01-May-2010 18:33 01-May-2010 18:37 01-May-2010 18:41 01-May-2010 18:45 01-May-2010 18:49 01-May-2010 18:53 01-May-2010 18:57
LOCAL_TIME

02/05/2010

B1 and B2 intensity and lifetime



02/05/2010



Power cut:

Beams were dumped correctly: FMCM triggered first.

02/05/2010

- 8:50 – Injecting again bunches in the machine – Beam parameters restored.
- 9:05 : 1st fill for "test run" with injection of **2x2, 1x10^{11}/bunch**

  No lifetime problems (although beam 1 worse than beam 2) during injection with separated beams (a small drop followed quickly by recovery, no loss in intensity)
- 9:40 : Separation bump collapsed, **all IPs at once**, lifetime of about 5 h for both beams

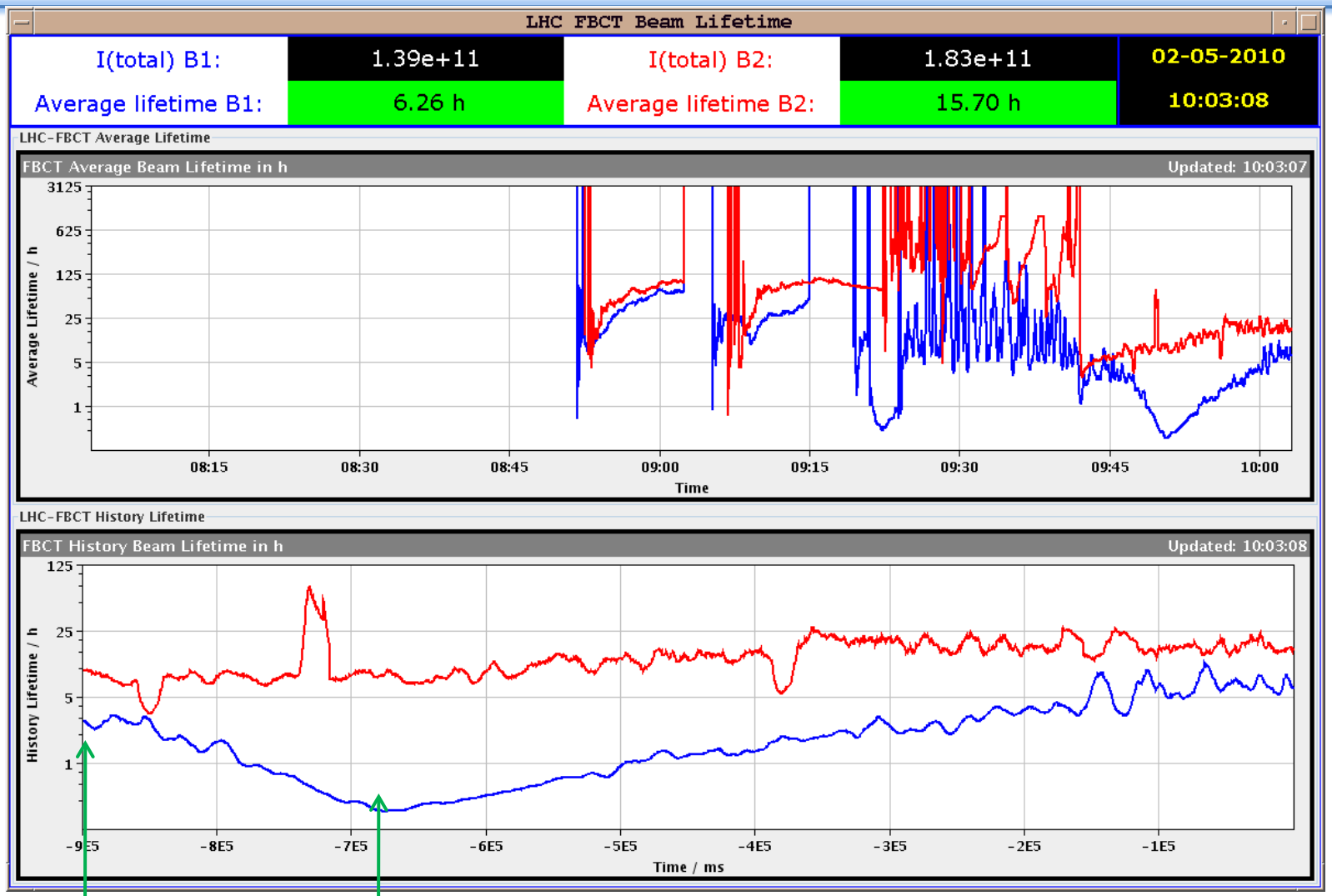
  → Clear degradation of beam 1 lifetime

  Clearly beam-beam effects are here, as expected…

  Lifetime is worst for bunch 1 of beam 1 which encounters the most number of collisions (3 collisions) – while both beam 2 bunches have equal number of collisions -Werner Herr-

  → Not a problem as cured by changing B1 Qh by + 0.006

02/05/2010



Bunch lifetime evolution at the start of ng the “test” run fill

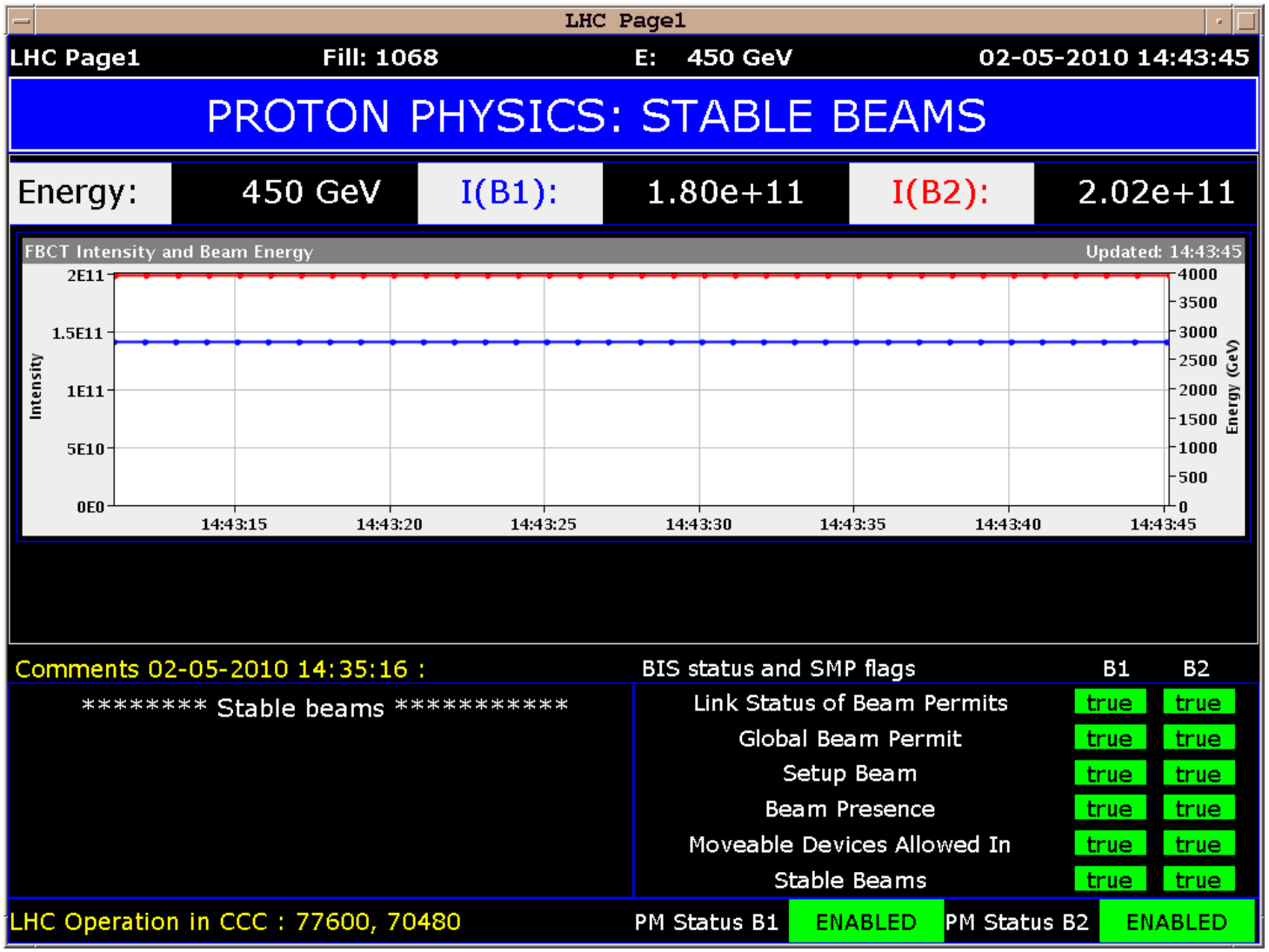
Collapsed bumps

B1 Qh changed

02/05/2010

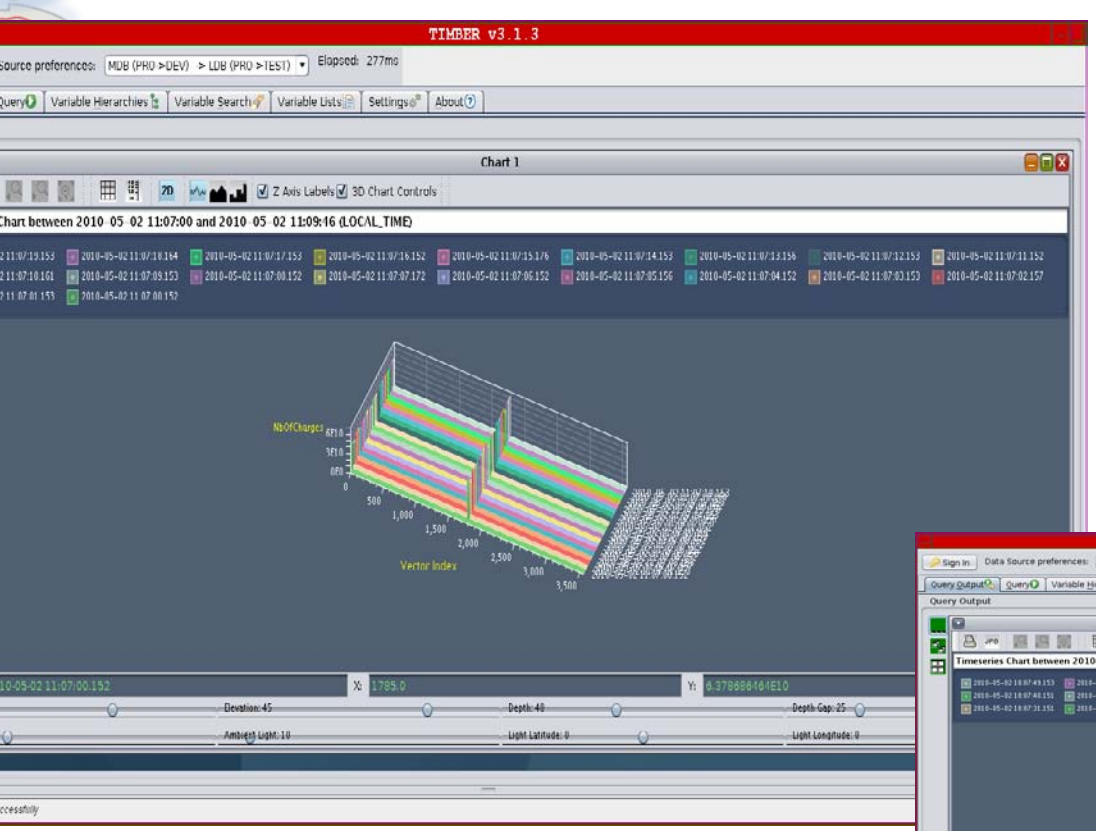
- 13:44 : Filling again for Stable Beams, 1e11/ bunch, 2x2
- Emittance measurements :
  B1 H : 2.0 - V : 2.4 - B2 H : 3.0 - B2 V : 3.2
- 14:10: Collapsing bumps, all at once
- As before, B1 lifetime dropped. Trimmed first the B1 Qh down by 0.005, the lifetime dropped further. Trimmed B1 Qh up to nominal+0.005 : lifetime recovered
- Emittance measurement after separation bump collapse :
  B1 H : 1.9 - V : 2.2 - B2 H : 3.1 - B2 V : 3.2
- All interlocks activated
- 14:34 : STABLE BEAMS
- Luminosity scans “manually” performed for all IPs
- On the accelerator beam physics side: a lot of beam parameters data were taken – being analysed by all teams

02/05/2010

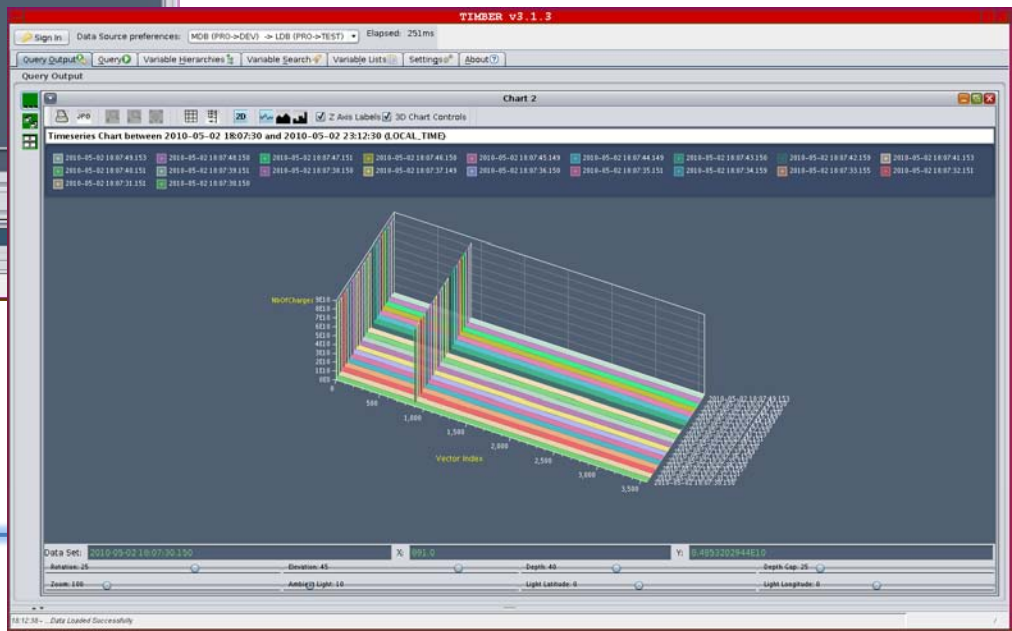

LHC Page1
LHC Page1 Fill: 1068 E: 450 GeV 02-05-2010 14:43:45
PROTON PHYSICS: STABLE BEAMS
Energy: 450 GeV I(B1): 1.80e+11 I(B2): 2.02e+11
FBCT Intensity and Beam Energy
Updated: 14:43:45
Intensity
Energy (GeV)
2E11
1.5E11
1E11
5E10
0E0
4000
3500
3000
2500
2000
1500
1000
500
0
14:43:15
14:43:20
14:43:25
14:43:30
14:43:35
14:43:40
14:43:45
Comments 02-05-2010 14:35:16 :
******** Stable beams **********
BIS status and SMP flags
B1
B2
Link Status of Beam Permits true true
Global Beam Permit true true
Setup Beam true true
Beam Presence true true
Moveable Devices Allowed In true true
Stable Beams true true
LHC Operation in CCC : 77600, 70480
PM Status B1 ENABLED
PM Status B2 ENABLED

02/05/2010

Beam 1/2 intensity measurements bunch by bunch – Michael Ludwig



Beam 1: first bunch mainly affected



Observations during the first 1.5 hours of the stable beam period

Werner Herr -Emanuele Laface

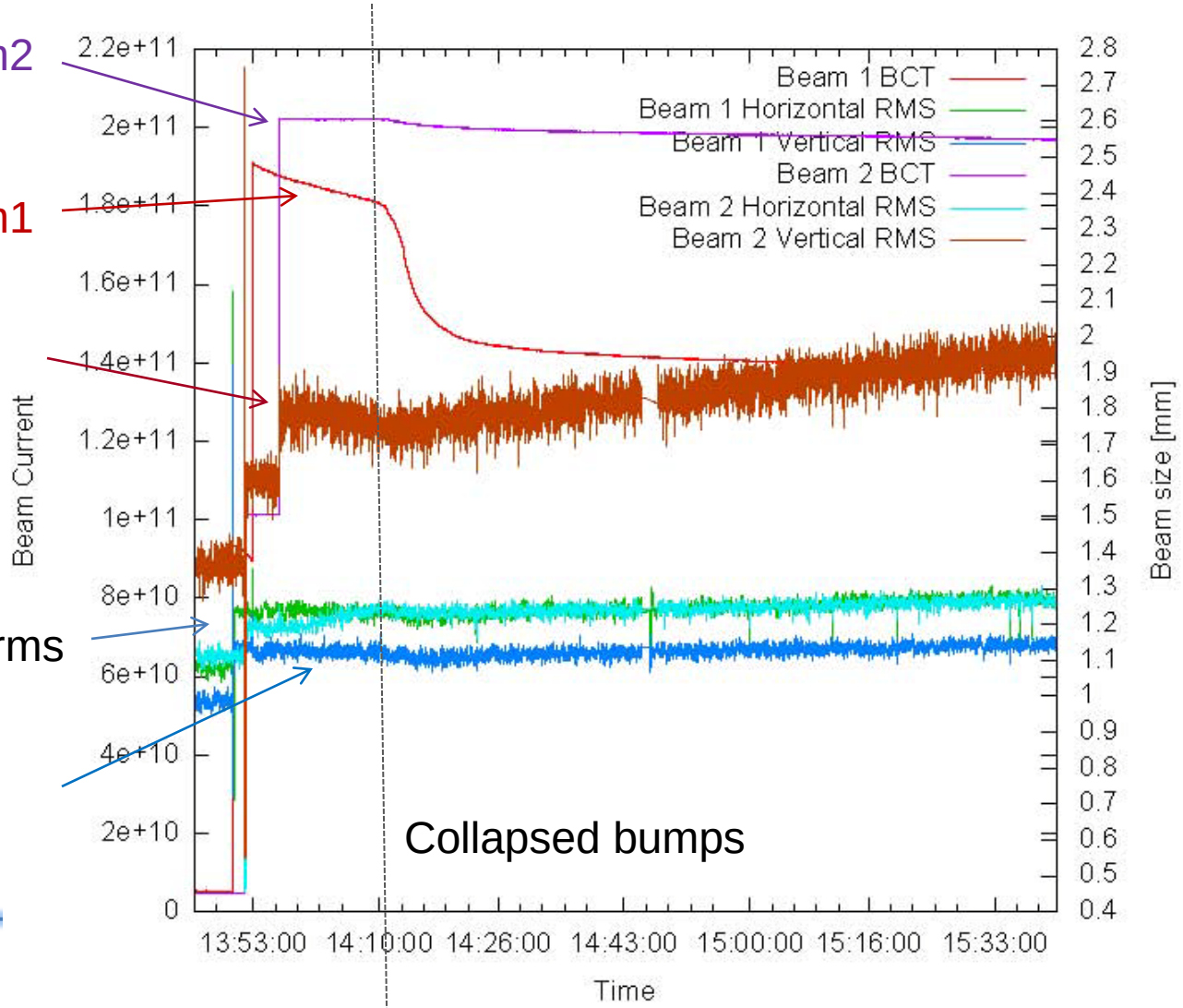
BCT beam2

BCT beam1

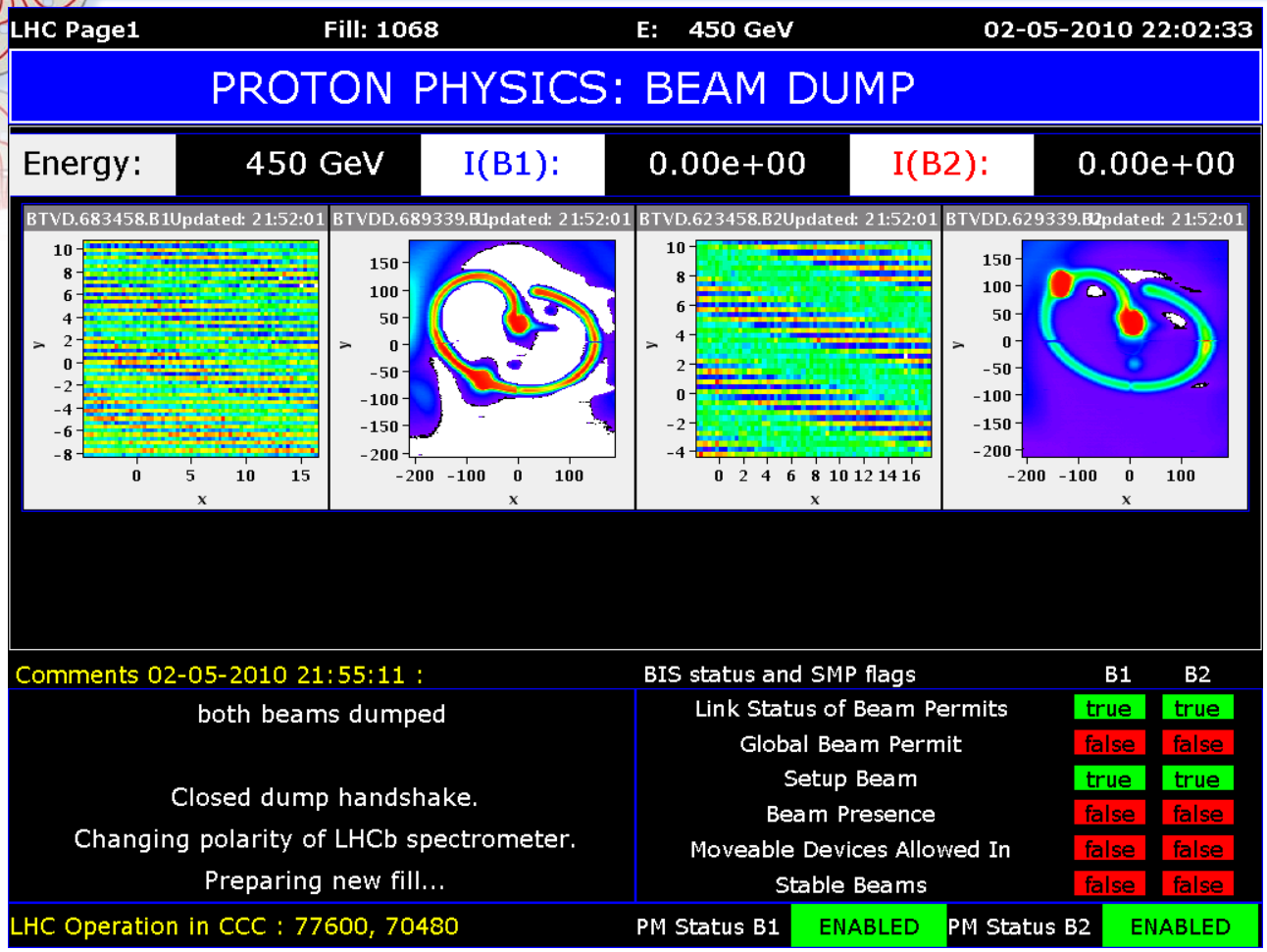
B2 V rms

B1 H - V rms

B2 H rms

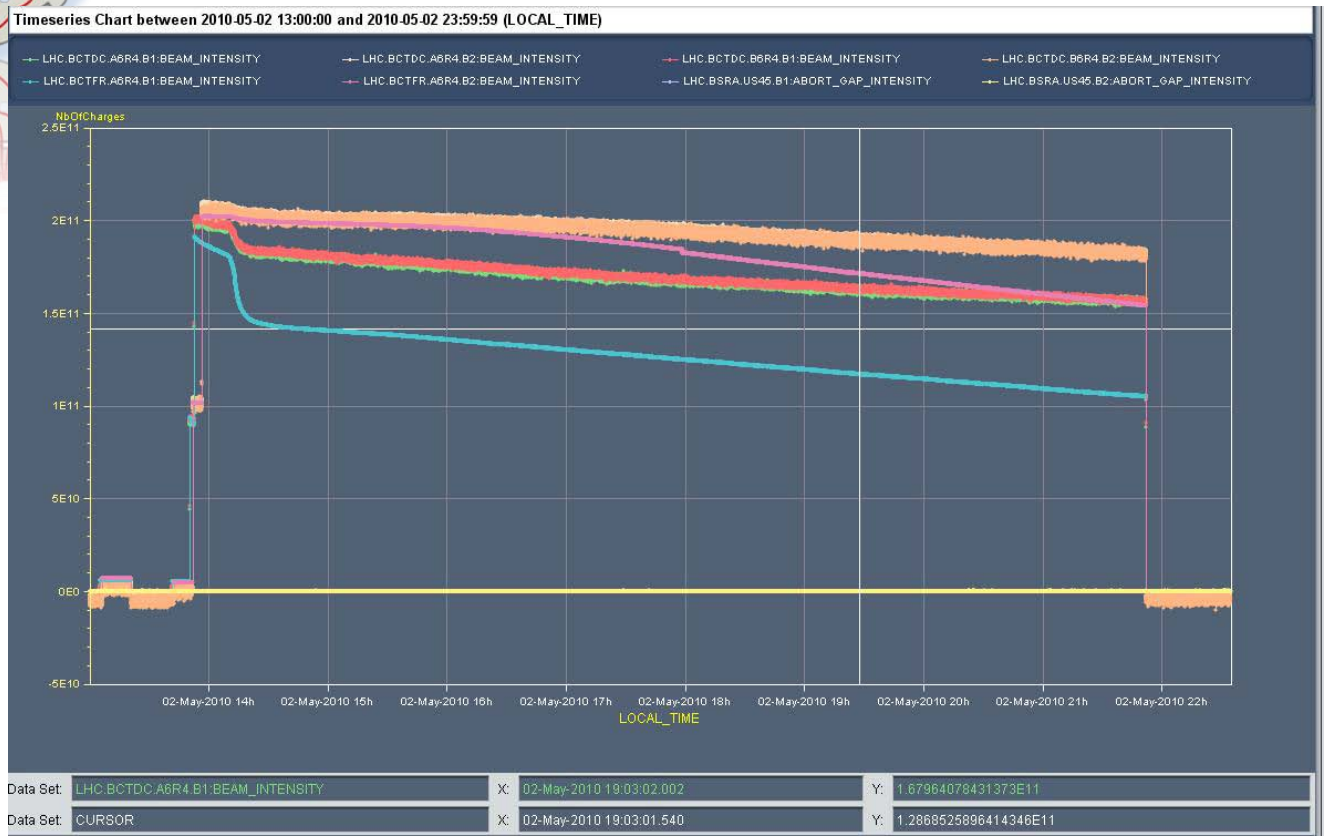


02/05/2010



Losses during the dump higher by factor 2.5 for beam 1 as compared to beam 2 (J. Uythoven)

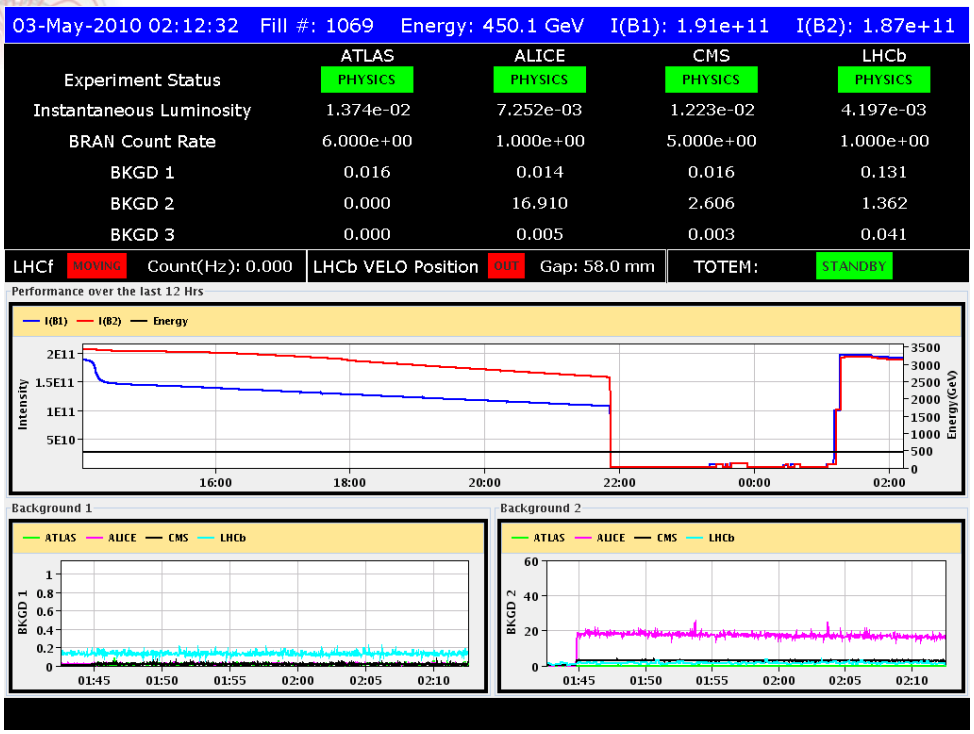
02/05/2010

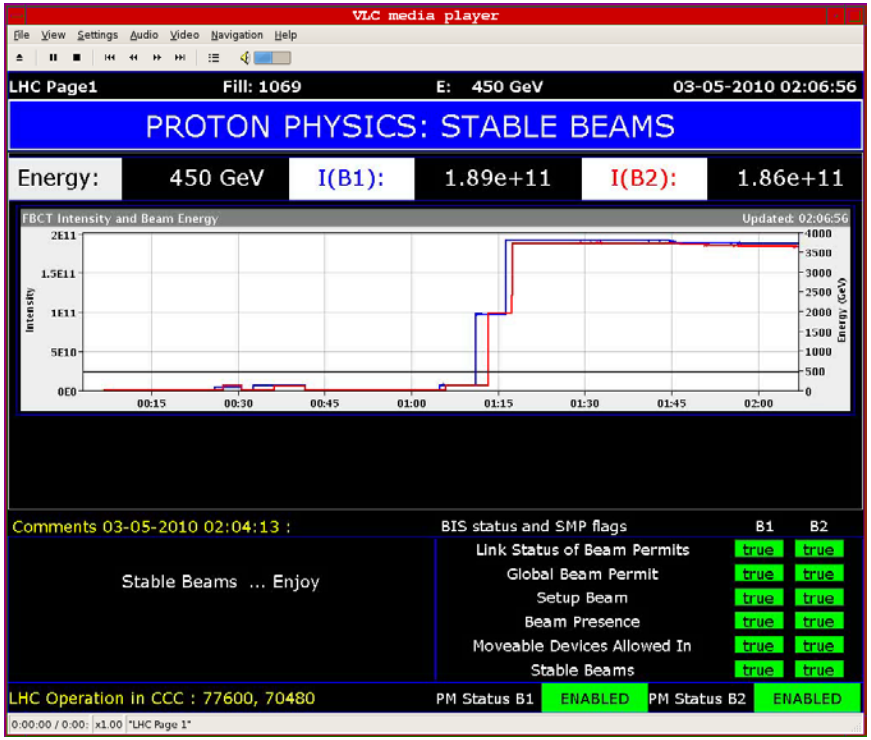


J. Uythoven

Decrease of the total intensity measured by Fast BCT faster than for DCBCT – longitudinal lifetime seems to be lower for B1 than for B2

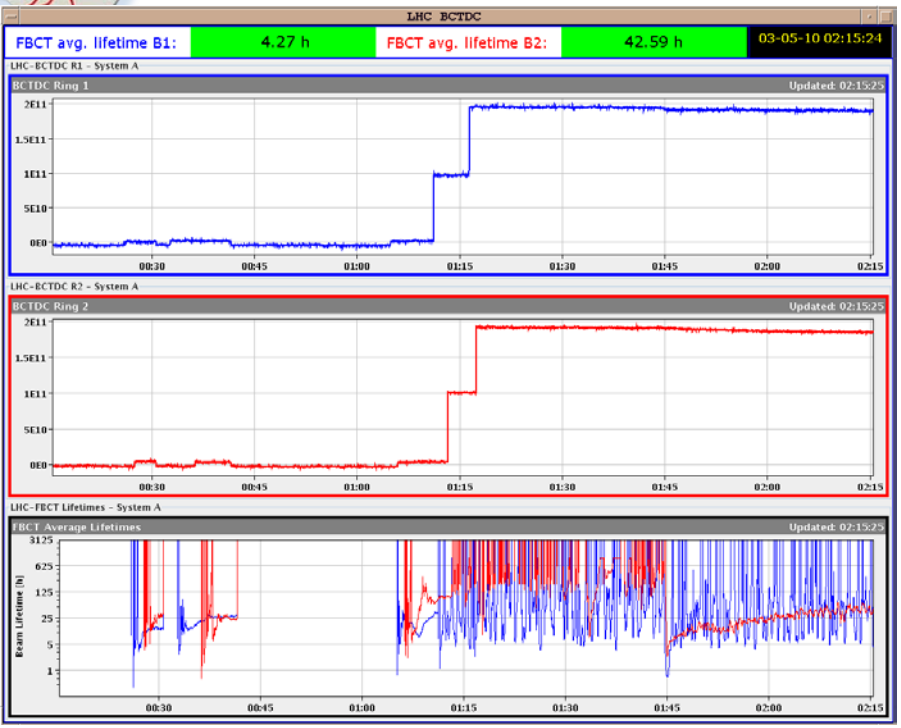
02/05/2010

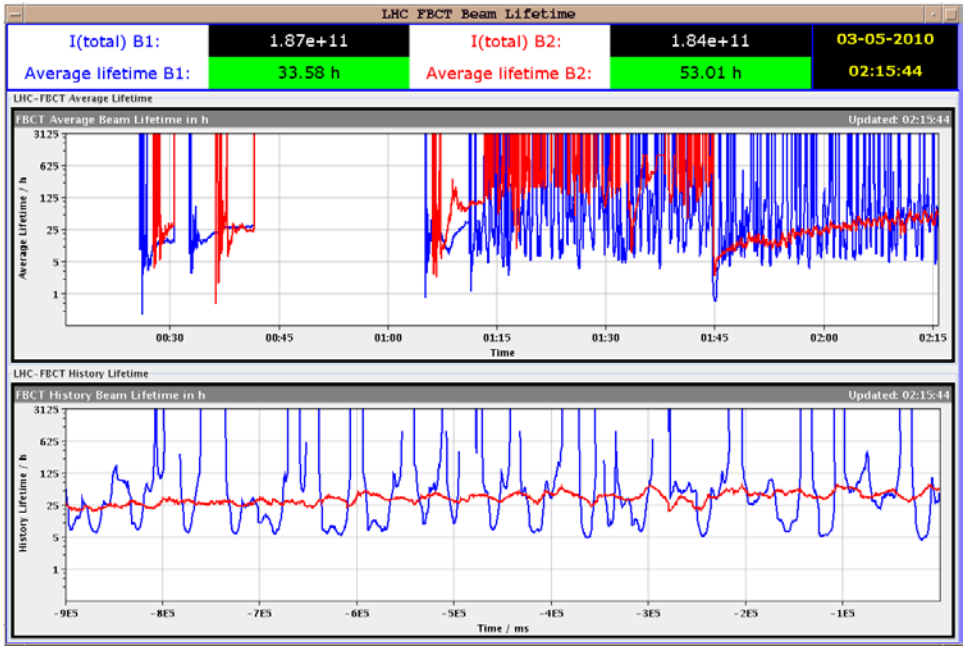




02:04 Stable beams for the second time after LHCb polarity switch and some troubles at injection

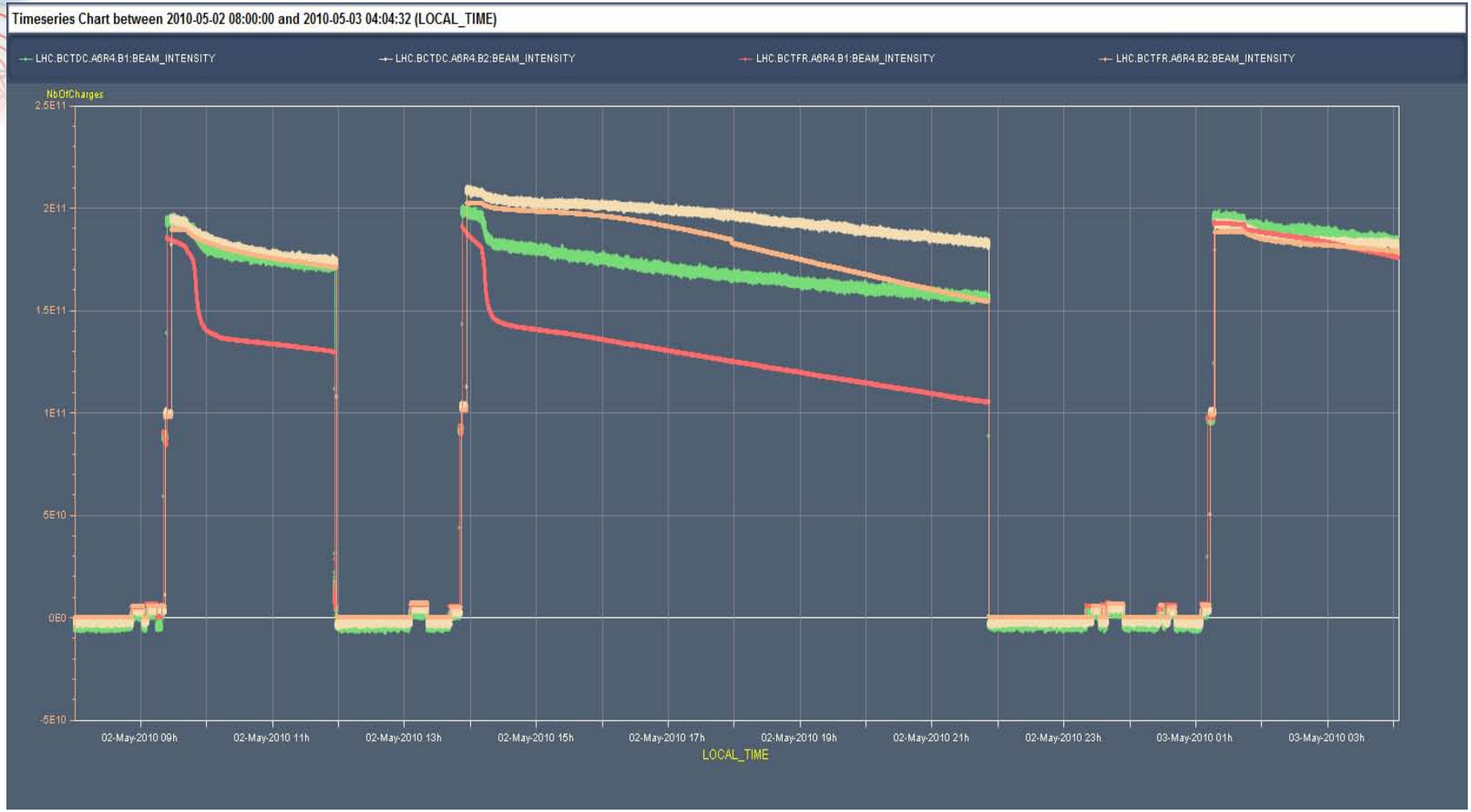
02/05/2010





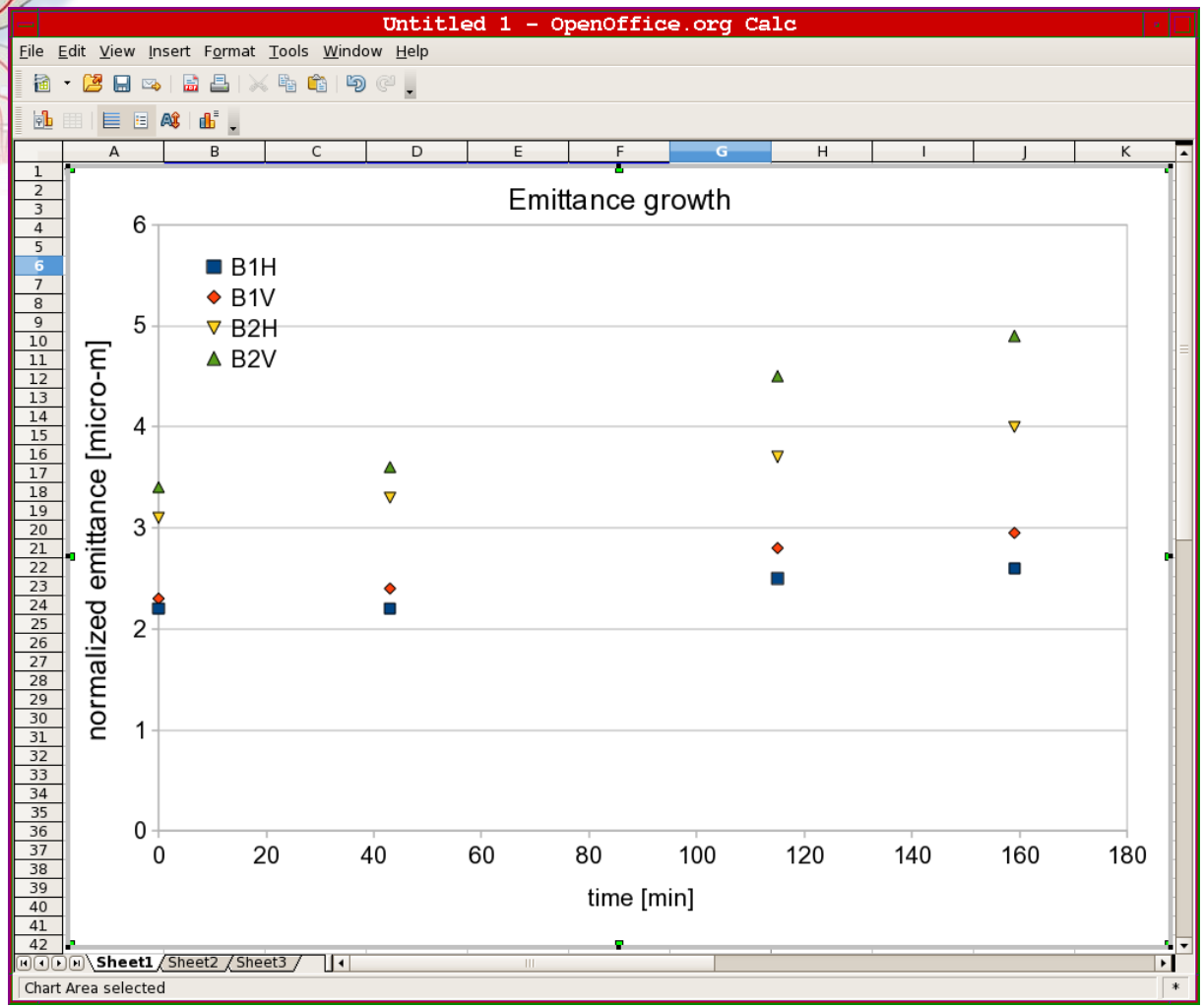
Second fill with better lifetime conditions for B1 after RF phase loop adjustment (thanks Philippe). It seems that most of the experiments have gained except LHCb ➔ VdM scan

03/05/2010


Timeseries Chart between 2010-05-02 08:00:00 and 2010-05-03 04:04:32 (LOCAL_TIME)
LHC.BCTDC.A6R4.B1:BEAM_INTENSITY
LHC.BCTDC.A6R4.B2:BEAM_INTENSITY
LHC.BCTFR.A6R4.B1:BEAM_INTENSITY
LHC.BCTFR.A6R4.B2:BEAM_INTENSITY
NbOfCharges
2.5E11
2E11
1.5E11
1E11
5E10
0E0
-5E10
02-May-2010 09h
02-May-2010 11h
02-May-2010 13h
02-May-2010 15h
02-May-2010 17h
02-May-2010 19h
02-May-2010 21h
02-May-2010 23h
03-May-2010 01h
03-May-2010 03h
LOCAL_TIME

03/05/2010

F. Schmidt, R. Miyamoto



- Remaining issues:
  - Check bunch length measurements for high intensity ➔ very important tool for impedance measurements
  - Inject and Dump
  - TDI losses during over-injection
  - BPM calibration vs. intensity

Today

Week 18 coordination : Joerg Wenninger and Oliver Bruening

Proposed plan for today:

- 9:00 – 11:00 : 450 GeV EOF studies on beam-beam
- then continuation of the setting-up of machine protection for higher beam intensity