

Beam Loss Detector for new ESRF Ring

- 1) **Presentation of our present BLDs with some results**
- 2) **What kind of BLDs & acquisition electronics to add in the future ?**

Questions :

- **what kind of detector ? (scintillator / radiator e.g. Cherenkov, Gamma ?)**
- **what kind of visible photon to electrical convertor (PMT ?)**
- **can all light sources (3 to 6 GeV electrons) agree on a common & optimized type of BLD ?**
- **this including the acquisition electronics ?**
- **resulting in a complete & a commercial system ?**
- **could development costs be covered by a European funding scheme ?**

some worries with the new L.E. ESRF Ring

- Now :**
- no top-up, instead injections 2 or 3 times a day**
 - injection efficiency reasonable**
 - lifetime >50hrs (depending on filling mode)**
 - degradation on (some) ID-magnets noticeable after 10 years**

- Future :**
- regular top-up,**
 - achievable injection efficiency ... ?**
 - lifetime <10Hrs or even (much) lower ...?**
 - degradation on ID-magnets in less then a year ..?!**

We think BLDs will play an important role in the future, together with dose-monitors (like the DOSFET devices)

Upgrades on the BeamLoss Detectors

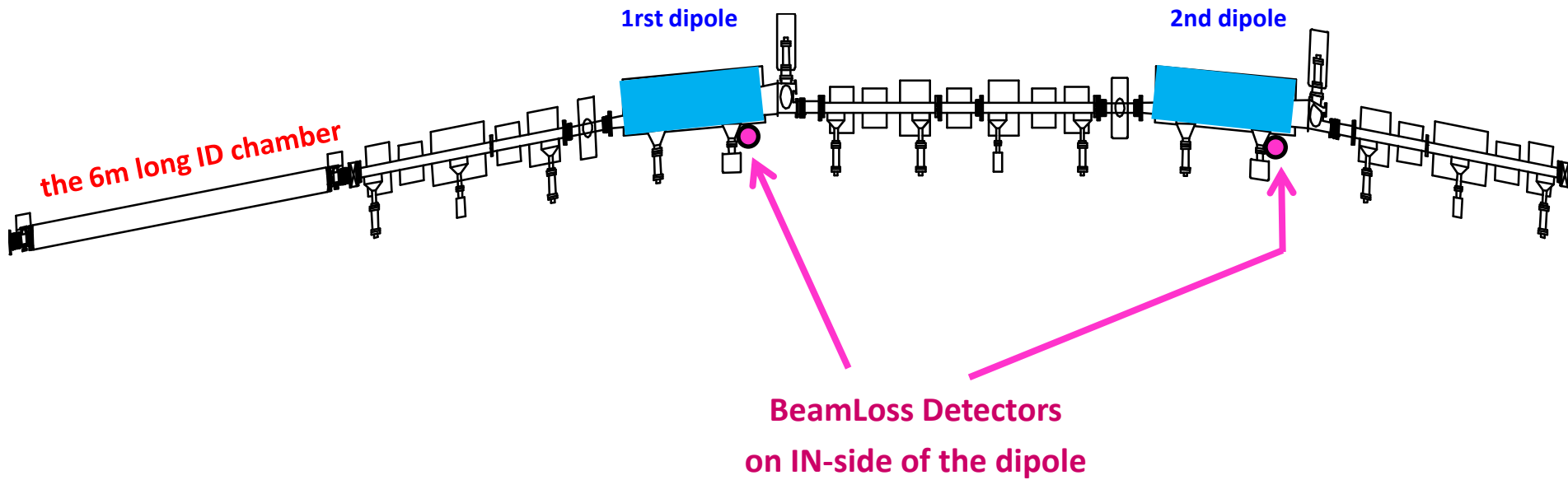
The vacuum lay-out of 1 cell (1 / 32 of the Ring) with :

the 6m long ID chamber

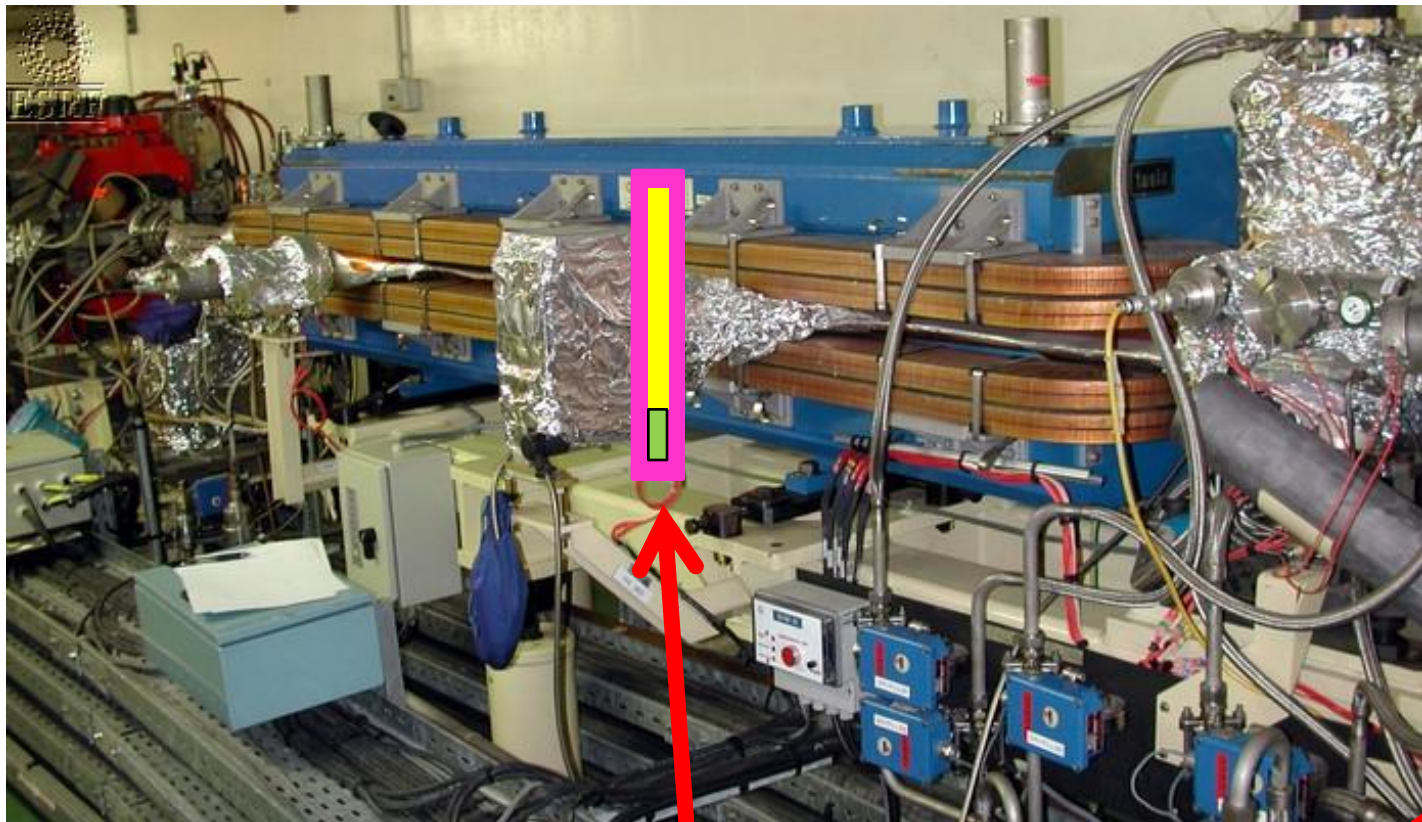
the 2 dipoles

the 2 BeamLoss Detectors

Top View

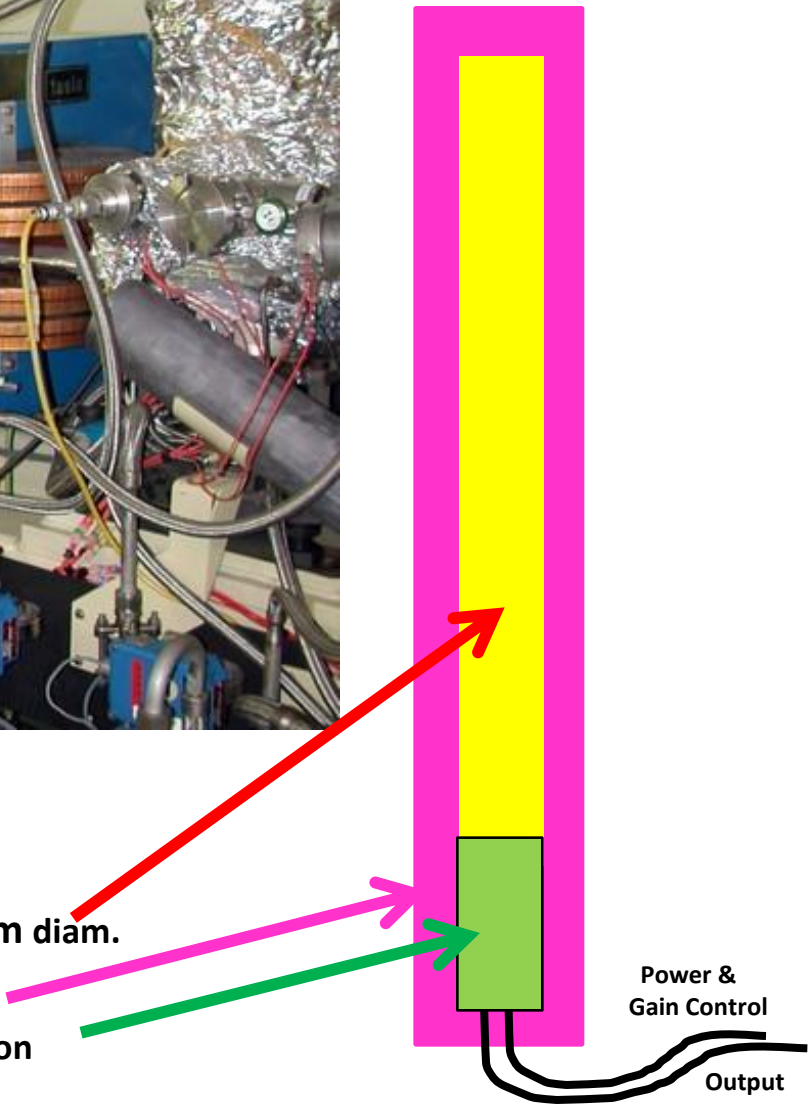


So : in total 64 BLDs in the Ring



Beam Loss Detector :

on the inside of each of the 64 Dipoles,
Perspex Cherenkov radiator rod of 600mm x 25mm diam.
with a 10 mm tubular Lead shielding
and a Photomultiplier tube for light amplification



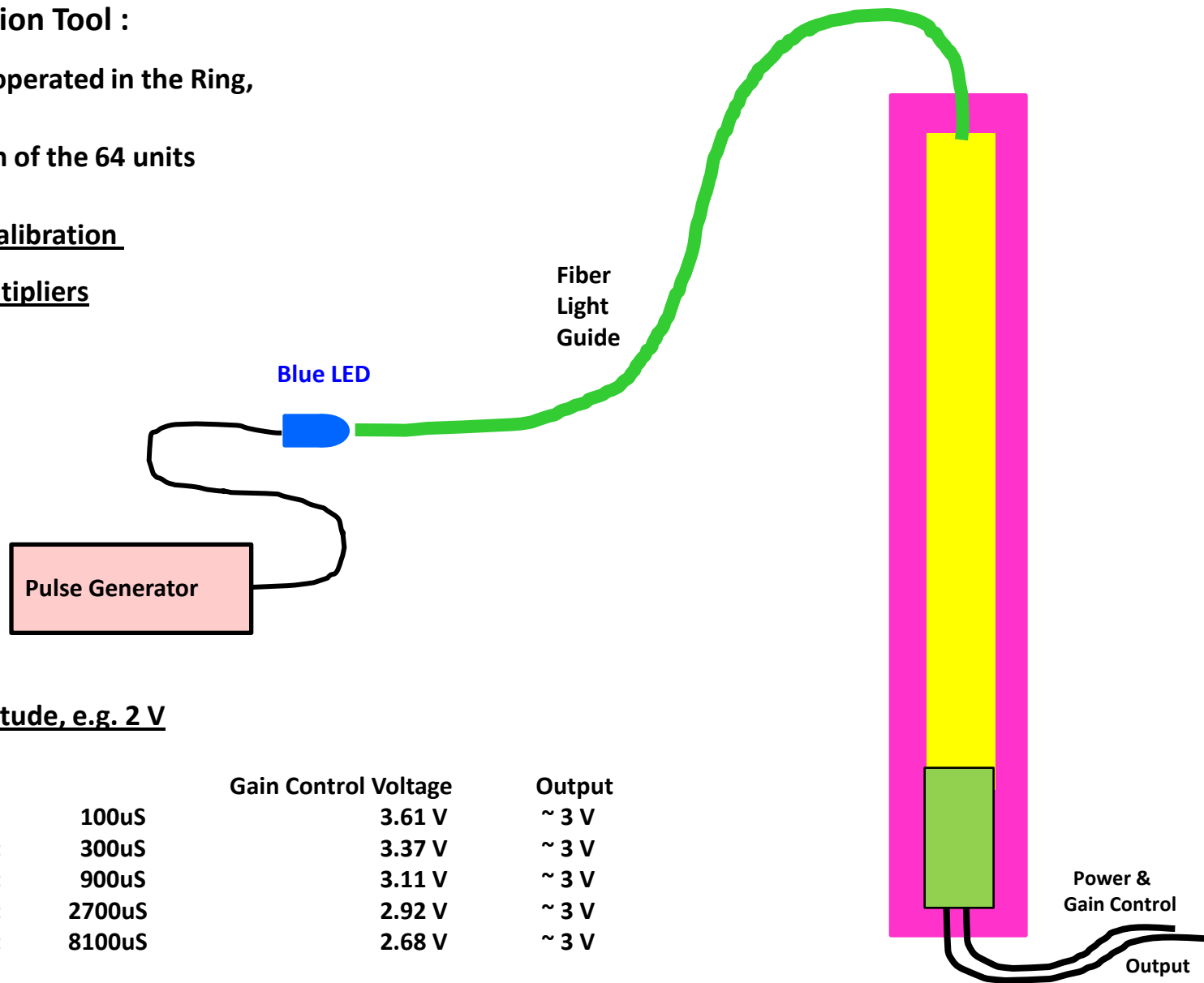
Calibration Tool :

portable, manually operated in the Ring,

consecutively on each of the 64 units

only does a relative calibration

of all the Photon-Multipliers

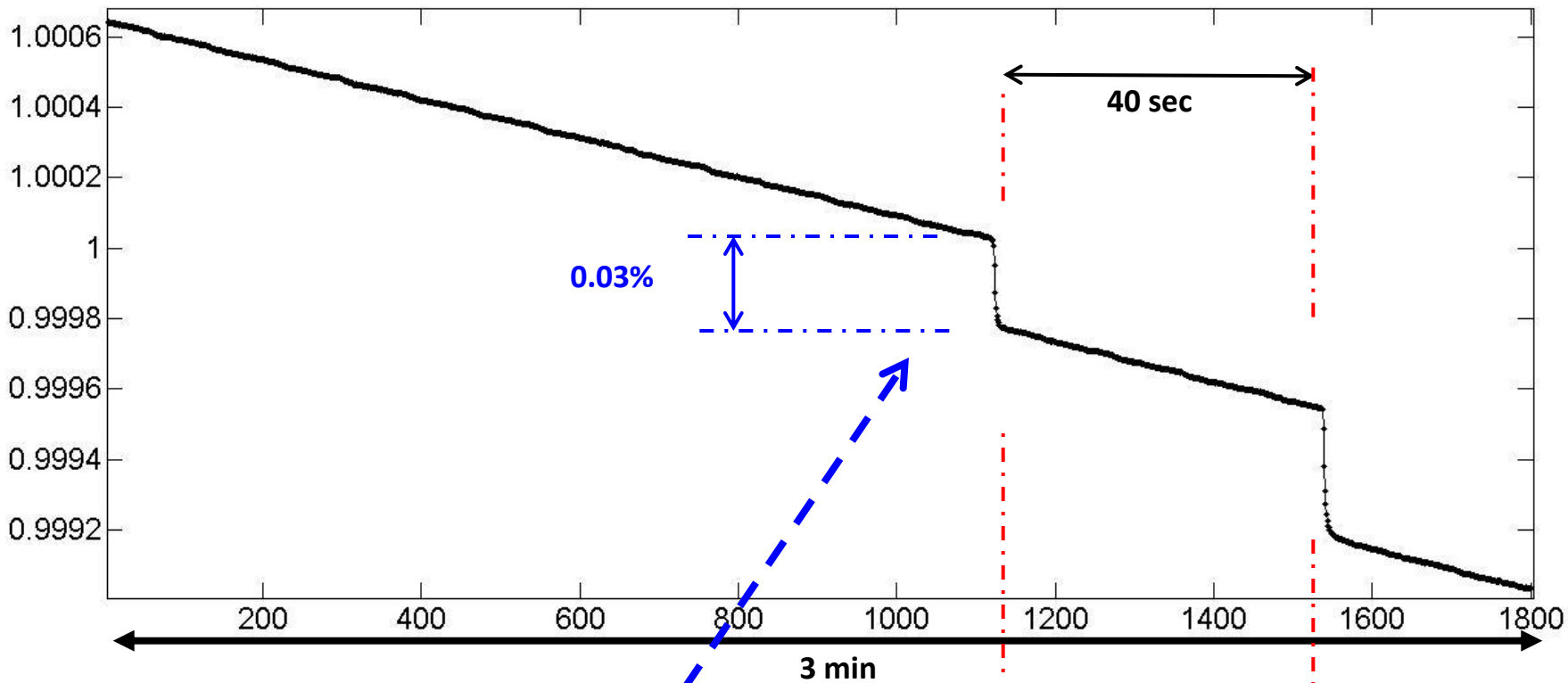


fixed, stable amplitude, e.g. 2 V

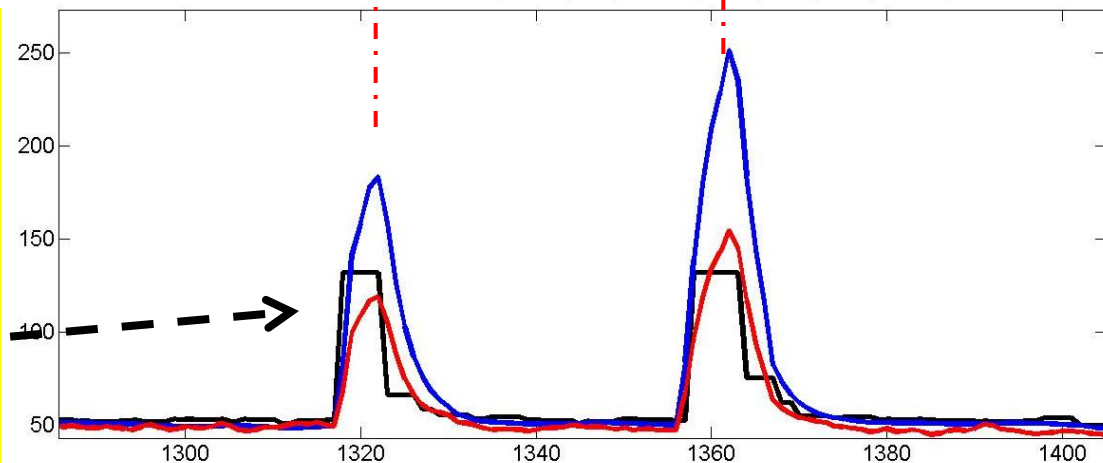
		Gain Control Voltage	Output
pulse width :	100uS	3.61 V	~ 3 V
“ “ :	300uS	3.37 V	~ 3 V
“ “ :	900uS	3.11 V	~ 3 V
“ “ :	2700uS	2.92 V	~ 3 V
“ “ :	8100uS	2.68 V	~ 3 V

The PM & electronics work in integrated mode (NOT counting mode)
output is filtered (1Hz BW) & amplified & digitized

double instant beam-drop with ~40sec interval, seen by SR-BPMs (Sum signal)

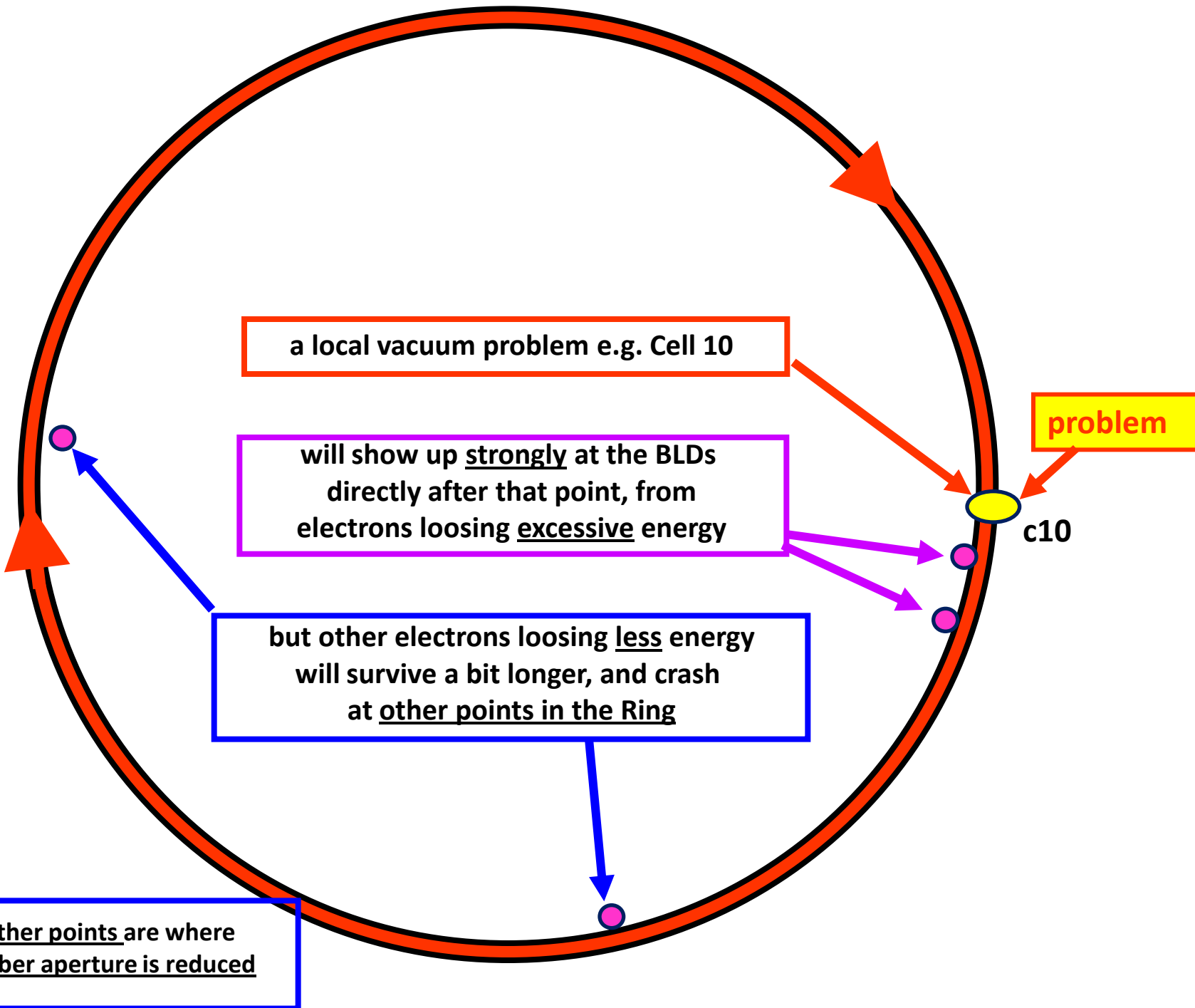


three BLDs in Cell 30, black =at ID, blue (X60) is at dipole-1, red (X300)is at dipole-2

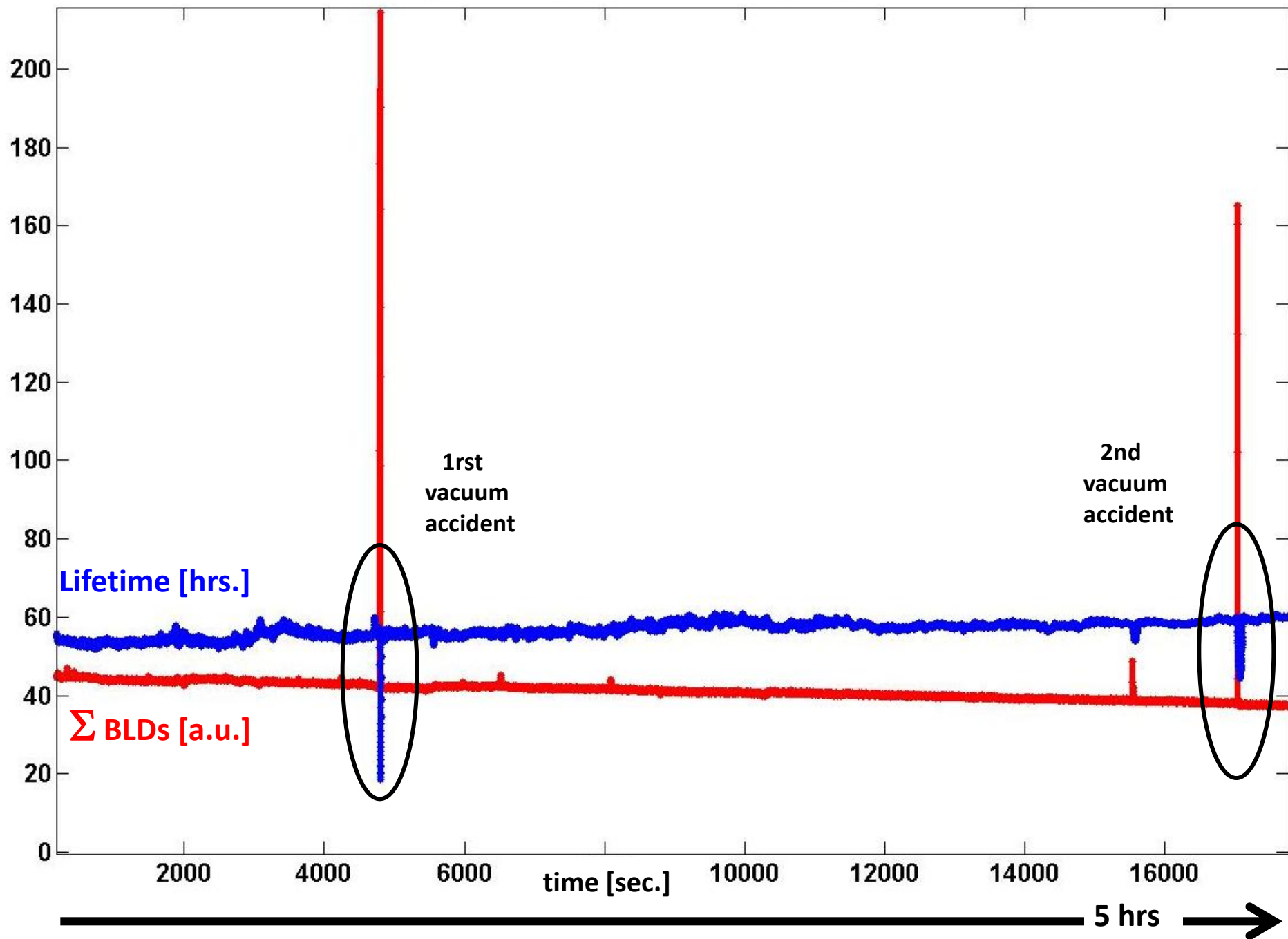


2 beam-drops caused by a local (C-30) vacuum outgassing, seen by current monitor (Sum-BPMs) for quantizing

and by BLDs for localizing

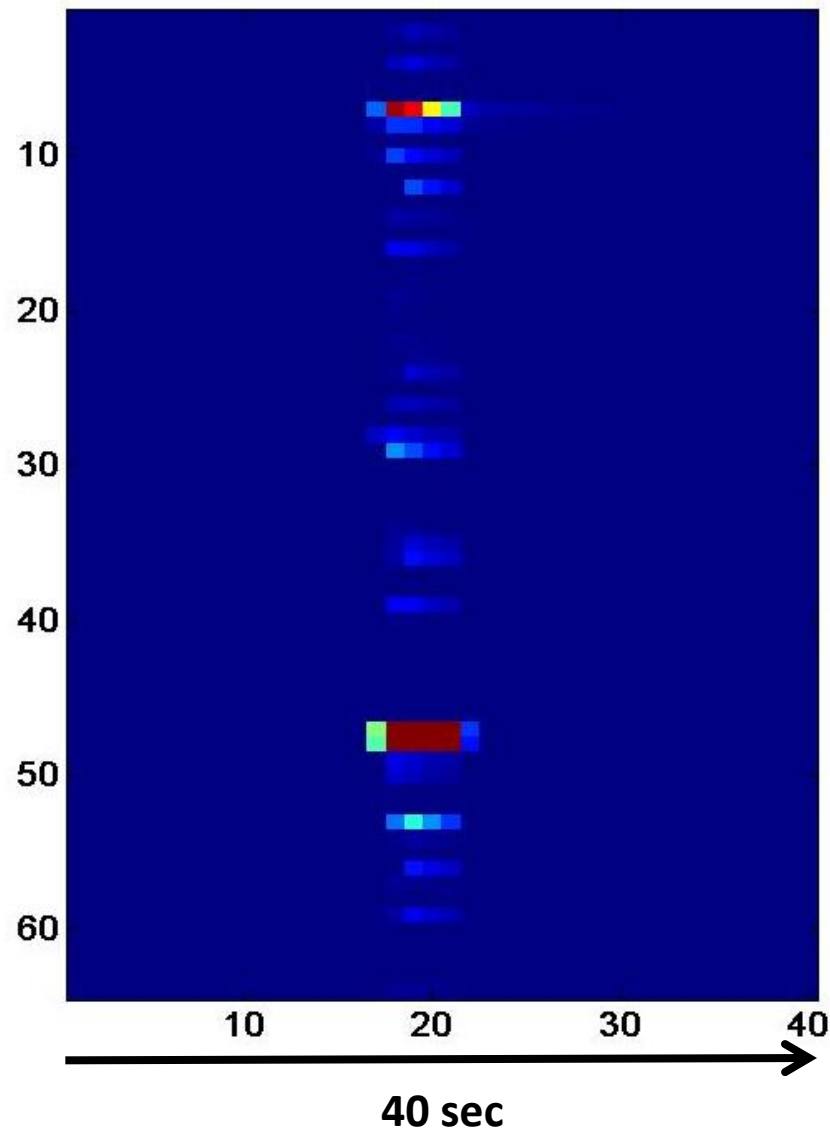
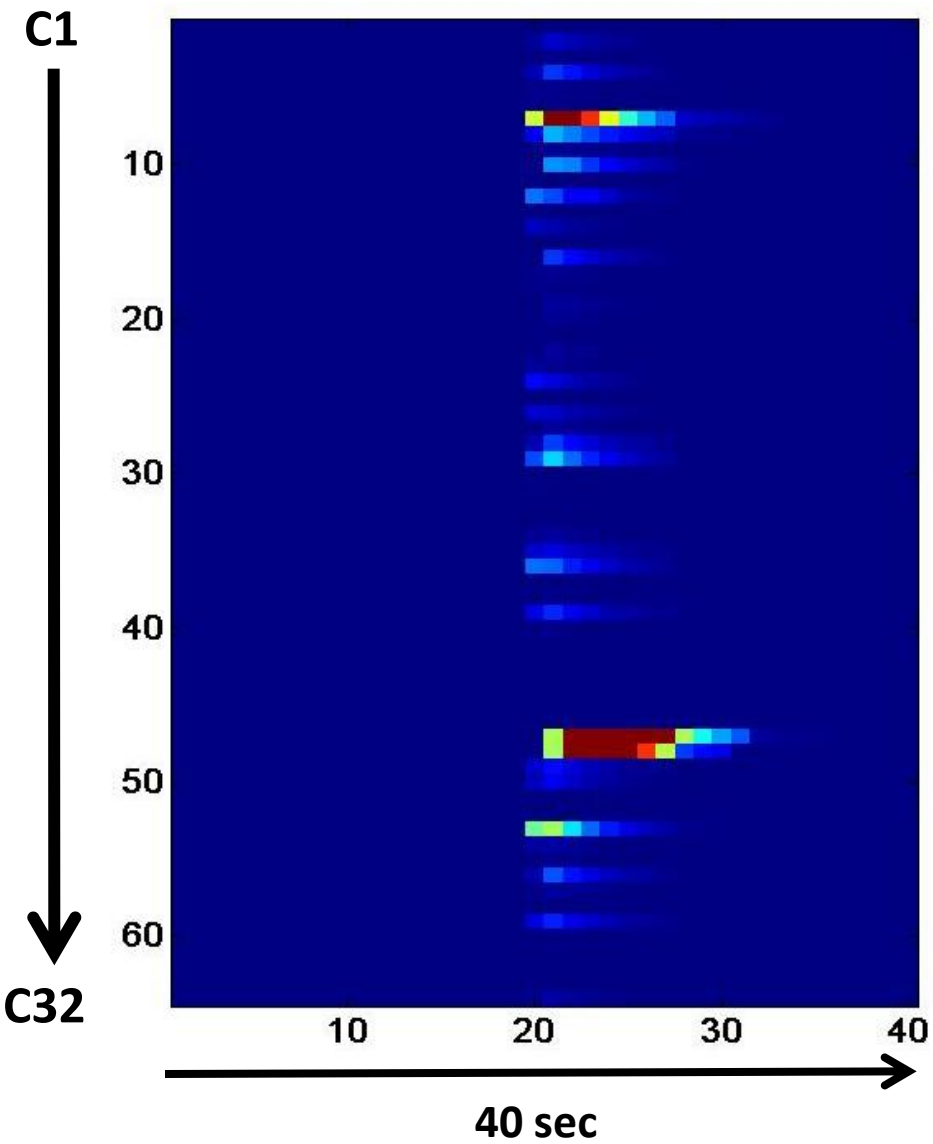


5 hours recording (1sec sampling) of BeamLoss (RED) and Lifetime (BLUE)

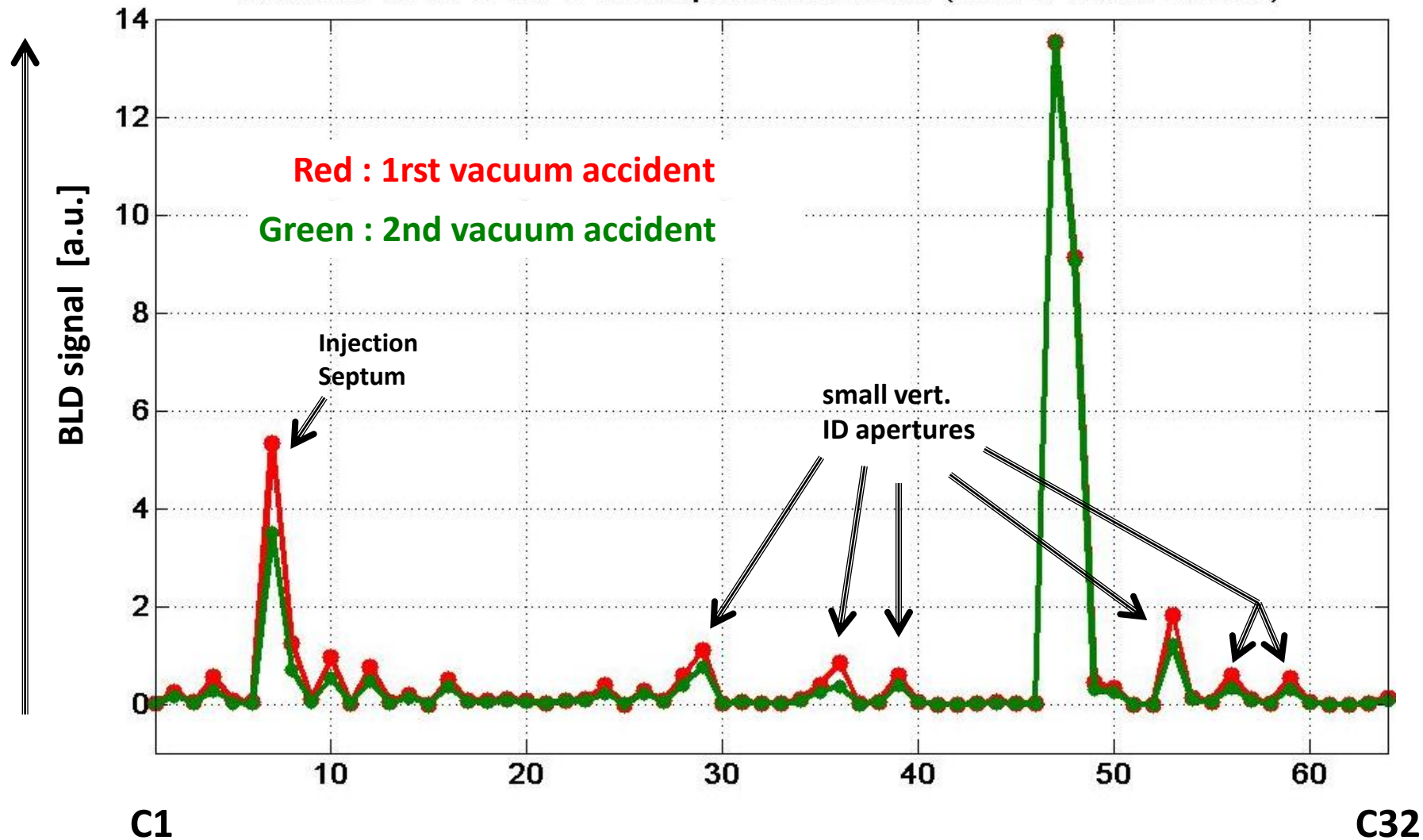


1rst vacuum accident

2nd vacuum accident



details of all 64 BLDs of two separate accidents (Cell 24 Pressure Rise)



Brilliance- BPM

224 Units in service for Orbit Correction



**and also for Turn-by-Turn
Orbit measurements**

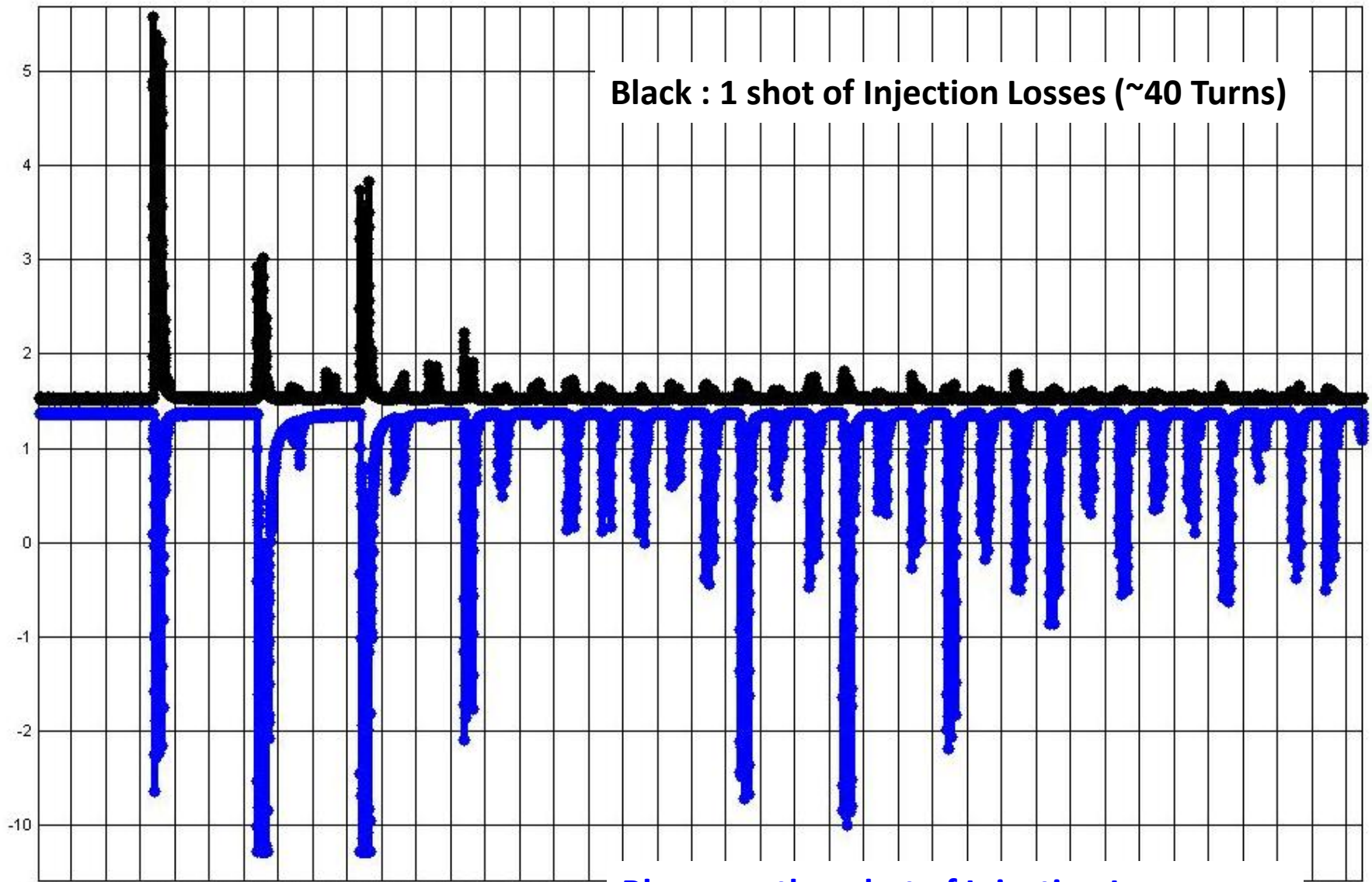
Beam Loss Monitor

1 unit procured & installed (for 4 BLDs)



**and also for Turn-by-Turn
Loss measurements**

on a "Fast-Compact BLD" on 1st dipole C4

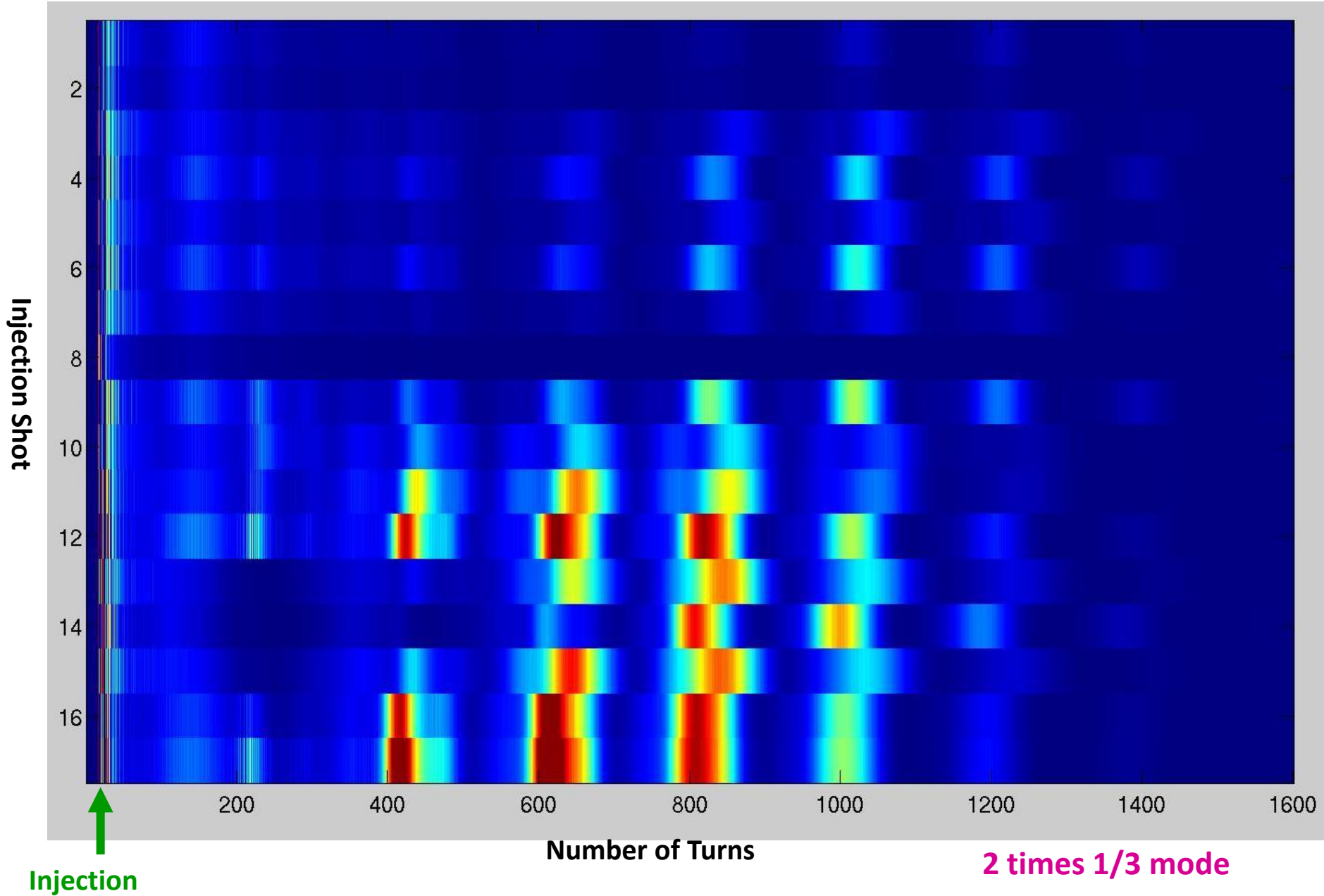


Black : 1 shot of Injection Losses (~40 Turns)

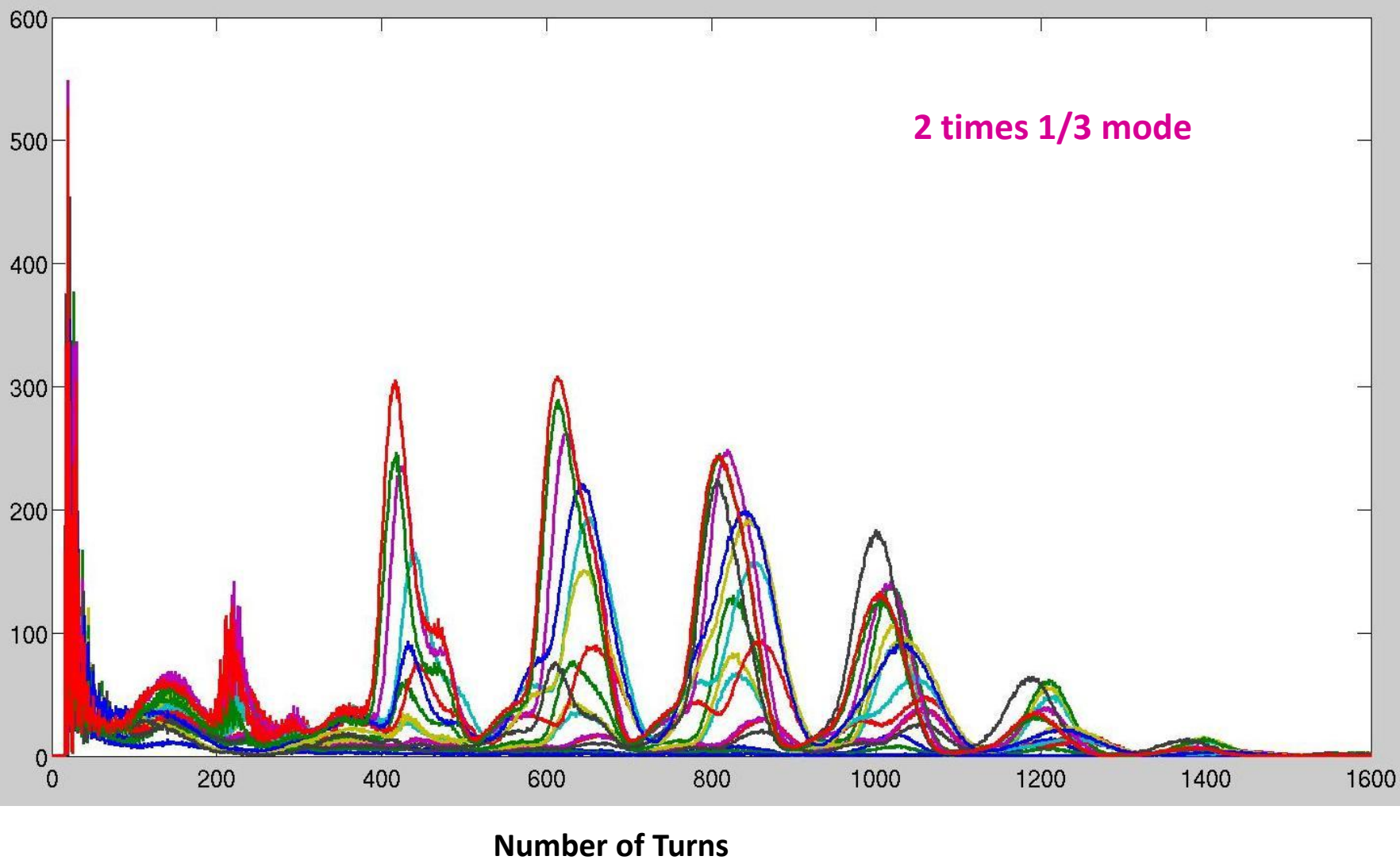
Blue : another shot of Injection Losses

in same injection, 5 bunch mode

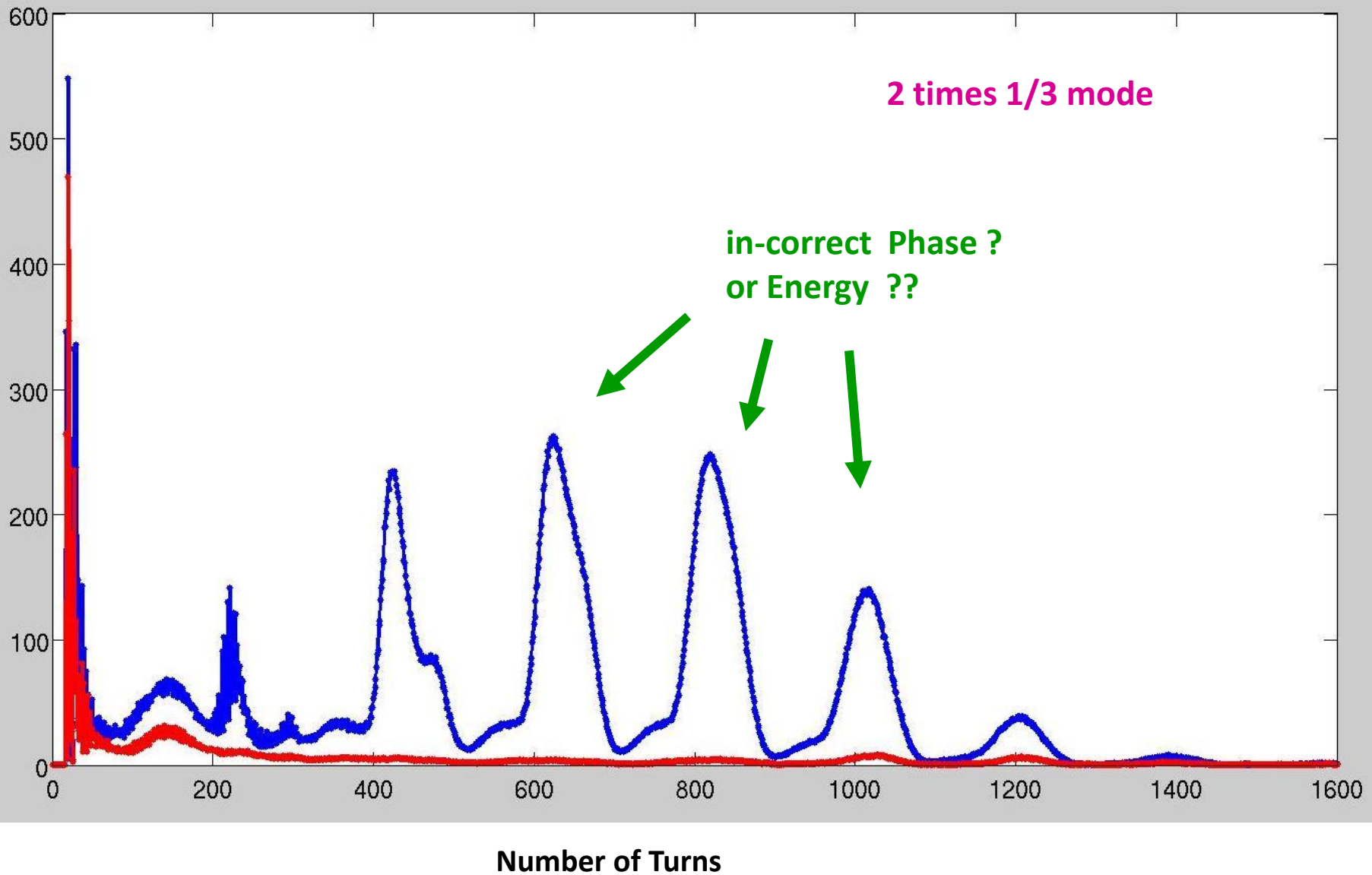
BeamLosses seen at Injection by the BLD directly after the C5 vert. scraper



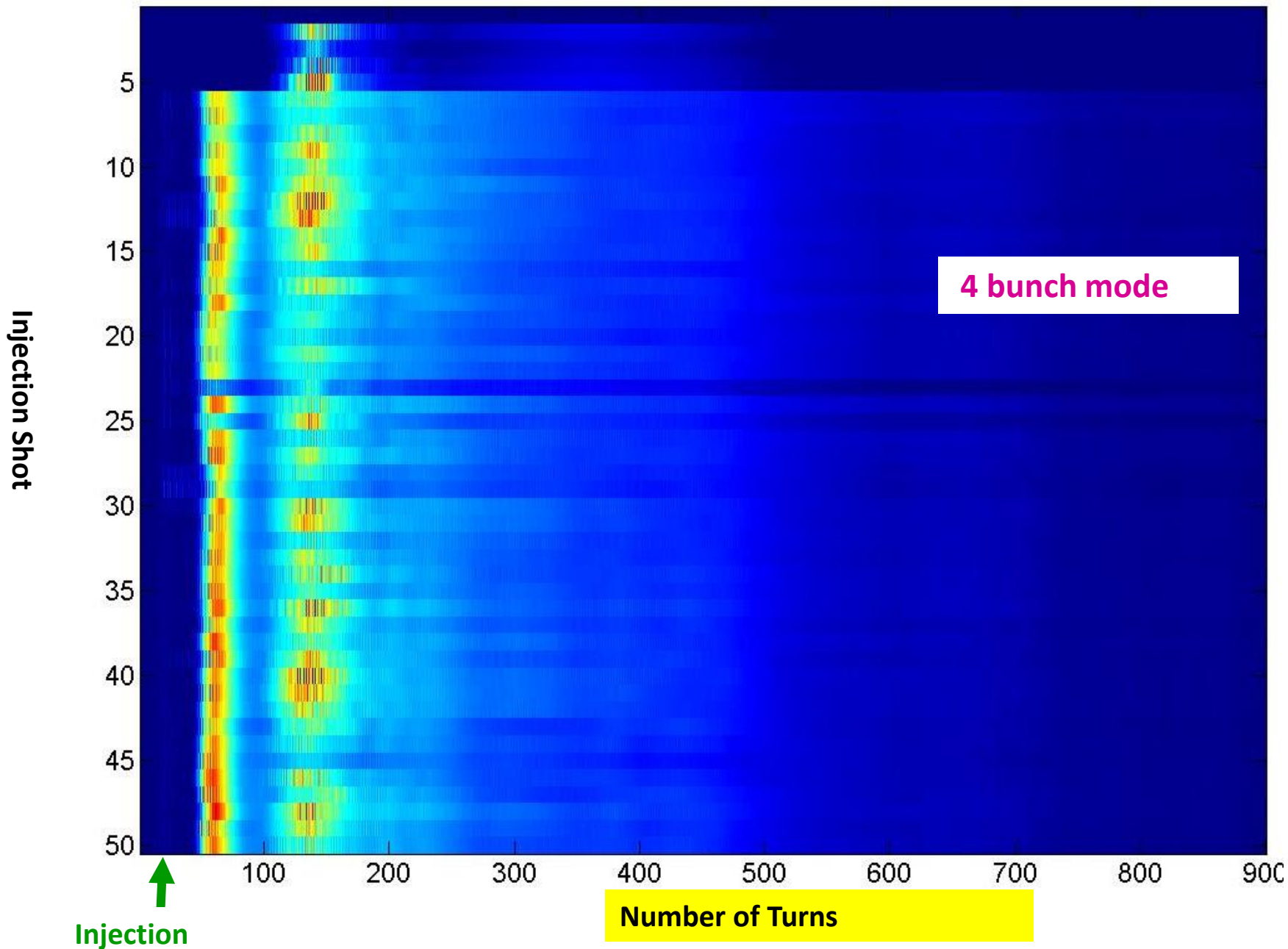
BeamLosses seen at Injection by the BLD directly after the C5 vert. scraper



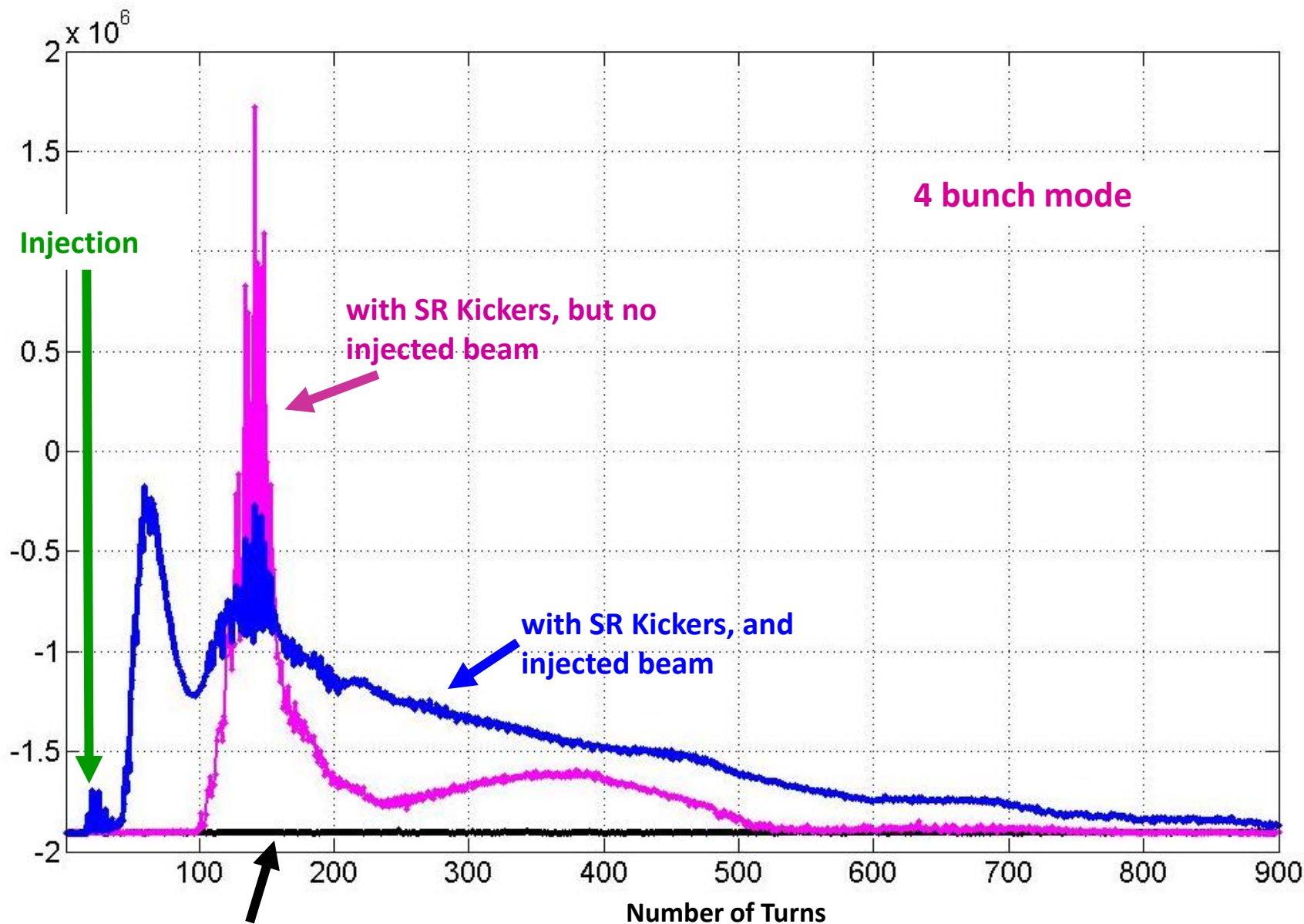
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no SR Kickers