

MPP

Meeting 31/07/2015

Intensity ramp up after scrubbing

R.Schmidt

Initial proposal for intensity ramp-up in 2015...

- 50ns (~9 steps to 1380b)
 - 3 – 12 – 48 – 144 – 288 - 480 –768 –1092 – 1236 – 1380
- 25ns (~11 steps to 2800b?!)
 - 3 – 12 - 48 – 72 - 144 – 288 – 432 - 588 –1164 –1740 – 2316 - 2748
- Scrubbing run(s)
 - 3 – 48 – 72 - 144 – 288 – 400 – 600 – 800 – 1000,..
- Note:
 - (If aligned) Roman pots could be inserted during each 2nd fill at each intensity step, after 2-3 hours (as part of beam process + TCL6,...). If beams dumped due to RPs no further insertion until reason fully understood.
 - EXP may want to collect data with reduced pile-up ($0.01 < \mu < 1$) early on (without delaying ramp-up or giving in too much int luminosity)
 - Either with separated beams (beam stability, what separation allowed) or with low(er) intensity bunches during commissioning

MPP meeting 24.4.2015, pending refinement with filling schemes & EXP requests



Intensity ramp-up

First 50 ns intensity ramp-up: 3 – 12 – 48 – 144 – 288 – 480 **done**

Reminder: Motivation for intensity ramp-up

- Get experience with machine protection system
- Understand current dependent effects
 - Beam losses and beam loss monitor thresholds
 - Heating of components
 - Single Event Effects
 - UFOs
- Detect non-conformities
- Develop smooth energy ramping and squeezing procedures
- Training of operation
- Introduce some checking during operation -> oblige different teams to verify performance and follow up operational issues



Experience

- Machine protection system did now show any important non-conformities
- Beam were always dumped as expected
 - After quenches, dump triggered by the QPS-PIC in time
 - In case of beam losses, always correct reaction
 - Many more ramps due to large number of failures (UFO, SEU, ...)
- Large number of bunches in LHC during scrubbing run at 450 GeV (up to ~2000 bunches)
- Therefore it can be questioned, if the initially planned intensity ramp for 25 ns up is justified



Proposal for intensity ramp-up

50ns (~9 steps to 1380b)

3 – 12 – 48 – 144 – 288 - 480 –768 –1092 – 1236 – 1380

Initial proposal 25 ns

3 – 12 - 48 – 72 - 144 – 288 – 432 - 588 –1164 –1740 – 2316 - 2748

Checks by MP3, Interlocks, RF, BI, Collimation, Operation/Orbit/Feedback, Injection and Beam Dump, Heating

Alternative proposal

3 – 72 - 144 – 288 – 432 - 588 –1164 –1740 – 2316 – 2748

Too low?



UFOs

- Indication that the UFOs rate is higher with 25 ns beams
- Indication that the UFOs rate decreases with time
- Indication that there is some relation between UFOs and electron clouds

- Questions
 - Does scrubbing help to reduce the UFO rate?
 - With the same number of bunches but different bunch distance, is the UFO rate different?

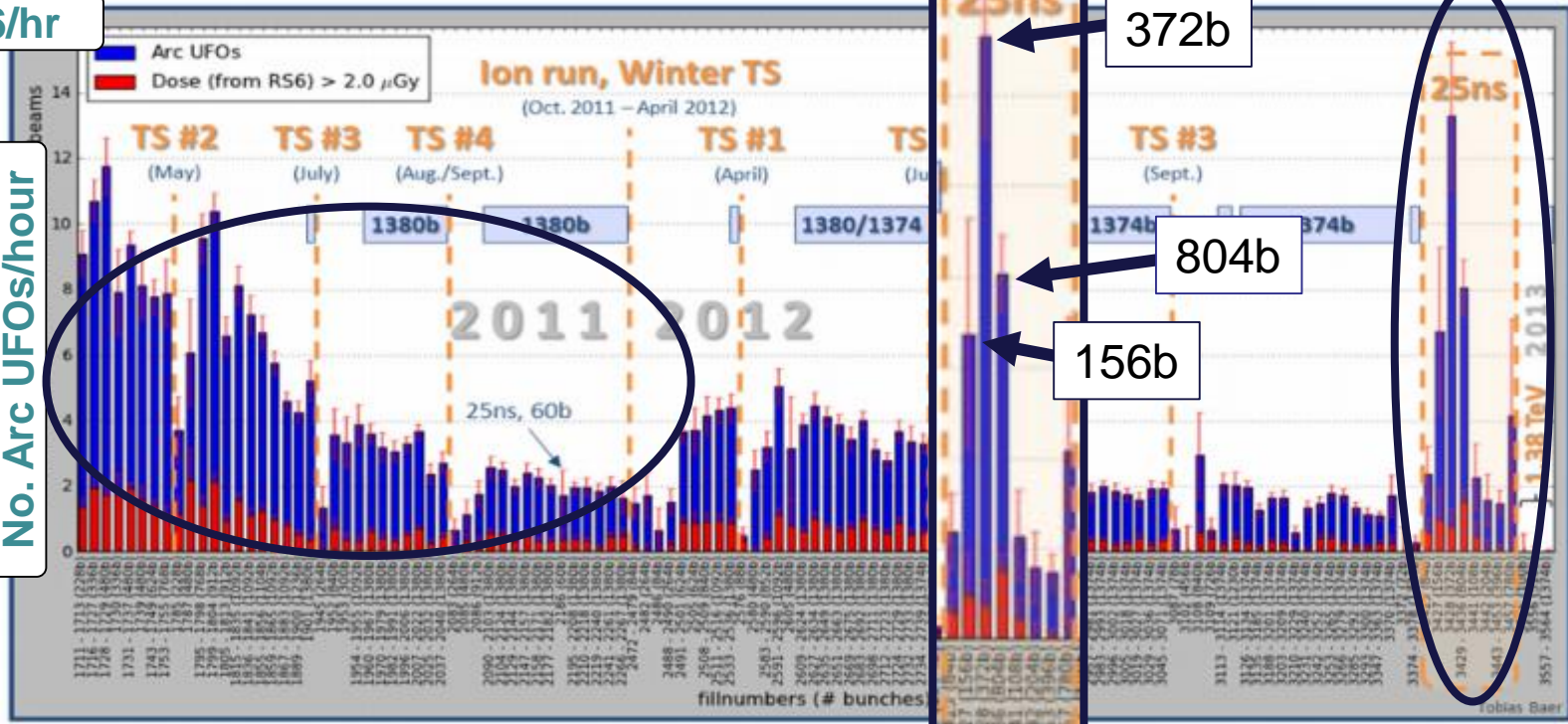
Proposal: with ~280 bunches, split the intensity step between 25 ns and 50 ns fills



UFO Rate – Measured 2011-2012

16/hr

No. Arc UFOs/hour



Conditioning Period

Unknown 25ns phenomena

- Peaks around 400b?
- Due to heating?



Initial proposal for intensity ramp-up

Proposal

3 – 72 - 144 – **288** – 432 - 588 – 1164 – 1740 – 2316 – 2748

between 25 ns
and 50 ns fills

Consequences for operation to switch between 25 ns and 50 ns to be worked out