p-Pb commissioning

LCU meeting, 22th January 2013

Reine Versteegen for the p-Pb Team

p-Pb commissioning, overview

- Commissioning started on Friday 11th with a first test of Pb injection.
- Then started the new squeeze commissioning.
- Thursday 17th , Saturday 19th collimation set up, aperture measurements in IR2, loss maps (cf. Gianluca's presentation).
- The first fill with 13 b of p in B1 and Pb B2 happened on Friday 18th, to test the whole sequence injection – ramp – cogging – squeeze off-momentum in one step – ALICE external angle reversal – collision optimization.

- First STABLE BEAMS on Sunday 20th afternoon with 13 bunches.
- Second STABLE BEAMS on Sunday 20th night with trains (96,120 b).
- Monday 21st : full filling scheme dumped due to unexpected losses during cogging.

- We faced (17/01) bad readings of BPMs with higher p-intensity (3 10^{10} p), which will maybe prevent the luminosity increase as planned.

Squeeze commissioning (optics correction) – 1/4

Andy Langer, Yngve Levinsen, Meghan McAteer, Ewen McLean, Tobias Persson, Piotr Skowronski, Matteo Solfaroli, Rogelio Tomas, Reine Versteegen, Jorg Wenninger

- New squeeze goes down to β*(IP1, IP2, IP5, IP8) = (0.8, 0.8, 0.8, 2.0),

- Optics measurements and correction were done in three steps with proton beams:

  - **on momentum** squeeze in steps with flat machine, measurements at flat top, 7 m, 3 m, 1 m, and 0.8 m,

  - **on momentum** squeeze in steps applying local IR corrections, same 5 stops to measure beta-beating, additional measurement at 0.8 m with global correction applied,

  - **on momentum** squeeze in steps with experiments bumps ON and beat-beating correction (measurements at 0.8 m), followed by 2 **off momentum** measurements at 0.8 m with intrinsic beta-beating knob ON, with ± 0.00023 dp/p.

Squeeze commissioning – 2/4

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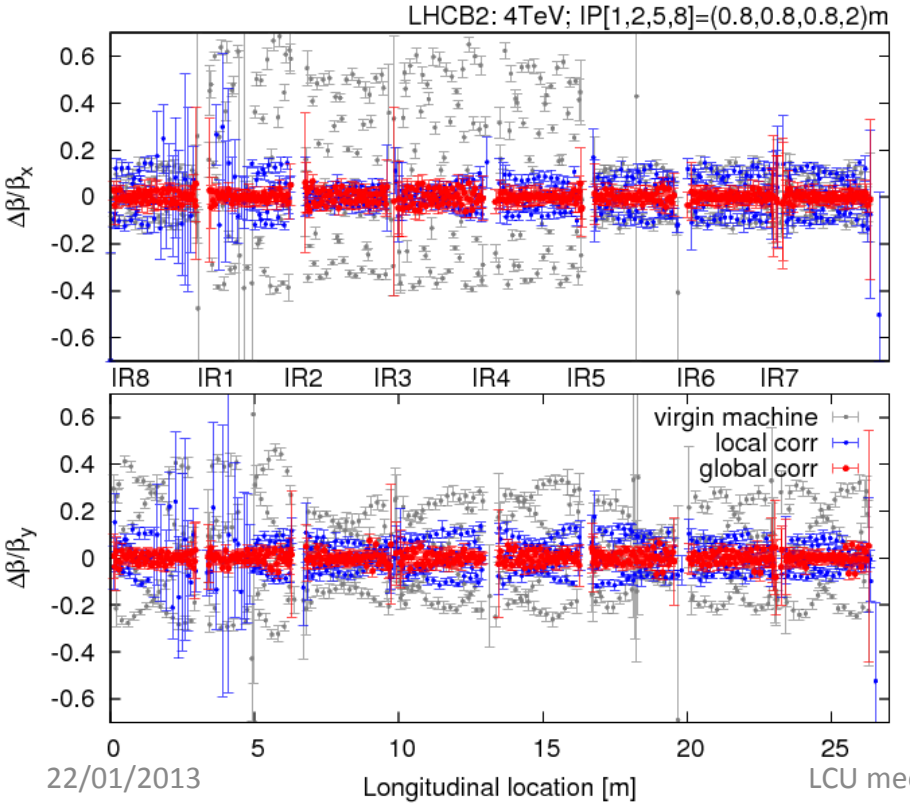
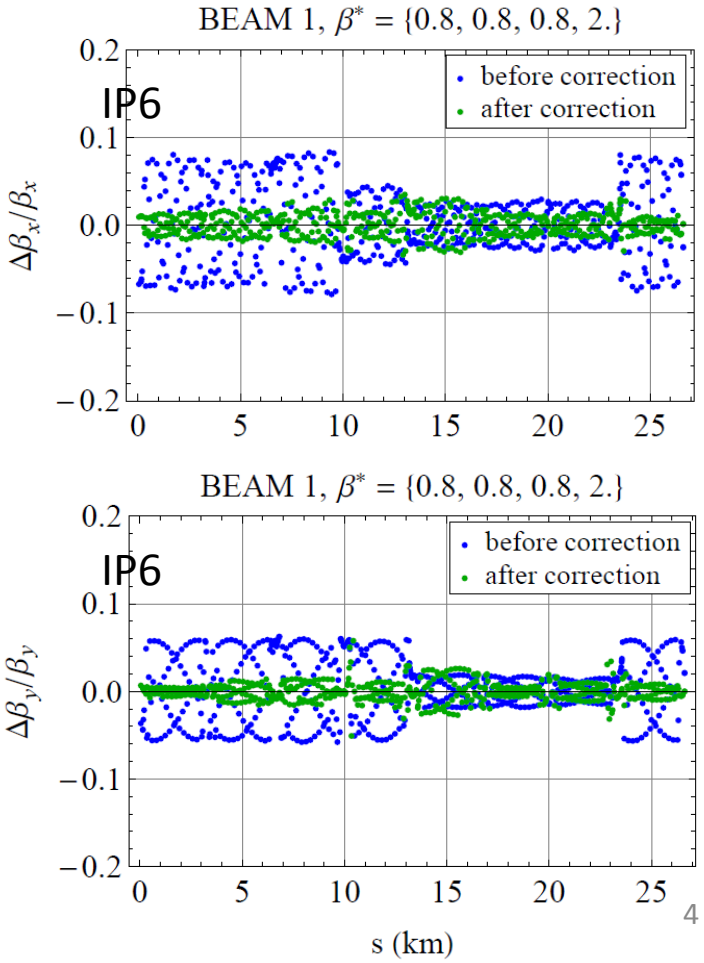
On momentum correction:

- More than 60% beta-beating without correction (in gray),
- Down to 20% with local correction (in blue),
- Down to 5% with global correction (in red).



Off momentum intrinsic beta-beating correction knob (as calculated for B1):

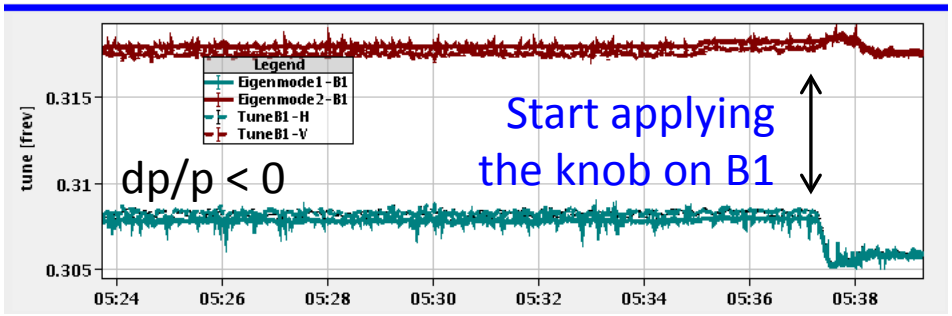


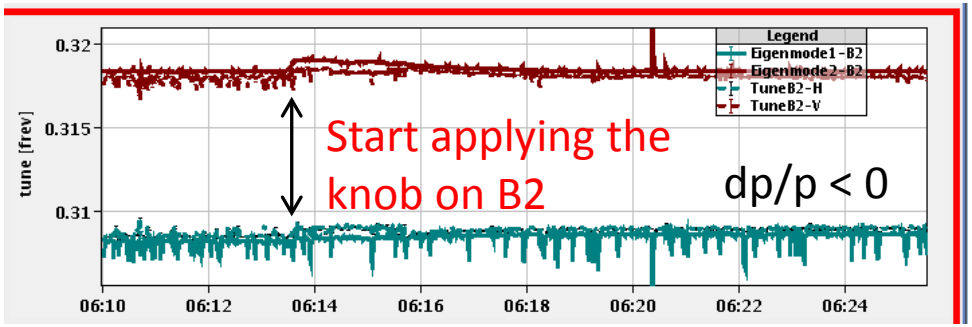
Squeeze commissioning – 3/4

Andy Langer, Yngve Levinsen, Meghan McAteer, Ewen McLean, Tobias Persson, Piotr Skowronski, Matteo Solfaroli, Rogelio Tomas, Reine Versteegen, Jorg Wenninger

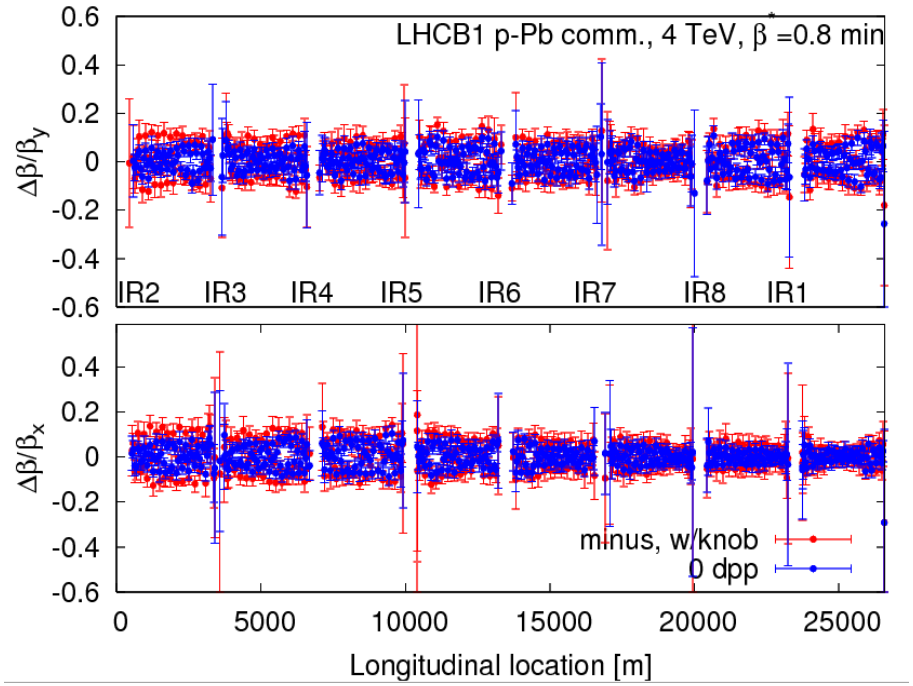
Off momentum measurements (with bumps), including intrinsic beta-beating correction knob:

- Chromaticity was set two ~2 units,
- Off-momentum knob acts on MQTs magnets,
- Tune changed suddenly when 20% of the knob was applied for B1, negative dp/p, but did not come back appling -30% -> Hysteresis? Did not happen for pos. dp/p nor for B2.





Beam1, dp/p < 0



-> Beta-beating stays below 10% off-momentum.

Squeeze commissioning – 4/4

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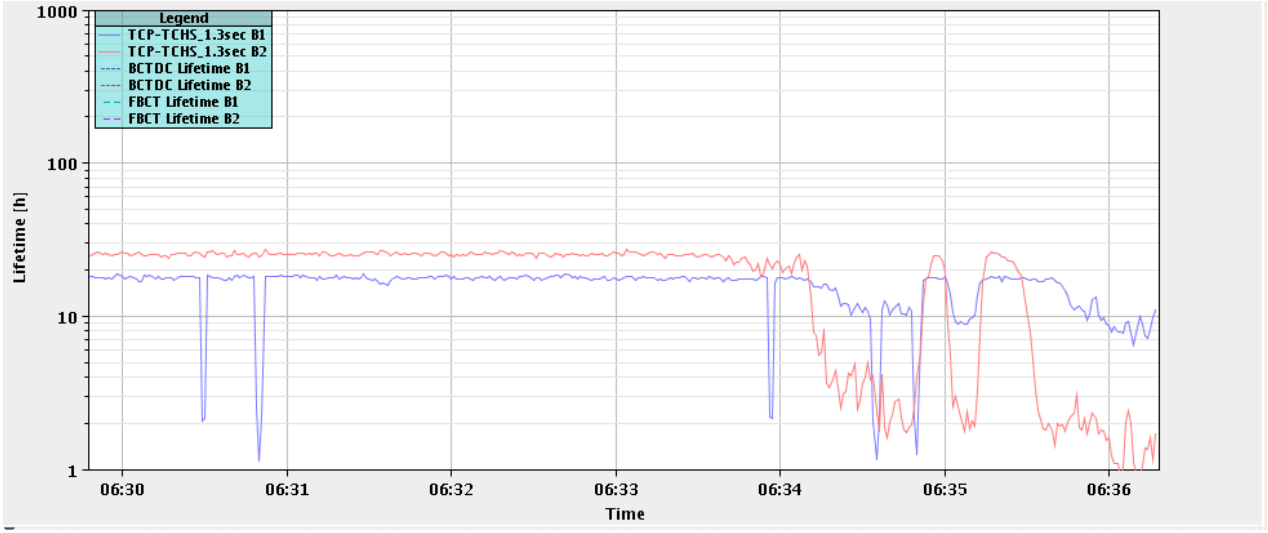
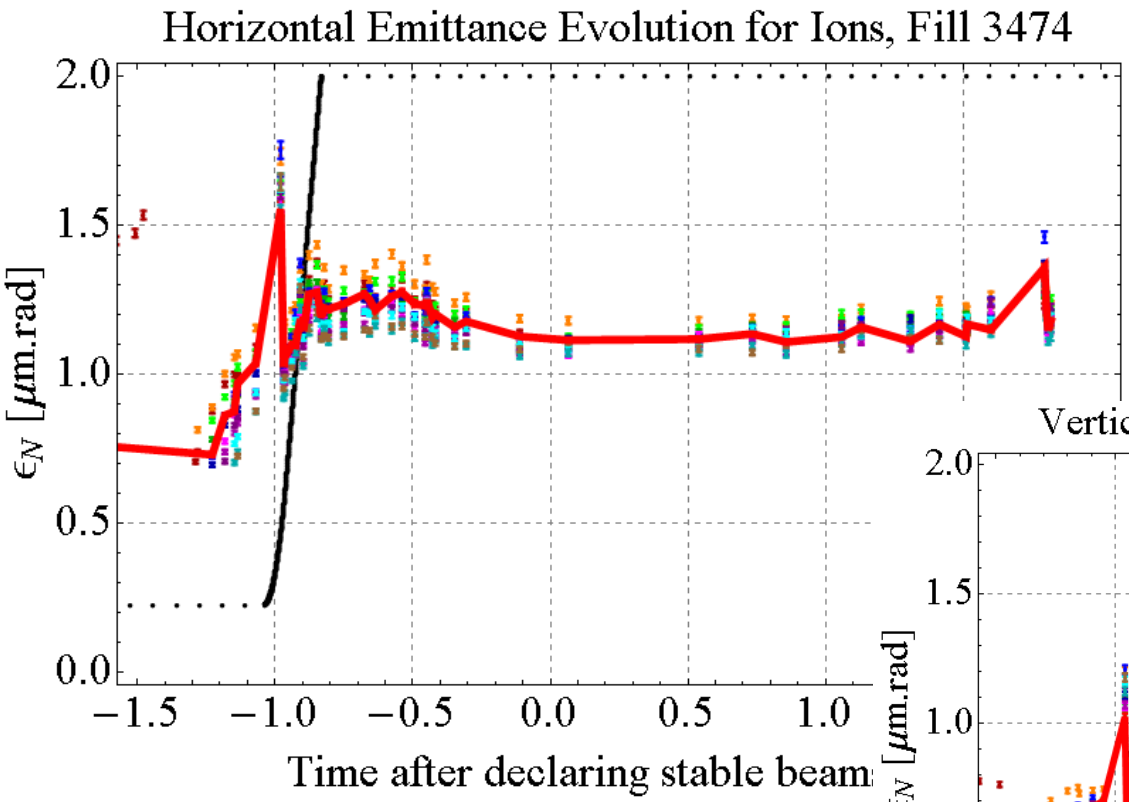
- As the tests at 0.8 meters looked very good and due to several major incidents shifting the planning, checks through the squeeze were postponed and to be done only in case of problems during the first squeeze off-momentum with p-Pb.

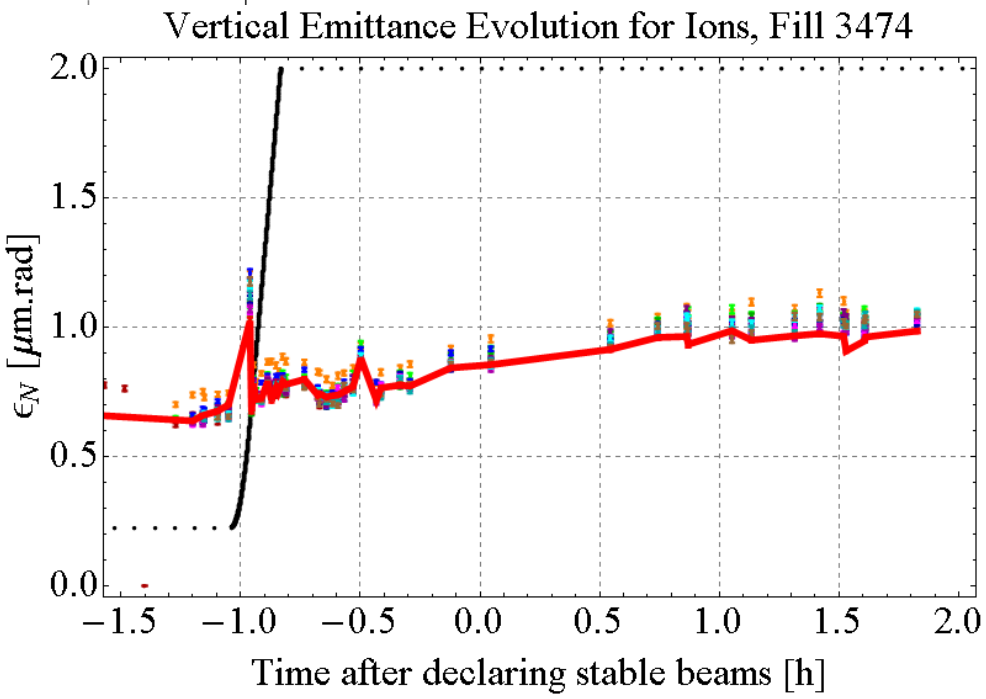


- Losses started around 2m in the squeeze, mainly in IR2… but were due to wrong settings of the TCTs.

First STABLE BEAMS: 13Bunches – Pb emittance evolution



- t = 0: start of SB
- thick red line: non-colliding bunch



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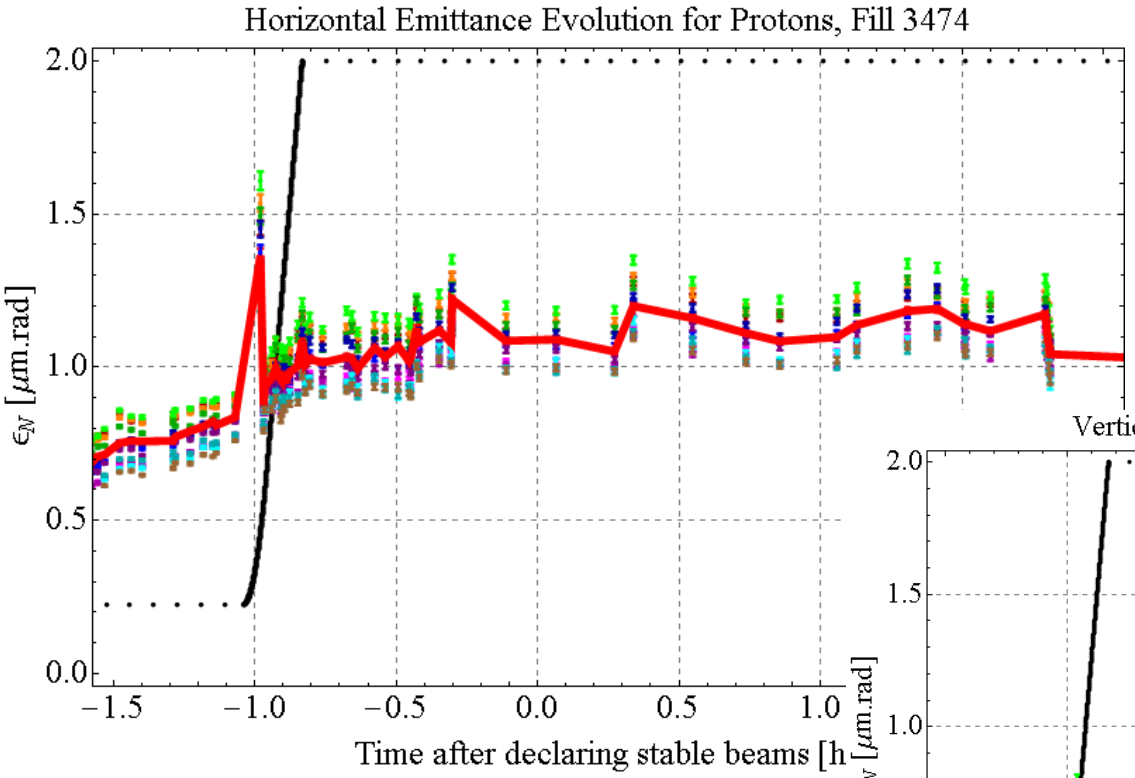
First STABLE BEAMS: 13Bunches – p emittance evolution



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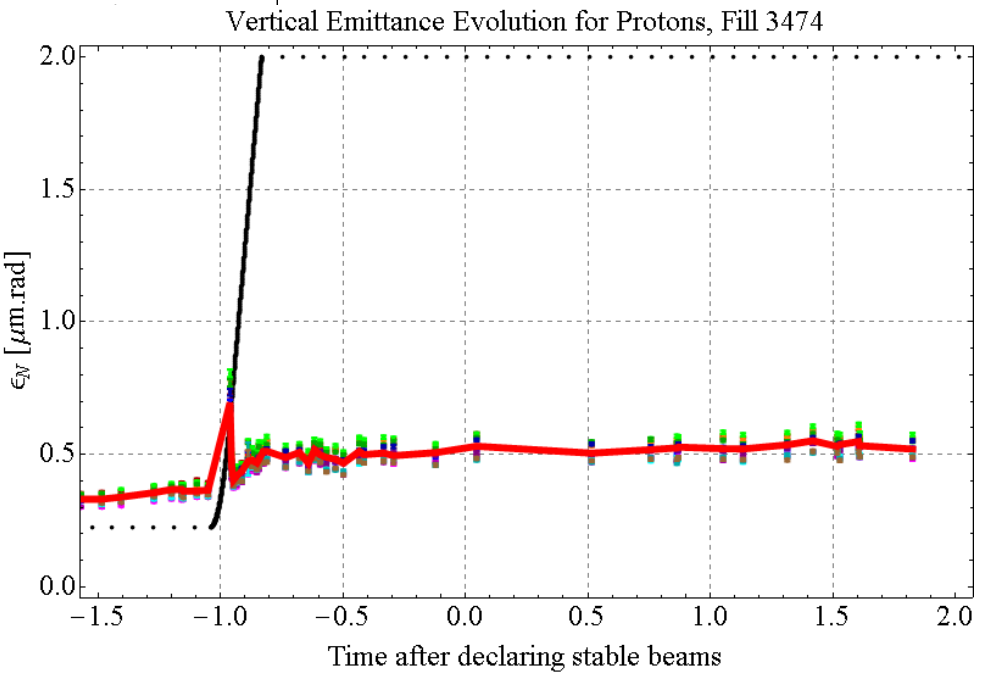

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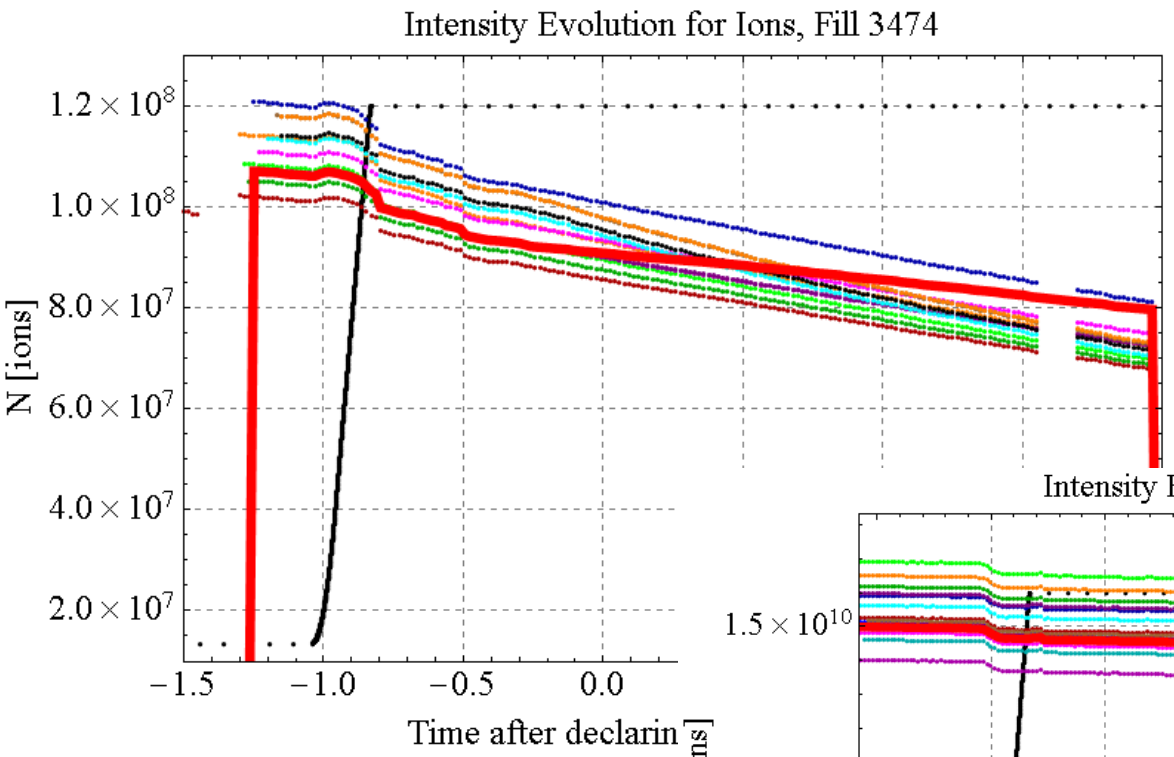
First STABLE BEAMS: 13Bunches Pb & p intensities



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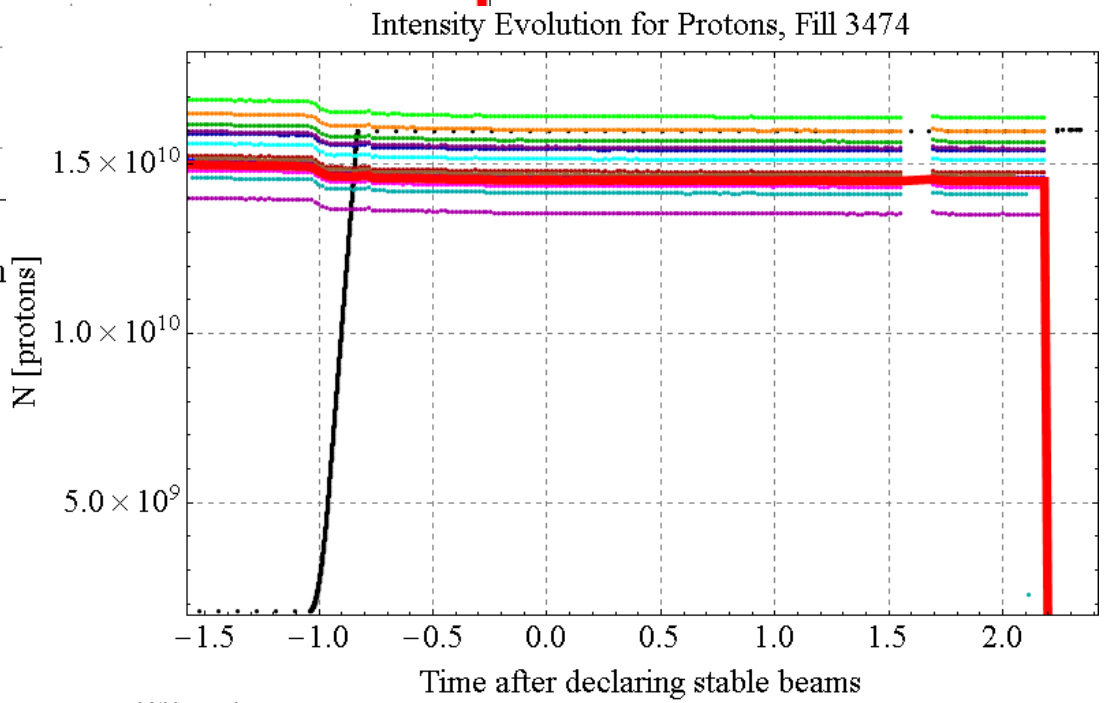

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Thanks