Tight collimator settings MD

R. Assmann, R. Bruce, F. Burkart, M. Cauchi, D. Deboy, L. Lari, S. Redaelli, A. Rossi, B. Salvachua, G. Valentino, D. Wollmann, S. Fartoukh et al.

Motivation and goal of MD

- Benefits with tight settings (IR7 @ 4-6-8 sigma, TCT @ 9.3):
  - Smaller β^* possible
  - Better efficiency => Higher stored intensities
  - Tight settings (in mm) needed for nominal 7 TeV operation
- Tight settings tested successfully in previous MDs in May and August
- Goal of MD:
  - Investigate the long-term stability of the cleaning performance with tight settings   *DONE*
  - Qualify cleaning with ATS-squeeze β^*=40cm (see S. Fartoukh et al) to establish reference for pile-up studies
    NOT DONE

MD program

- 1 nominal bunch per beam
- Ramped using functions driving the collimators to tight settings
- Squeezed to β^*=1m (fall-back since ATS MD not yet done at that time)
- Performed loss maps (hor., ver. and off-momentum)

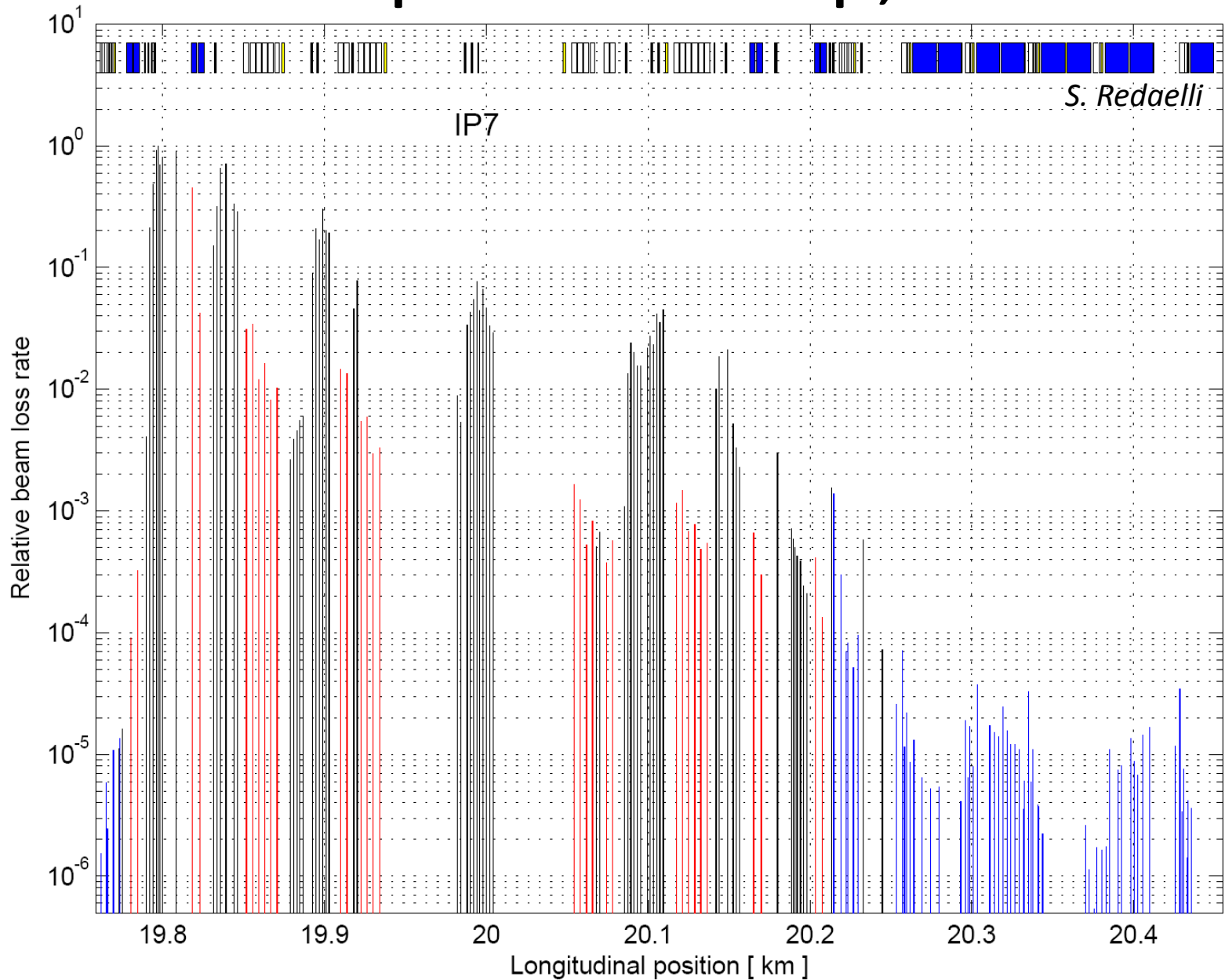# Losses in ramp and squeeze

B. Salvachua
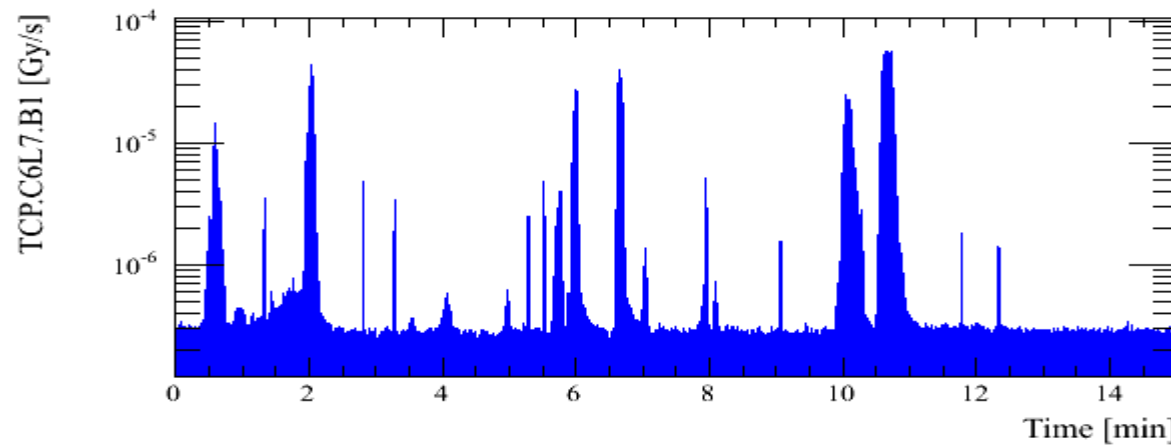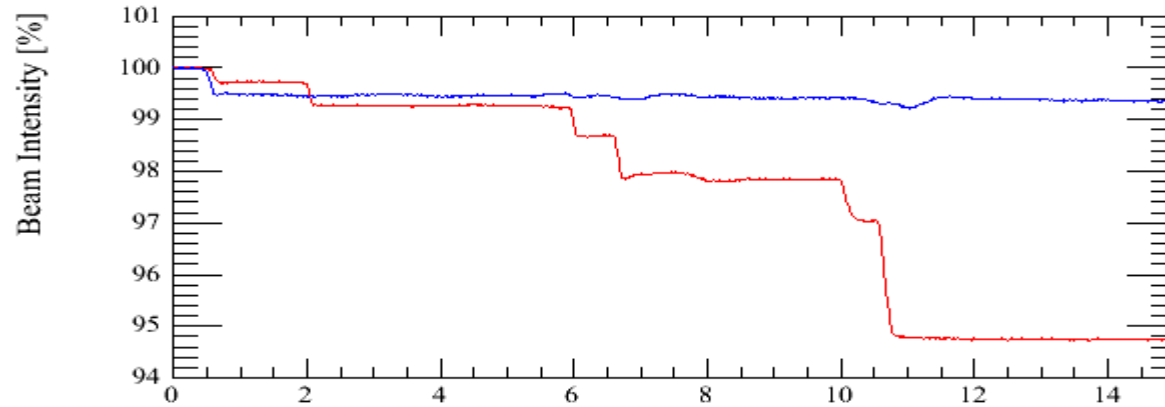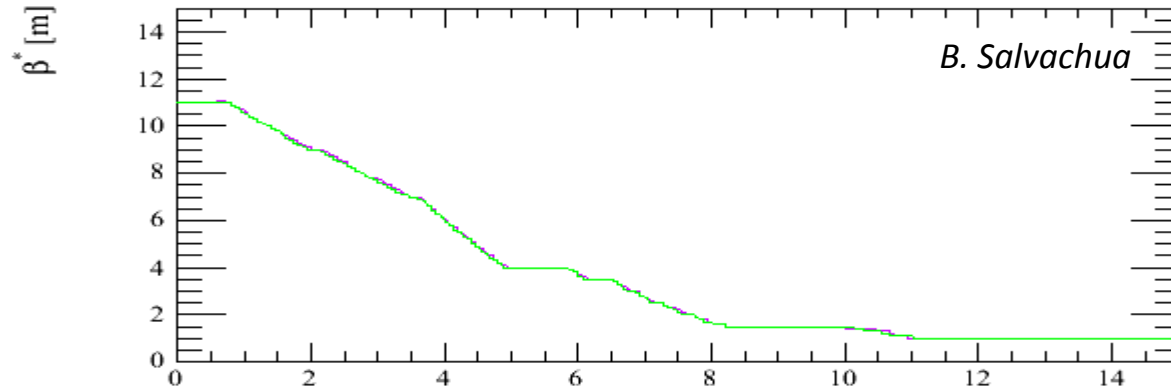
Losses in ramp and squeeze

- Because of orbit oscillations, unintentional beam scraping at primary collimators
  - Some losses seen during ramp (~1% of beam)
  - Larger losses in B1 during squeeze (~5% of beam)
- Losses not acceptable for high-intensity operation

Example: loss map, B1H

S. Redaelli

Results: loss maps

- Hierarchy well preserved – excellent long-term stability. Using centers from setup in March!

- Cleaning inefficiency consistent with previous MDs (significant improvement wrt intermediate)

- Including Q7 to be on the safe side (same dump threshold as downstream BLMs)

Inefficiency	B1	B2
Horizontal	Q7R7: 7.2e-5	Q8L7: 1.3e-4
Vertical	Q7R7: 6.9e-5	Q8L7: 5.7e-5

Conclusions

- Excellent long-term stability of cleaning performance. Tight settings still valid 8 months after collimation setup

- 5% of B1 lost during squeeze, 0.5% lost during ramp

  – Promising concept for 2012 but better control of orbit oscillations in squeeze needed.

  – Ongoing work (J. Wenninger, S. Redaelli, R. Steinhagen). See LBOC 2011.11.29

- We still hope to test tight collimator settings with ATS optics and beta*=40cm in the future