Discussion on Roman pot settings for 2012 operation

S. Redaelli

CERN - BE department
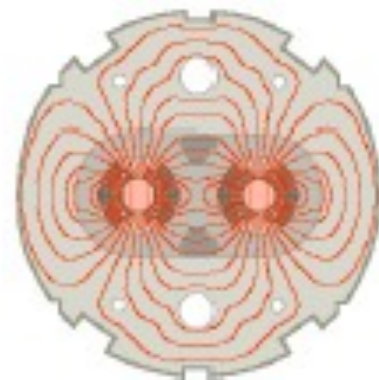
Scope

⇨ Talk at the "Lumi days" next week on
   "Closest approach of Roman pots to the beam"

   Topic that caused lively discussions last year...
   Collimator settings <u>determine</u> how close we can go to the beam
   Roman pot settings are relevant for MP

⇨ Good opportunity to agree on a baseline strategy for 2012

   Early preparation will allow an optimized strategy, important because
   the priority of the 2012 OP will be focused on the Higgs...
   Still room for discussion during the year, but we should avoid online
   discussion during beam tests!

⇨ This is NOT a dry run of my presentation!

   Overview of the general ideas / proposals from collimation aspects
   Can send me feedback until mid next week!
   Will still make a few discussions with the people involved
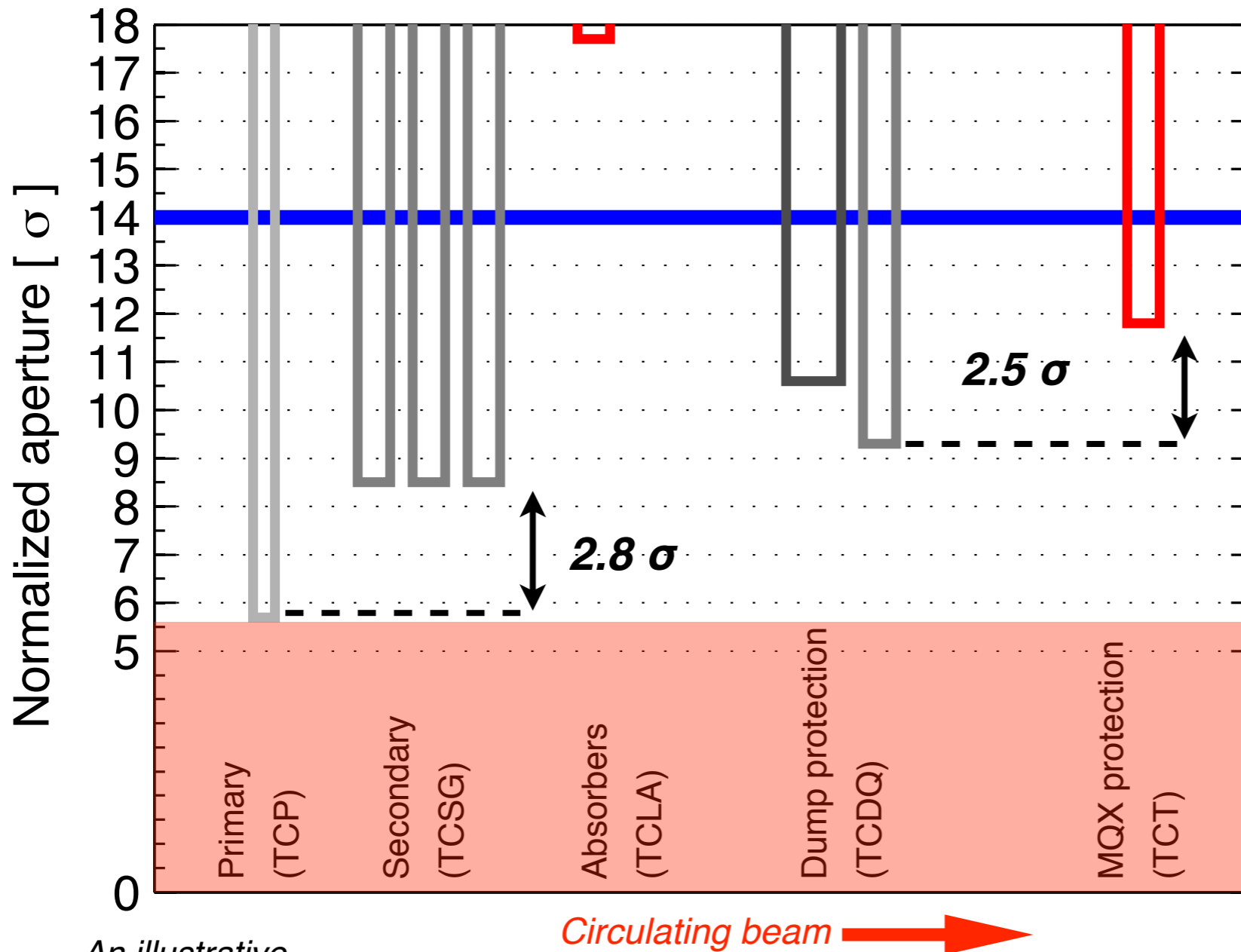
Settings in mm calculated for an emittance of 3.5 microns

Roman pots must respect the collimator hierarchy for unsafe beam intensities!

An illustrative scheme

Circulating beam

Roman pot's modes of operation

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A. **Standard physics fill at high intensity**, within <u>STABLE BEAMS</u> mode

> *Baseline: all Roman pots aligned with respect to the beam*
> *("beam-based alignment"), like done for ALL collimators*
> *Pot positions MUST be validated by loss maps in physics (transverse,*
> *off-momentum, asynch dump)*
> → *BB alignment required early on (if don't want to wait until next loss maps!)*

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B. **Special "alignment" fills** <u>outside STABLE BEAMS</u>

Two different optics requested 90m like in 2011 and ~hundreds m (new)
TCP moved close to the beam (4-6σ), pots touch the halo, then retracted
Done with low-ish intensities, but above safe limits → no loss maps
(considered acceptable risk as in alignment campaigns)
Request to do it in 2012 with up to ~100 bunches!

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> **Reminder: Pots alignment takes a long time.** There will be pressure to take short cuts...

Questions

1. Allowed settings for standard physics fills?

2. Allowed settings for special high-beta fills?
   Different depending on the number of bunches...

3. Maximum allowed intensity and bunch number
   for special fills?
   Remark: MP aspects depend on single-bunch intensity!

4. Can we allow moving in pots that have not been aligned?
   "Deterministic" settings without previous beam-based alignment

5. Special constraints for "dream" scenarios with pots very close?

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    Respect a single-stage cleaning with TCPs as bottleneck

    Pots retracted by 1-2 σ (absolute: 4-6 σ)

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3. Special optics - high intensity

    Minimum hierarchy in place (depends on achieving coll tight settings!):

     H: ~ 2 σ retraction from TCDQ in IP6   (absolute: 10 σ)

     V: ~ 2 σ retraction from TCSGs in IP7   (absolute: 8.5-9.0 σ)

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    Requires a validated machine configuration and OP sequences, unlike alignment fills followed by data taking.

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   How far above the VERY RELAXED flag can we go without
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5. "Deterministic" settings without alignment with STABLE BEAMS

   RA proposed a method to move in all pots until the first one
   touches the beam → this gives the maximum setup error