Ramp Optics Measurement and Correction

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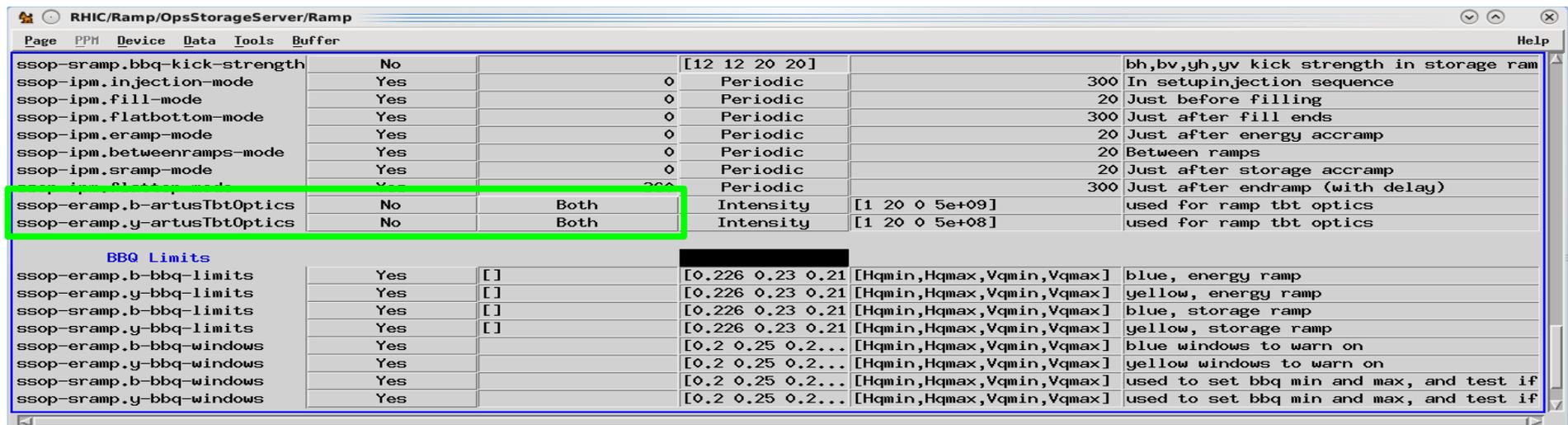
Run-14 RHIC retreat

Outline

- Advance of ramp optics measurement

- Advance of ramp optics correction

Achievements in 2013

- Optics correction being operational.

- Measured linear optics during beam acceleration parasitically in RHIC, with a script (A. Marusic).

- Implemented optics correction for rotator ramp operationally.

- Attempted optics correction on the energy ramp, encountered PS excursion when anchoring step-stone settings.
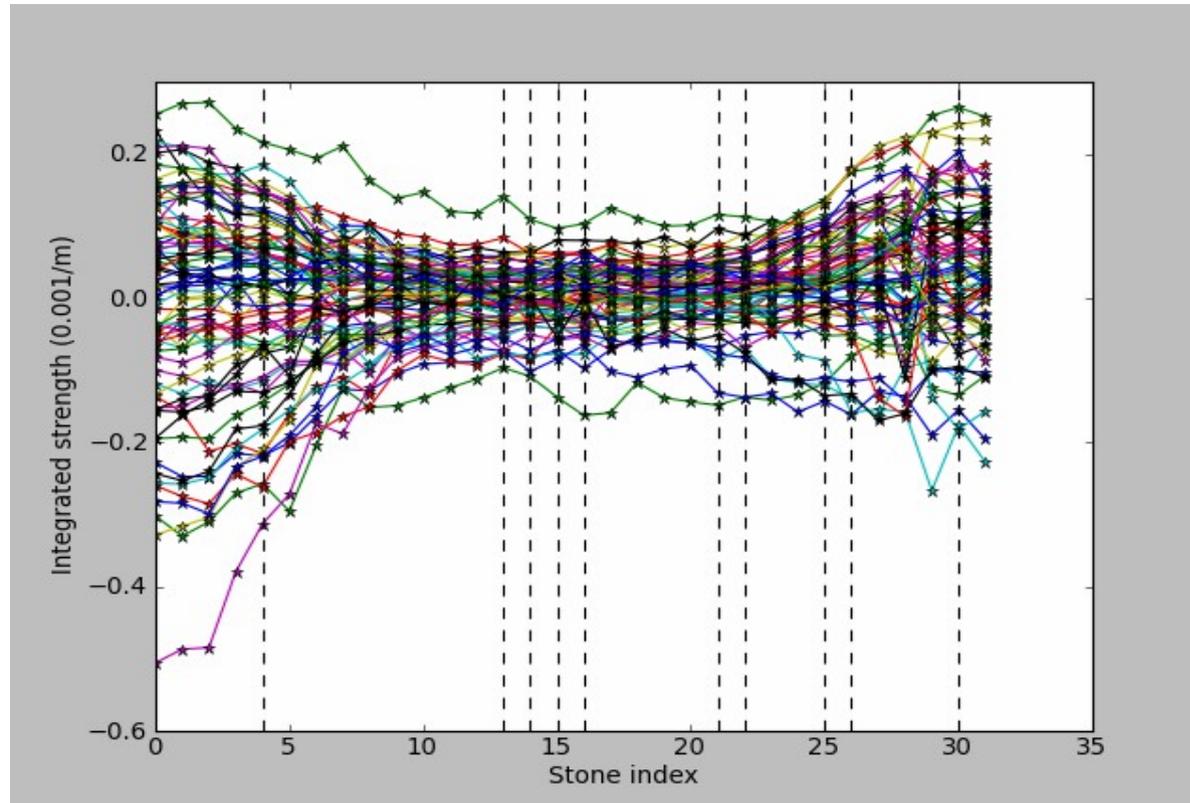
Ramp Optics Measurement in tape sequence

Ramp Optics Measurement was truly operational with A. Drees, A. Marusic, R. Michnoff, I. Blackler, G. Marr's effort of implementing it in tape sequence.

Correction strength during acceleration


The correction strengths for 72 trim quadrupoles in the Yellow ring on the energy ramp calculated for pp13b-v2. Dashed lines are at the stones where magnet setting are anchored or partially anchored. In-between the anchored stones, strengths change more or less LINEAR. The same is true for the Blue ring as well.

This led to the decision of applying corrections for selected stones.
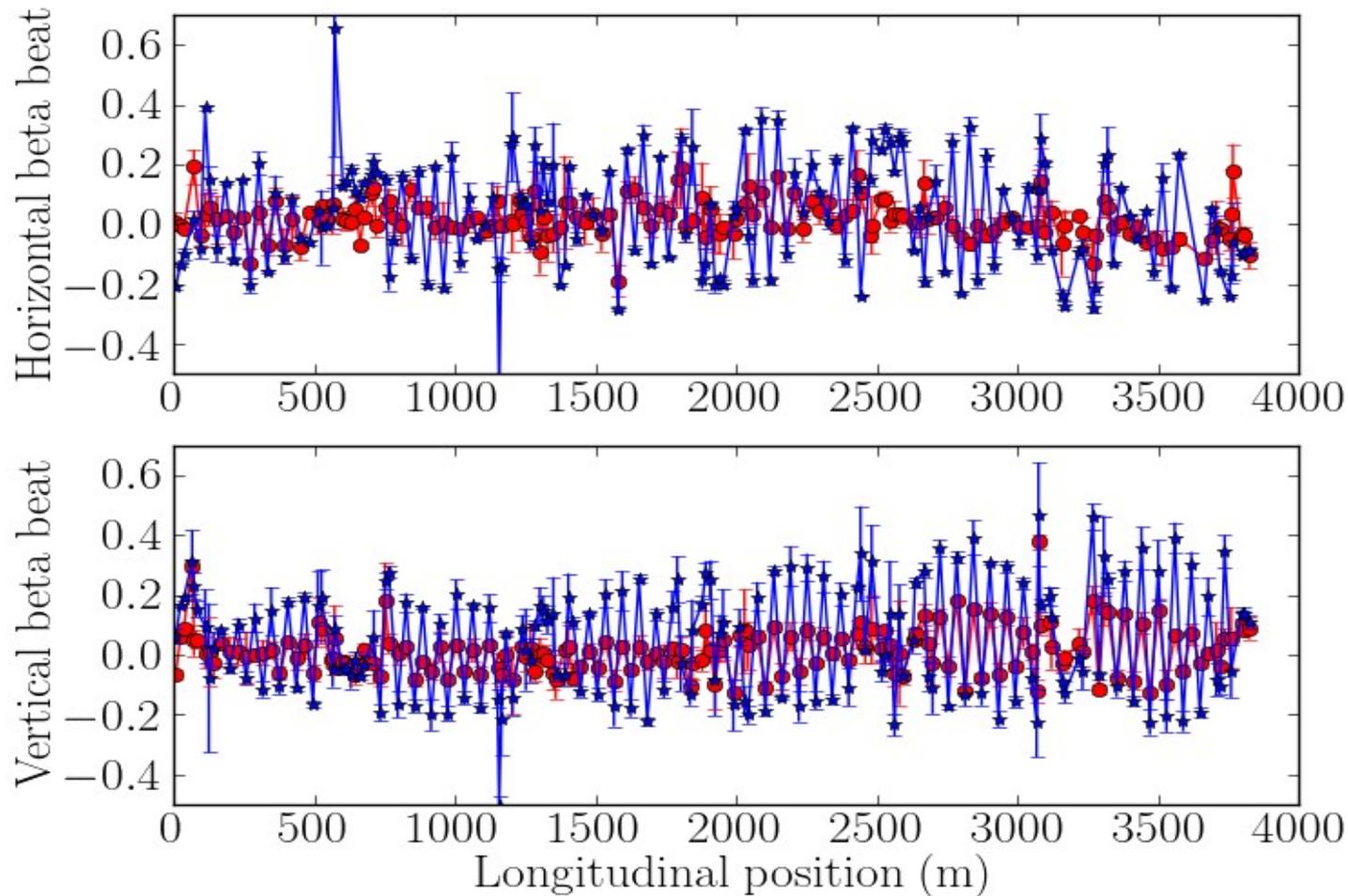
Correction results
--Global beta beat on the ramp
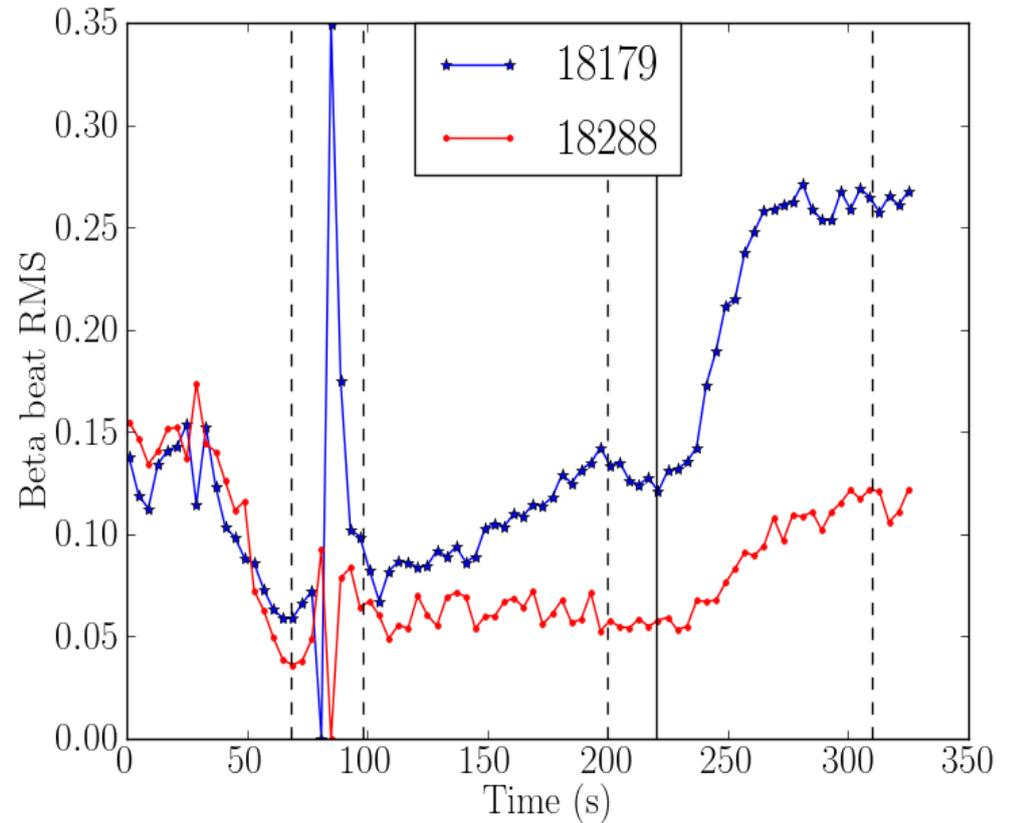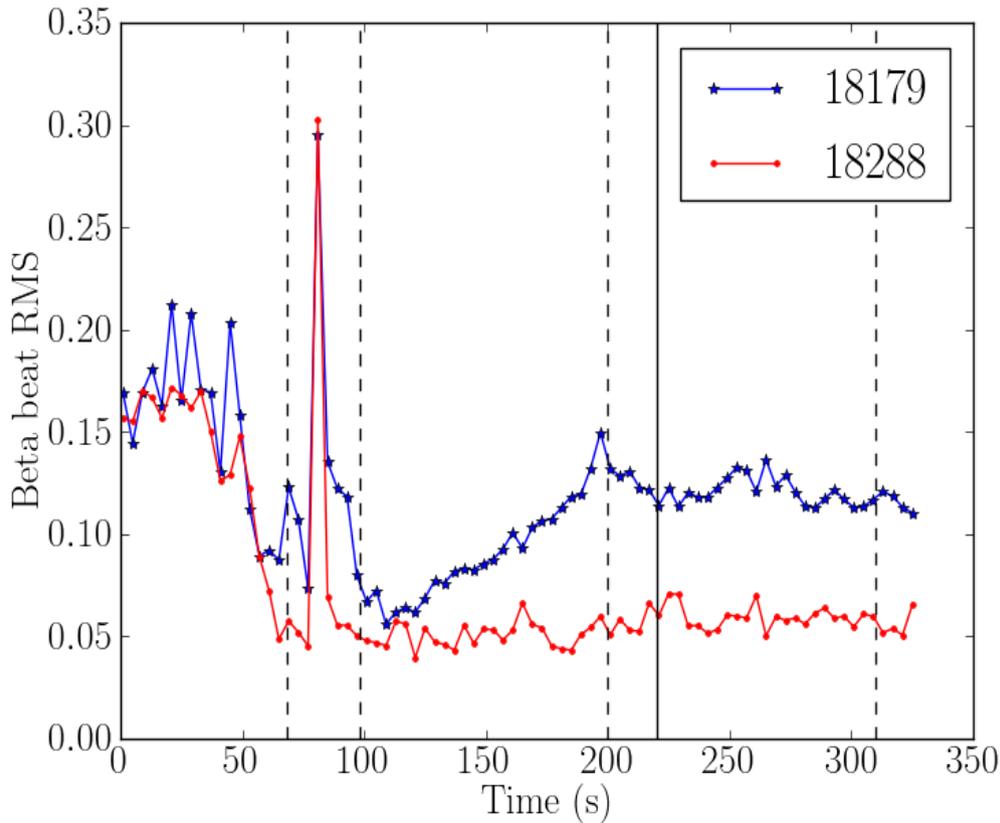
The global beta beat measured for fill #18179 (w/o correction) and #18288 (with ramp optics correction): the left and right plot are for horizontal and vertical plane in the Yellow ring, the corrections were only applied at the stones marked by the vertical lines.
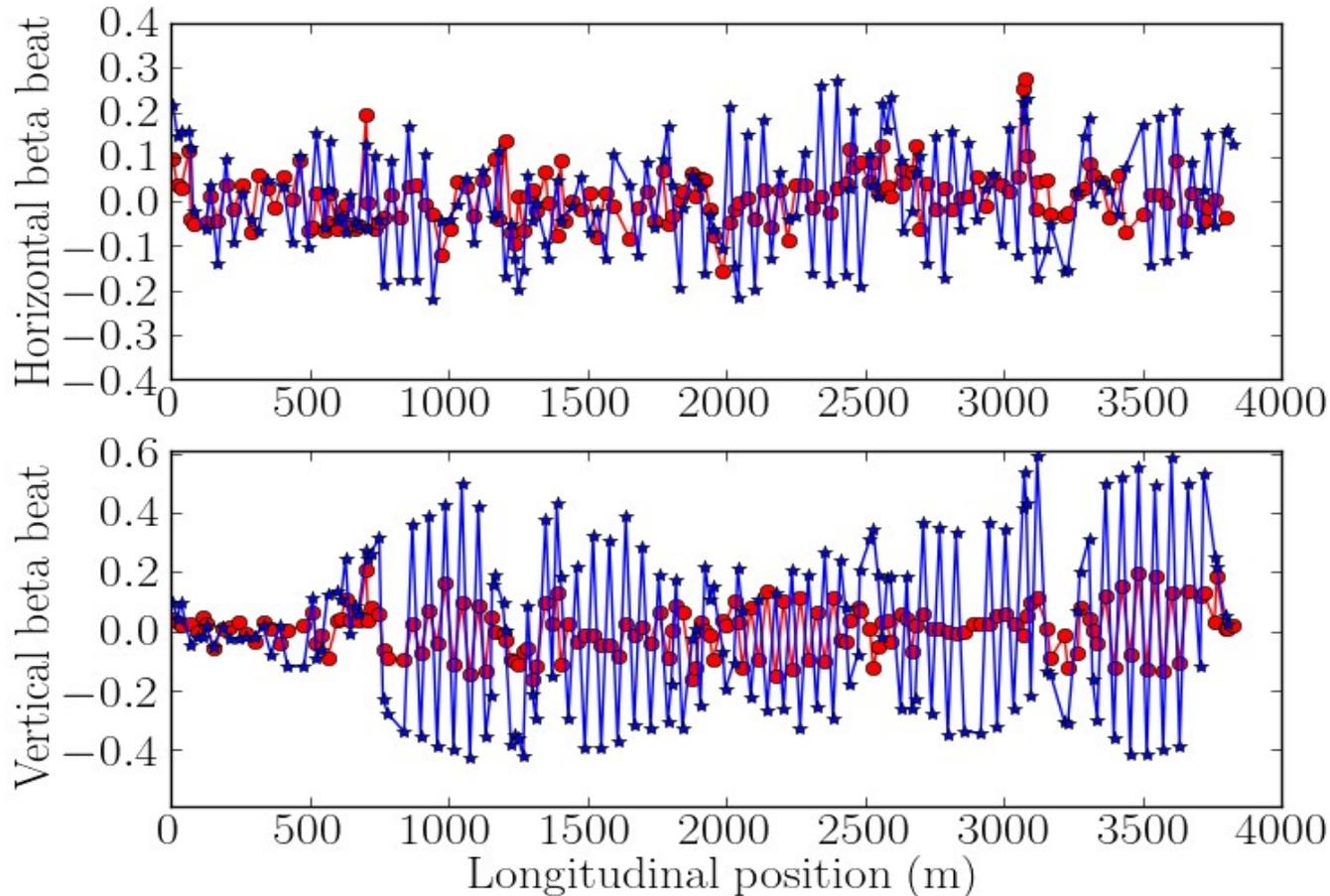
Correction results
--global beta beat at store

Global beta beat at store measured for #18179 and #18288 for the Blue ring: the upper and lower are the horizontal and vertical beta beat, blue and red data are for #18179 and #18288.

Correction results

at an intermediate point, t260

Global beta beat at t260 measured for #18179 and #18288 for the Yellow ring: the upper and lower are the horizontal and vertical beta beat, blue and red data are for #18179 and #18288.

Interpolated corrections worked well on the ramp.

Summary

- Ramp Optics Measurement is operational, optics information can be obtained every 4 s on the ramp, facilitated ramp tuning as well.

- Ramp Optics Correction is operational, corrected the optics on the ramp for the first time in a hadron collider, improved absolute emittance measurement by IPMs.