

Circumference Lengthening

studies on February 24

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APEX'15: Plan for Run 16

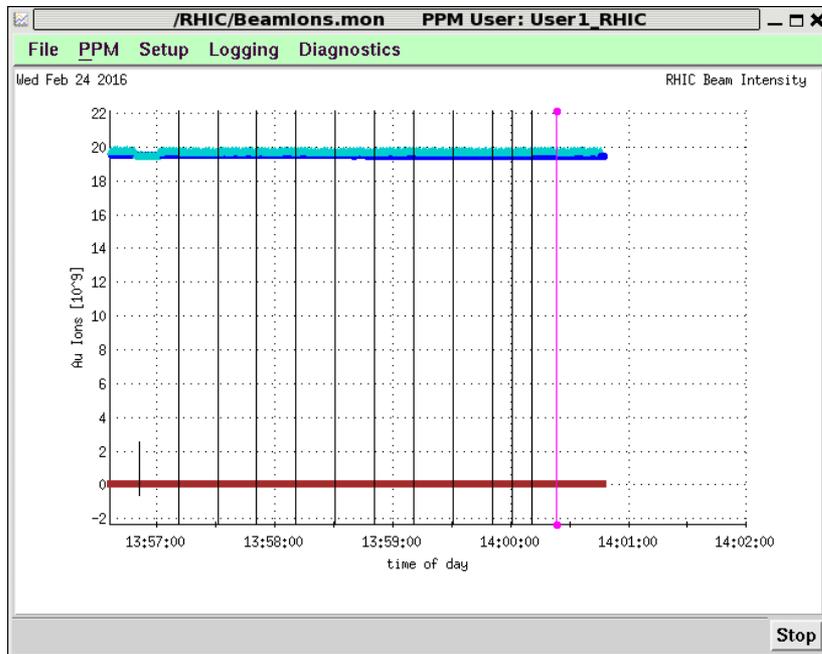
- We are ready for the experiment at the top energy.
- Second order chromaticities have to be corrected as good as possible before this experiment.
- Can on-line tune/chromaticity correction take on the account the shifted radius?
- The lattice ramp may need to incorporate the orbit correction at high-beta triplets to prevent radial orbit excursion there.
- The experiment at the store will compare the beam lifetime with and without radial orbit shift.

February 24 session

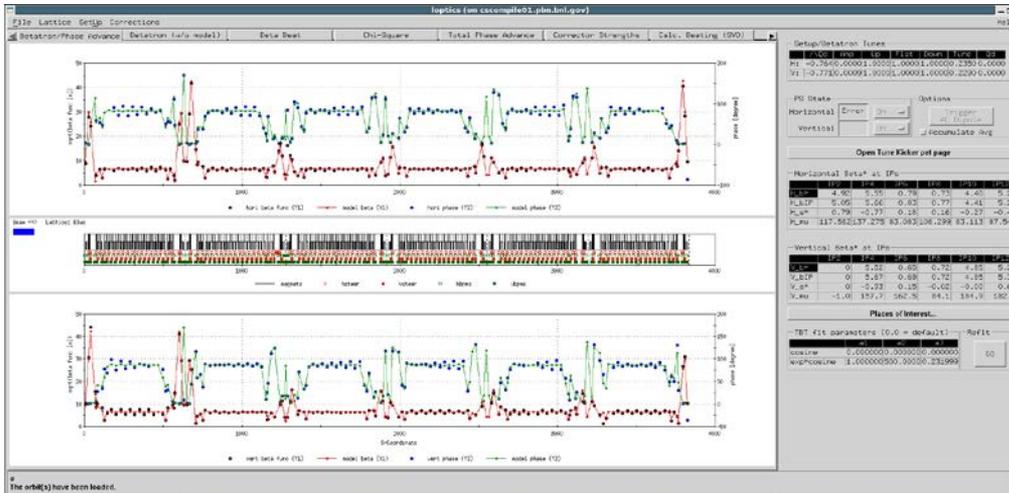
- Special acceleration ramp ending with the store without separation and protection orbit bumps.
Only Blue beam (12 bunches) was accelerated.
- Optics measurement at the store.
- Chromaticity measurement at the store.
- 2nd order chromaticity correction at the store.

All this work was on shoulders of Guillaume and Al .

Special ramp ending with no bumps at the store worked beautifully!

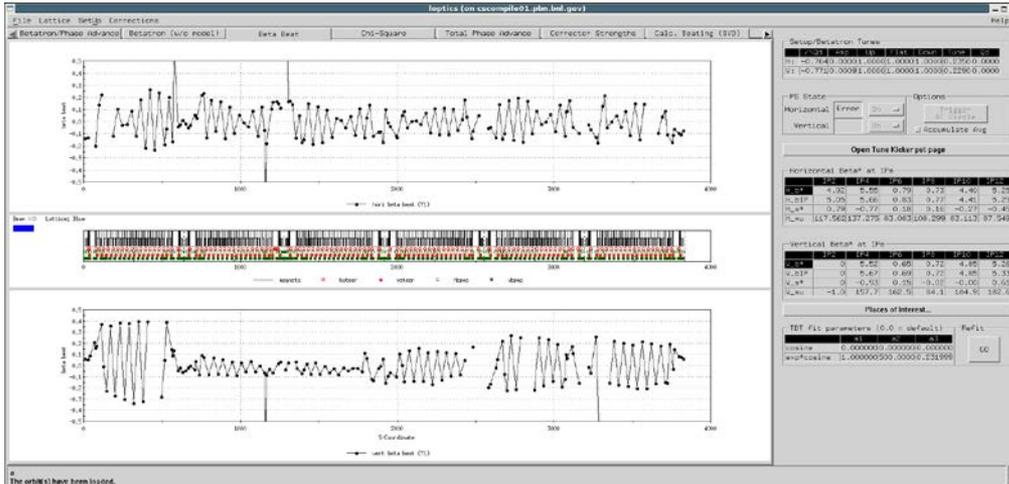


Optics measurement at the store

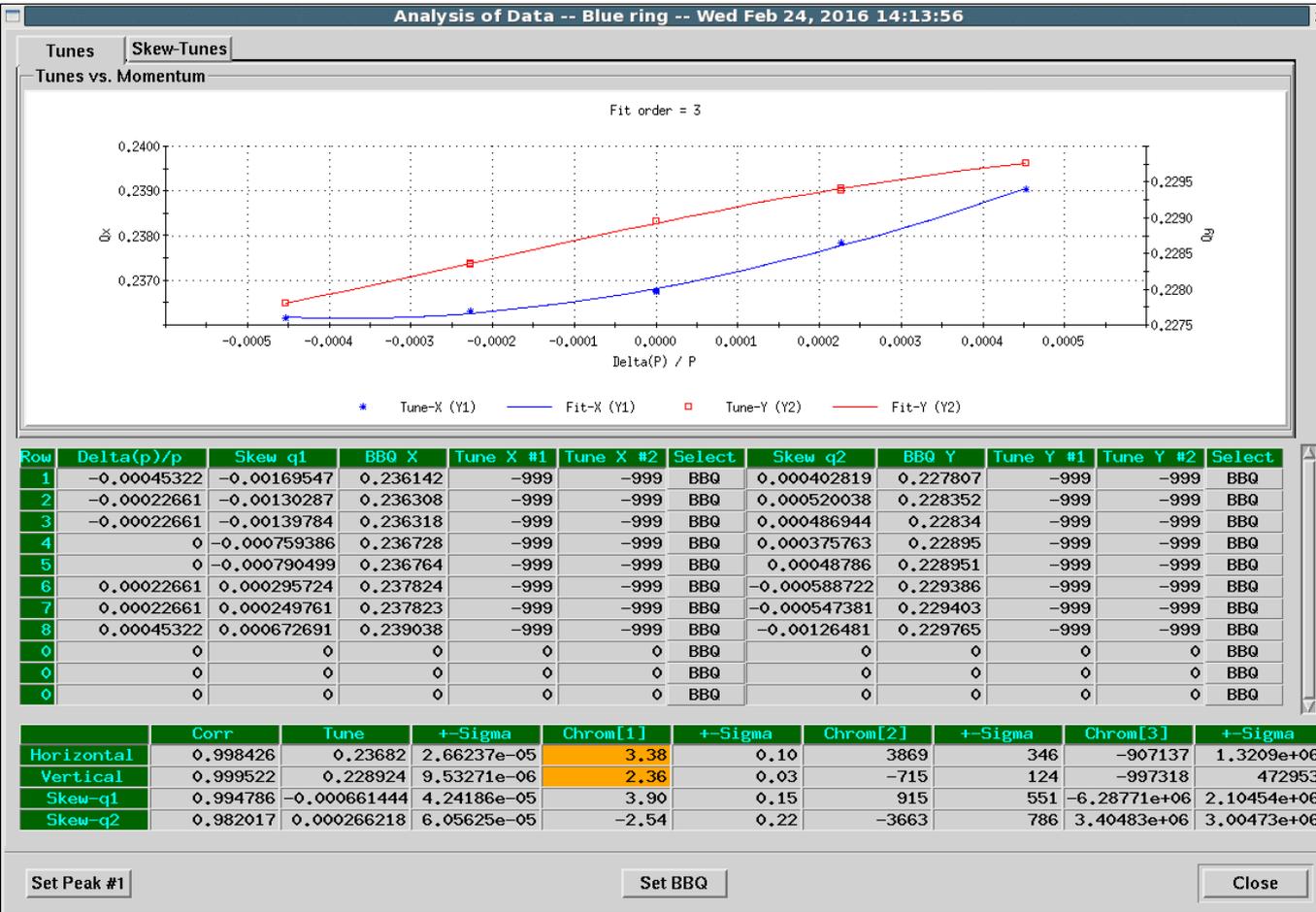


Guillaume's observation:

The optics errors measured at this store without orbit bumps are not much different from previously measured optics errors with bumps



Chromaticity measurements



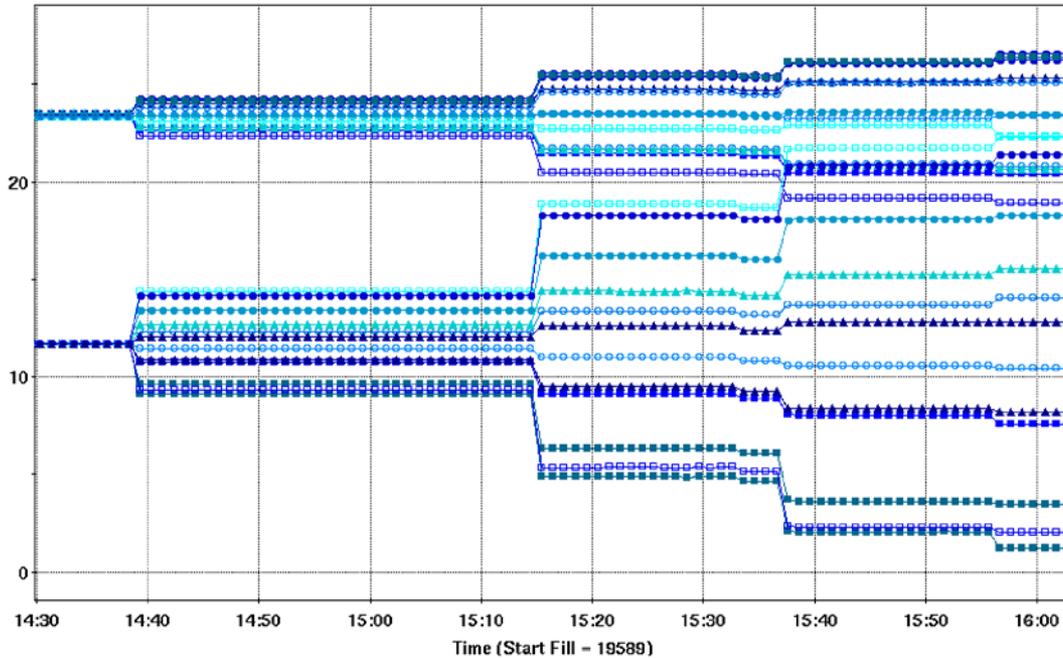
This one with 0.5 mm radial shift

The measurements were done with much better accuracy than during this year RHIC start-up

Very large horizontal 2nd order chrom!

Guillaume's 2nd order chrom correction using all 24 sextupole PS independently

$\xi_{2x} \sim 3800$ $\xi_{2x} \sim 3800$ $\xi_{2x} \sim 2200$ $\xi_{2x} \sim 2400$ $\xi_{2x} \sim 2000$
 $\xi_{2y} \sim -700$ $\xi_{2y} \sim -500$ $\xi_{2y} \sim -300$ $\xi_{2y} \sim -800$ $\xi_{2y} \sim -900$



Plot shows 24 sextupole PS currents during 2nd order chrom corrections

First order chromaticities weren't affected much by this knob.

- b11-sxd1-ps.current:dataBarM
- b19-sxd1-ps.current:dataBarM
- bo3-sxd1-ps.current:dataBarM
- b11-sxf2-ps.current:dataBarM
- b15-sxf2-ps.current:dataBarM
- b19-sxf2-ps.current:dataBarM
- b11-sxf1-ps.current:dataBarM
- b19-sxf1-ps.current:dataBarM
- bo3-sxf1-ps.current:dataBarM
- b11-sxd2-ps.current:dataBarM
- b15-sxd2-ps.current:dataBarM
- b19-sxd2-ps.current:dataBarM
- ▲ b15-sxd1-ps.current:dataBarM
- bo11-sxd1-ps.current:dataBarM
- bo7-sxd1-ps.current:dataBarM
- bo3-sxf2-ps.current:dataBarM
- bo7-sxf2-ps.current:dataBarM
- bo11-sxf2-ps.current:dataBarM
- b15-sxf1-ps.current:dataBarM
- bo11-sxf1-ps.current:dataBarM
- bo7-sxf1-ps.current:dataBarM
- bo3-sxd2-ps.current:dataBarM
- bo7-sxd2-ps.current:dataBarM
- bo11-sxd2-ps.current:dataBarM

The 2nd order horizontal chrom was shifted considerably at one (largest) adjustment step, but not at other steps. ?????

Further actions

- Find explanation to the observed 2nd order chrom behaviour during the correction.
- Improve the chrom correction algorithm.
- Attempt one more time to correct 2nd order chrom down to few 100 units
- Try the radial shift ramp. The radial shift steps will be defined by success of chrom correction activity.

Dedicated Ramp

The screenshot shows the RampEditor application window. The title bar reads "RampEditor (on cscompile01.pbn.bnl.gov)". The menu bar includes "Ramp", "Edit", "Buffer", "Optics", "Stepstone", "Compare", "Diagnostics", and "Help". The status bar shows "Editing: pp15-APEXradius0", "Live Stone: pp15-APEXradius0::store", "Ramp State: LastStone", and buttons for "Save" and "Activate / Make Live". The "Stepstone Editor" tab is active, displaying a table with columns for Time, Stepstone, Gamma, TuneX, TuneY, ChromX, and ChromY. The table has two panes: a main table on the left and a zoomed-in view on the right. The main table has 4 rows, with the last row highlighted in green. The zoomed-in view shows the last row of the main table. At the bottom, there is a "Tune Nudge" control set to 0.0005. A log window at the bottom left contains the following text:

```
wfgMan:messageM = Auxramp to last initiated (53 PS moved)(Mar 11 10:01:41)
Ramp activate successful. (Mar 11 10:01:43)
Ramp file activated - pp15-APEXradius0_1426082499 (Mar 11 10:01:43)
```

Time	Stepstone	Gamma	TuneX	TuneY	ChromX	ChromY	
1	0.0	injection	25.379	29.6222	30.6058	2.6	0.5
2	10.0	t10	25.379	29.7027	30.6857	-0.4	-0.1
3	20.0	t20	25.379	29.8094	30.7883	-6.6	-0.9
4	30.0	store	25.379	29.9140	30.8723	-38.5	-2.7

TuneX	TuneY	ChromX	ChromY
29.6222	30.6058	2.6	0.5
29.6222	30.6058	2.6	0.5
29.6222	30.6058	2.6	0.5
29.6222	30.6058	2.6	0.5

Tune Nudge = 0.0005