1st RSC Meeting Run 13.

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Outline

- Overview of Operational Plan
- Upgrades and their current status
- Lattice development
  - DA estimates
  - Polarization

Schedule

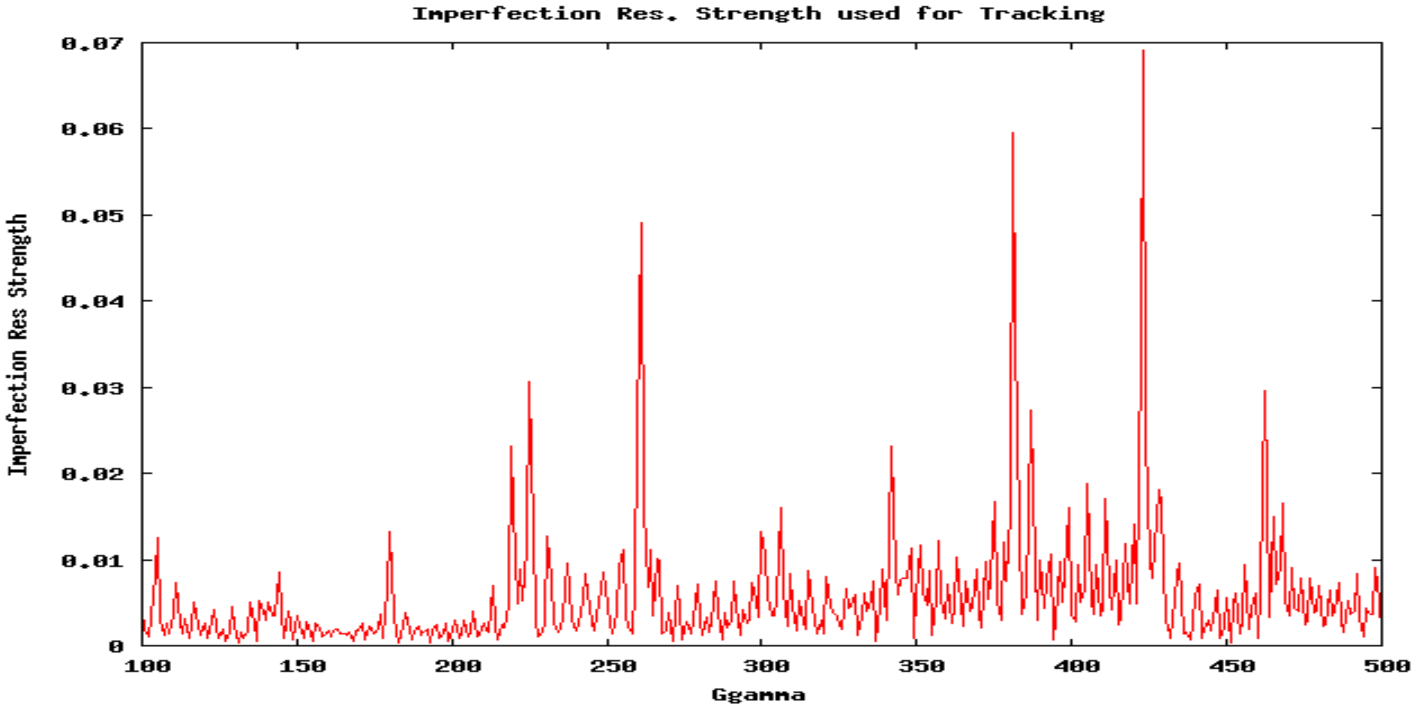
- 1 week from 4K wave to be cold in both ring.
- First 2 weeks after being cool down: set-up for pp 255 GeV with goal to achieve collisions (E-lens Lattice)
- Third week: Machine Ramp Up with 8hrs/night for Experiments.
- After first three weeks stable machine operations are expected.
- At some point during the run we will switch to pp2pp mode. This will cost 4 days of operation.

Machine Upgrades Status

- Source Upgrade:
  - New RF bunch structure for Booster and AGS
  - Change in bunch spin pattern
- E-lens :
  - New Lattice at new integer tune values
  - Change in abort gap location or adding gap in bunch train
- RF Upgrades:
  - Vector Sum (real bunch-to-bucket phase measurement)
  - I/Q feedback on bouncers for amplitude and phase accuracy
  - New landau cavities this year
    - harmonic this year (FY13) = 21 ½ x 9 MHz (not storage cavity)
    - Improve beam loading, enabling lower voltage at injection
  - New dipole mode longitudinal damper (already tested past run. Still needs work)
- AGS Status
  - Repair : We expect the Siemens to be back 1st week in Feb. In the meantime Westinghouse is being readied.

Prognosis for Polarization

- The Blue Ring should fair better than last year since Intrinsic resonances are all lower.
- Yellow Ring is mixed the 411-Nu resonance is significantly lower however 293+NU and 393+NU are both stronger especially 293+NU.

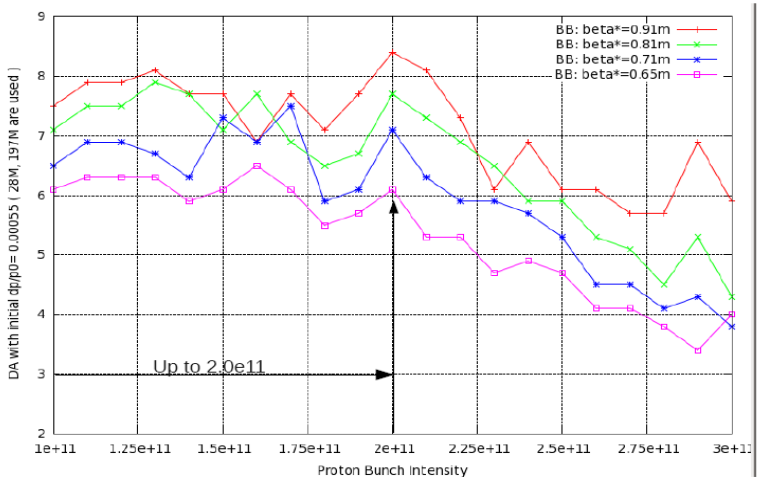


However since our Imperfection Resonances scale with Energy this has less of and impact than at it would at the intrinsic resonance higher up the ramp.

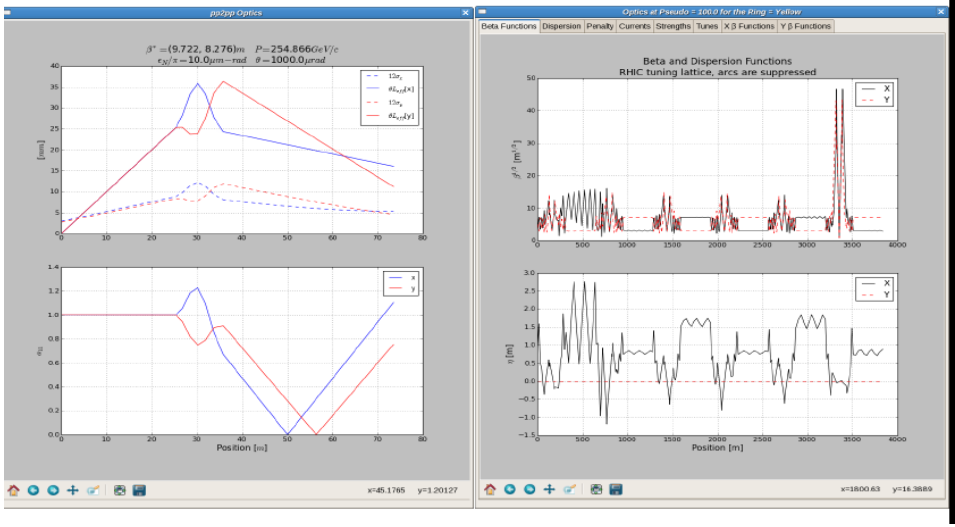
Lattice Development

- E-lens:
  - Steve Tepikian has developed solutions which by Yun Lou's tracking shows we are at 6 sigma DA at our goal intensity. This appears good enough to run with.
  - Change in beta squeeze on ramp. To make the new lattice interface more easily with pp2pp mode we are ramping with fixed beta Star at 7.5 m to top energy. Then during rotator ramp we will perform the beta squeeze necessary for normal runs.
- Pp2pp:.
  - Steve has developed a solution which would work with the e-lens ramped optics.

DA with BB at IP6 and IP8

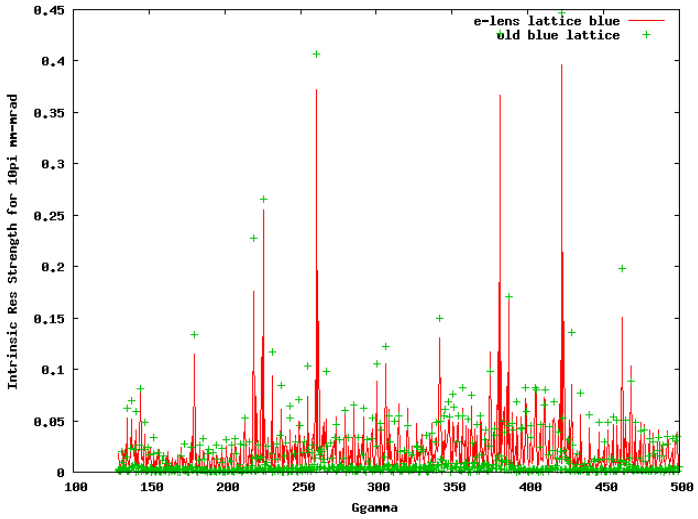


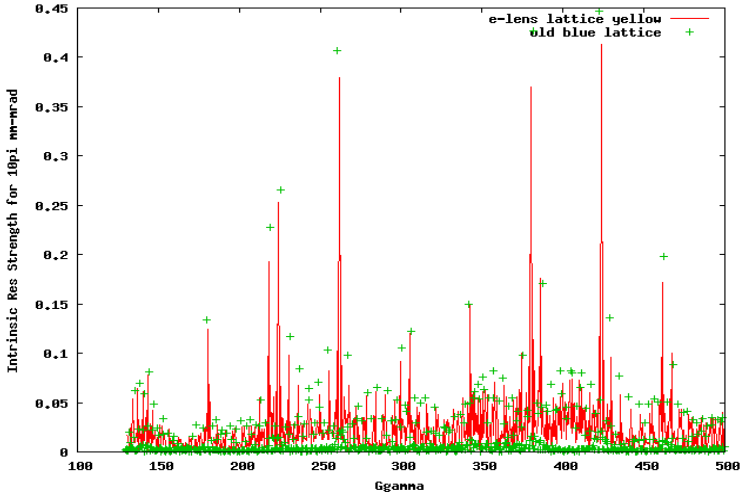
Yellow Ring, Tunes = (29.69, 30.68)



DEPOL calculations for new e-lens lattice

Initially we thought the E-lens lattice looked great with at 10% in the strong intrinsic resonance



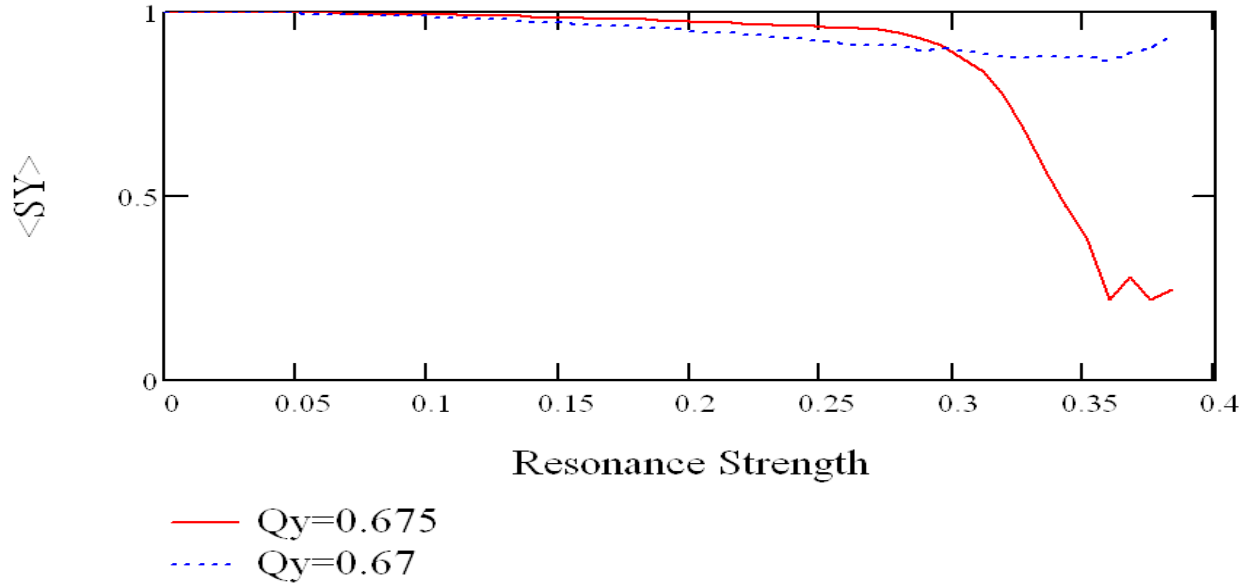


However the Un-squeezed Ramped resonance calculations showed a much more pessimistic Picture.

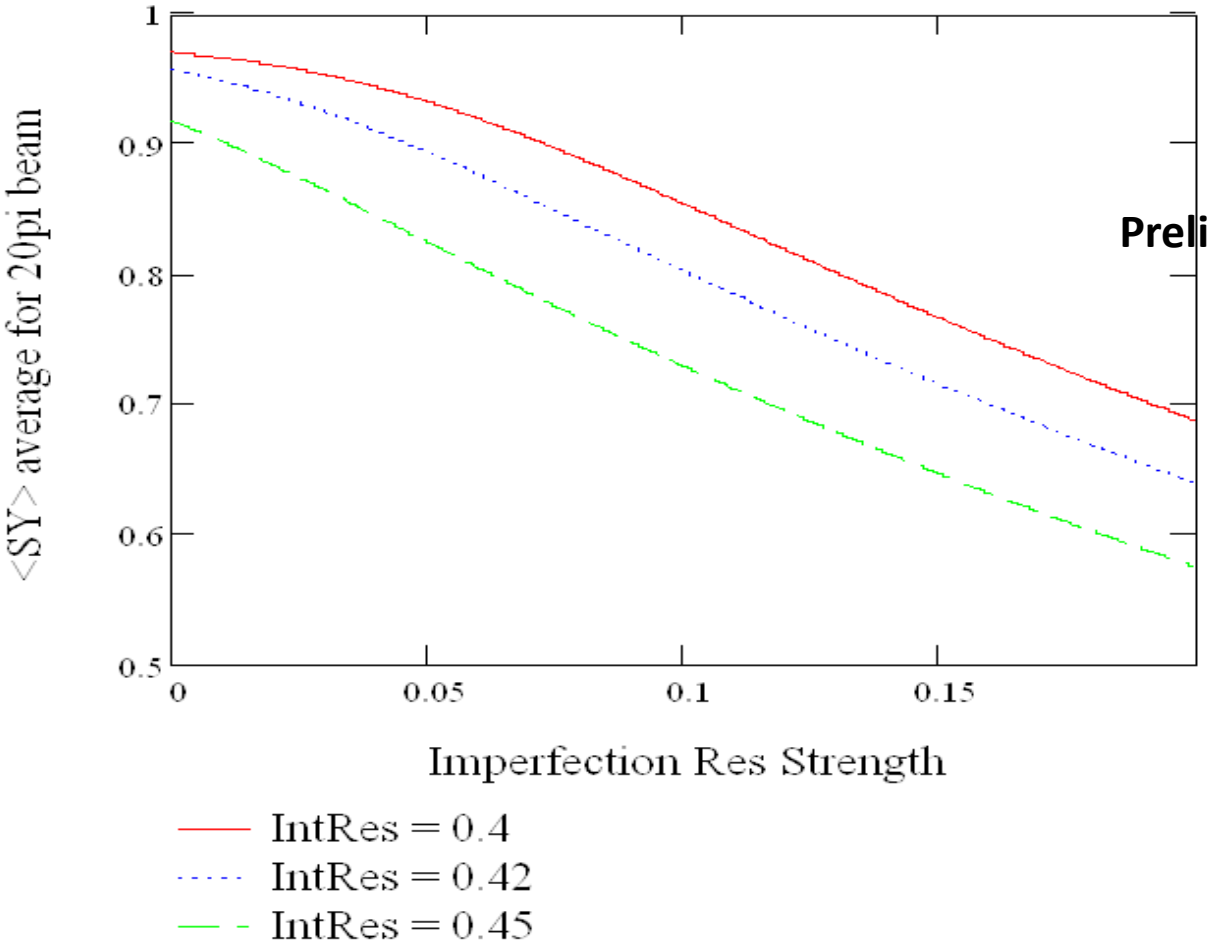
Intrinsic Res	Old Blue	New Blue	Old Yellow	New Yellow
293+NU	0.408	0.398	0.409	0.4398
411-NU	0.426	0.414	0.427	0.397
393+NU	0.447	0.445	0.4495	0.458

Tune and Chromaticity Considerations

- Aside from the strength of the intrinsic and Imperfection resonance proximity to the 2/3rd's tune has a very important effect on the polarization losses.
- By not squeezing on the ramp we should have more DA to be able to move our tune down from 0.673 to 0.672 and lower the chromaticity during the resonance crossings



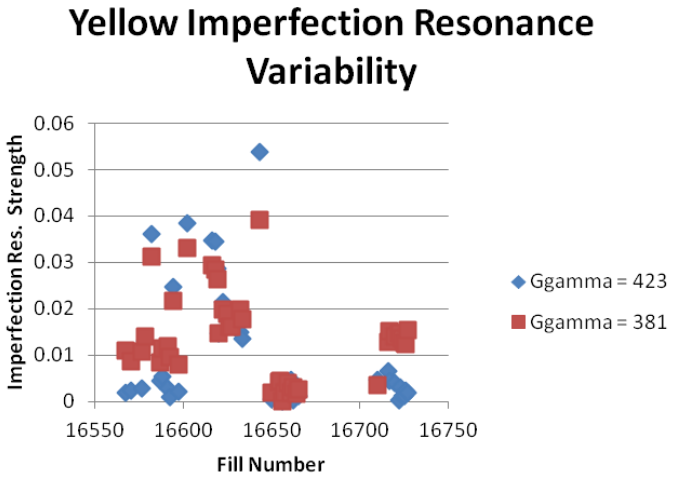
Imperfection and Intrinsic Sensitivity graphs for Qy=0.675

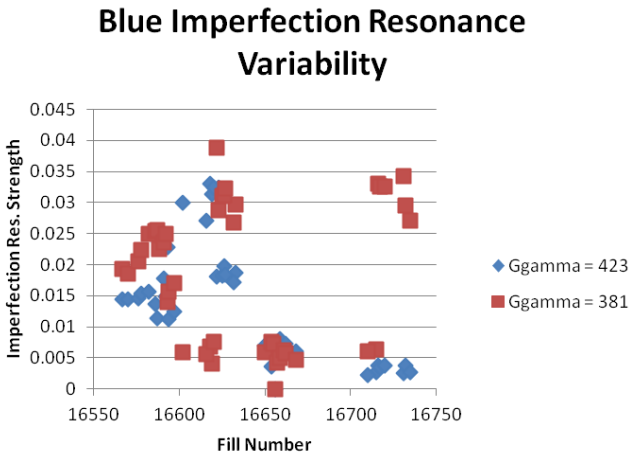


Preliminary Model

Estimates of Threshold for Imperfection Resonances (20pi beam)

Intrinsic Resonance (Qy=0.673)	Imperfection Threshold
0.45	0.03
0.42	0.05
0.4	0.07

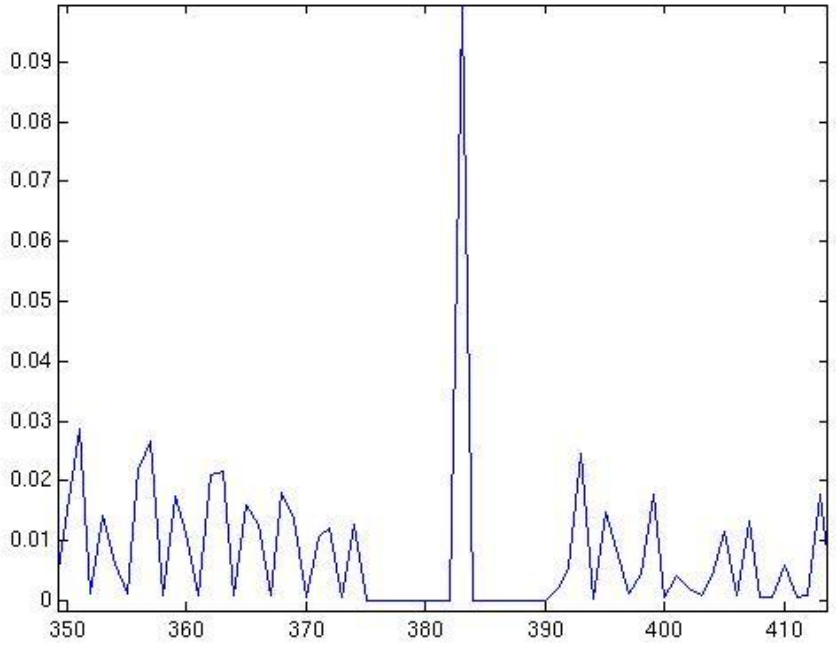




Controlled RHIC Polarization Calibration

To control Polarization losses for a given optics . A more deliberate calibration of our model using defined orbit distortions and snake de-tuning we believe will improve its predictive capacity so that we can better tune on polarization transmission efficiency.
too reduce Imperfection resonance fluctuation

IMPERFECTION BUMPS



- Similar to ORM approach: apply controlled Imperfection resonance bumps during the first several stores these should effect Polarization < 20% level.
- Demonstrated during APEX 12
- We also should bump snake currents in a controlled manner.
- With knowledge of the underlying Imperfection resonance we could tune this out of our target orbit and then tolerate the Swings in Imperfection.

Summary

- Schedule still on track
- Upgrades progressing well
- Lattice Development is on track
  - Issues with Resonance Strengths for yellow.
    - Address this with lower tunes on ramp
    - Better imperfection correction
    - Back-up squeezed ramp with better resonance structure.
    - Search for solution which doesn't alter beta squeeze.
  - Chromaticity control with new ramp.