APEX 2009 Workshop

Lattices for β* 0.5*m*

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Lattices for β* 0.5*m*

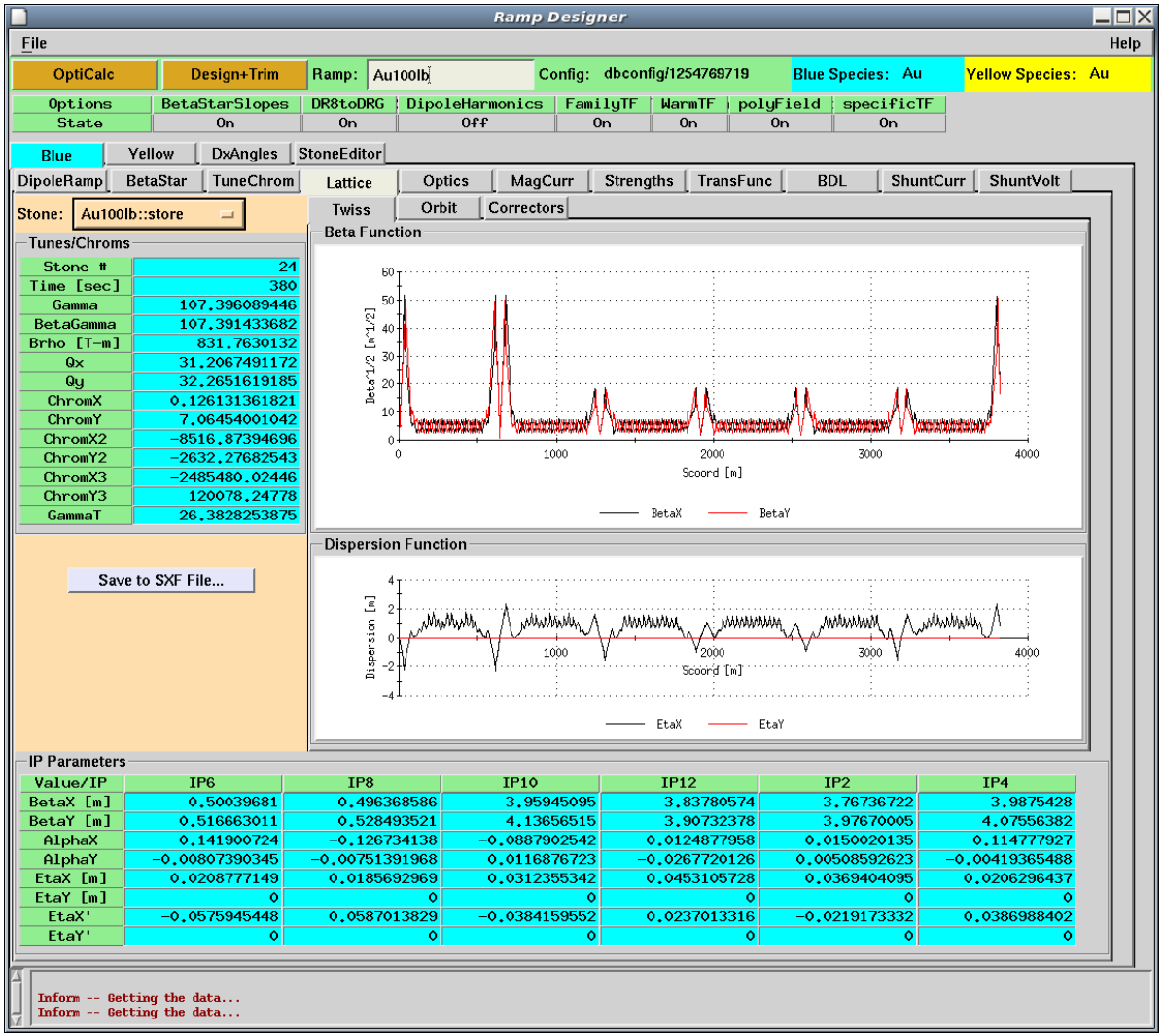
- Requirements
- Blue Optics
- Yellow Optics
- Previous proposals
- Future goals
- Summary

Requirements

- Fit within existing power supplies
  - Use IBS-suppression optics
  - Trim quadrupoles with 100*Amps* limits
  - QF8 and QF9 shunt power supplies at limits
  - Possible limits on sextupoles (unless the supplies are swapped)
- Tune feedback for ramp development
- Chromaticity/Dispersion measurements
- Beta function measurements

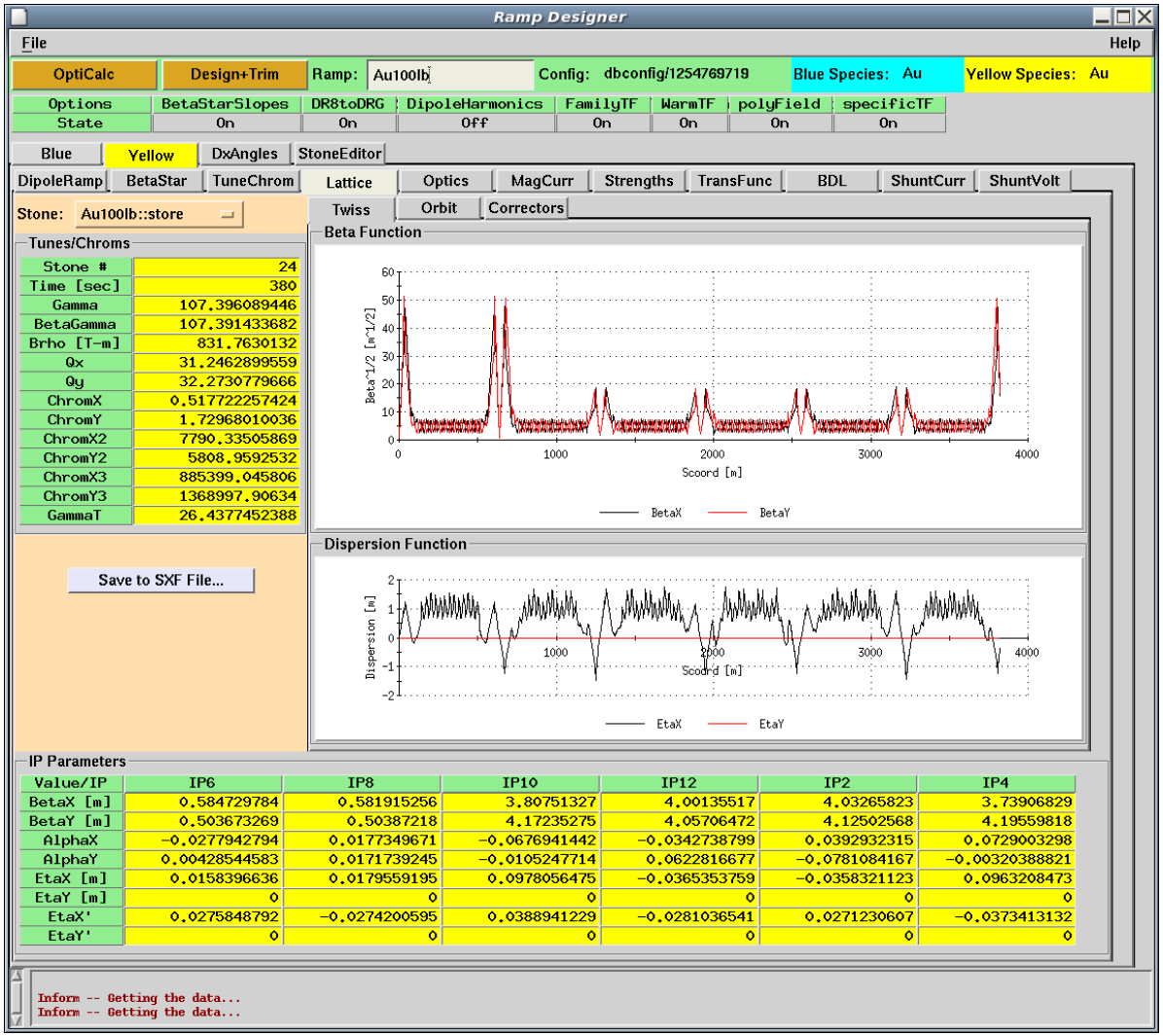
Blue Optics

- Preliminary
  - Needs tweaking
- Just may fit within existing sextupole power supply limits (if they are not swapped)



Yellow Optics

- Preliminary
  - Needs tweaking
  - Exceeds sextupole ramp rate limit, may need to lengthen the ramp
- Requires sextupole power supplies to be swapped



Previous Proposals

Experiment Number: 08-17

Beam Experiment Title: Test of ramp and operations with beta*<0.8m

Spokesperson(s): F. Pilat

Team: M. Bai, D. Bruno, W. Christie, A. Drees, M. Leitch, N. Malitsky, V. Ptitsyn, T. Satogata, S. Tepikian

Experiment Goal: To test the feasibility of ramping and machine operations with beta*< 0.8m. (An optics with 0.65m in blue and yellow has been successfully tested in Run-7 at store). First for ions, then for protons.

Benefits: 1. Luminosity increase at experimental IP`s. 2. Practice for dynamic beta* squeeze (of future interest when beam cooling is operational)

Experiment Description: The following steps apply to ions operations, then protons. 1. Prepare a ramp for blue and yellow, cloned from the Run-8 operation ramps (preliminary solutions to 0.6m exist for blue and yellow) 2. Develop the ramp with limited bunch number (6-12) and operational bunch intensity. 3. Measure rates in IP6 and IP8, linear optics, non-linear effects at store. 4. Ramp a physics store (likely prerequisite collimation on the ramp), set-up for collisions and test feasibility of operations at beta*=0.6m (or whatever can be practically achieved). Compare machine and detector operations to the Run-8 nominal beta*. Alternate plans in case of difficulty in ramping: 1. Squeeze one ring alone. 2. Squeeze at store both rings (as done in Run-7) but test feasibility with a physics store.

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Previous Proposals

Experiment Number: 09-04

Beam Experiment Title: Beta-squeeze to 0.5m with 100 GeV protons

Spokesperson(s): C. Montag

Team: Christoph, Fulvia, Steve, Vadim, Todd, Mei, Yun,...

Experiment Goal: After operations with beta-star=0.7 is established, attempt squeezing to 0.5m during APEX. This should obviously happen early in the run, so the benefit for luminosity improvement is maximized if the experiment is successful and the remainder of the run is done in this configuration.

Benefits: 40 percent luminosity increase (neglecting hourglass effect)

Experiment Description: Ramp and squeeze to 50cm instead of 70cm. Maximize lifetime in collision, apply collimators, minimize backgrounds, establish operational conditions.

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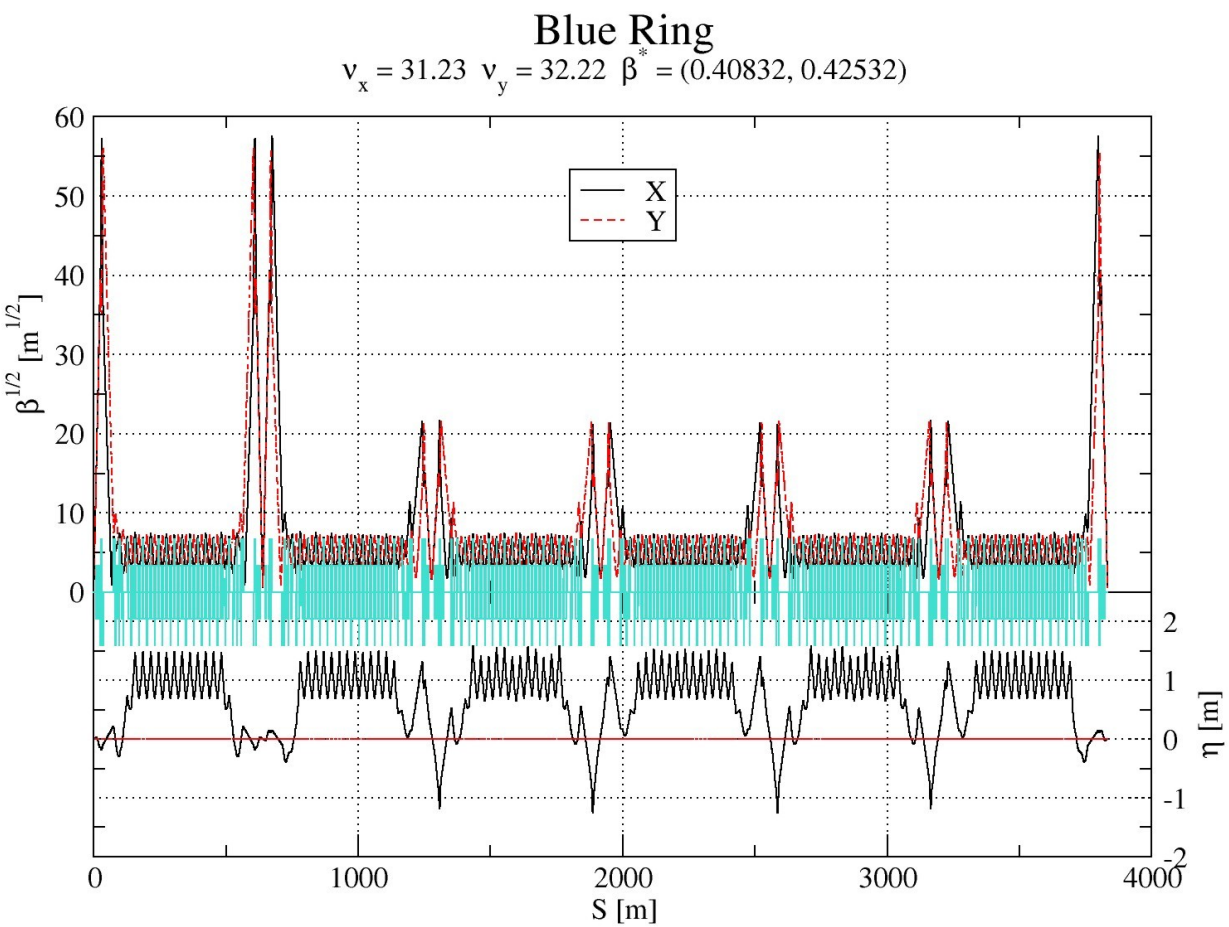
Future goals

- IBS-suppression optics
- Used higher limits on power supplies
  - Trim quadrupoles to 150*Amps*
  - Q89 bipolar supplies to ±300*Amps*
- A β* squeeze needs to be developed



Summary

- Write a new proposal for the next run
- Use IBS-suppression optics
- Build the ramp for $\beta^* = 0.5m$ within existing power supply limits
  - May be just be able squeeze by *without* swapping the Blue sextupole power supplies
  - Requires the Yellow sextupole supplies to be swapped
  - Lengthen the ramp due to sextupole ramp rate