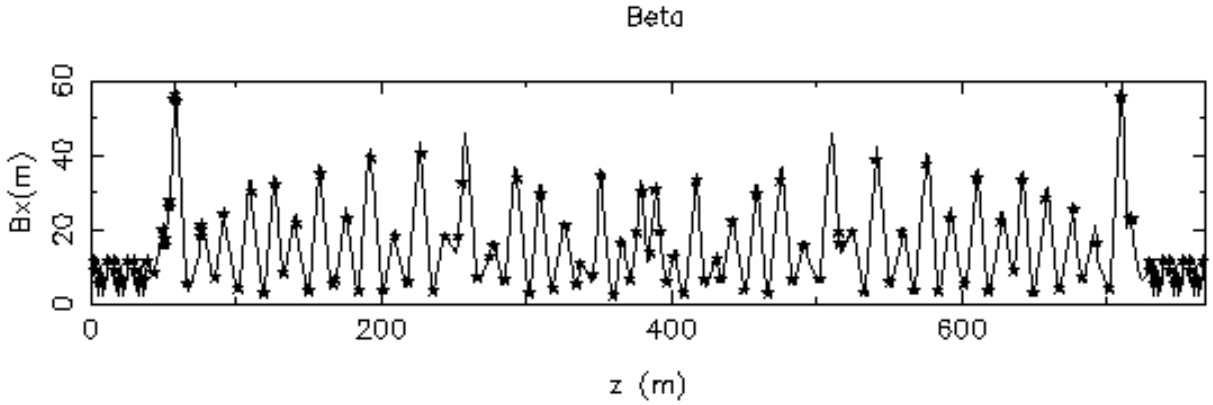
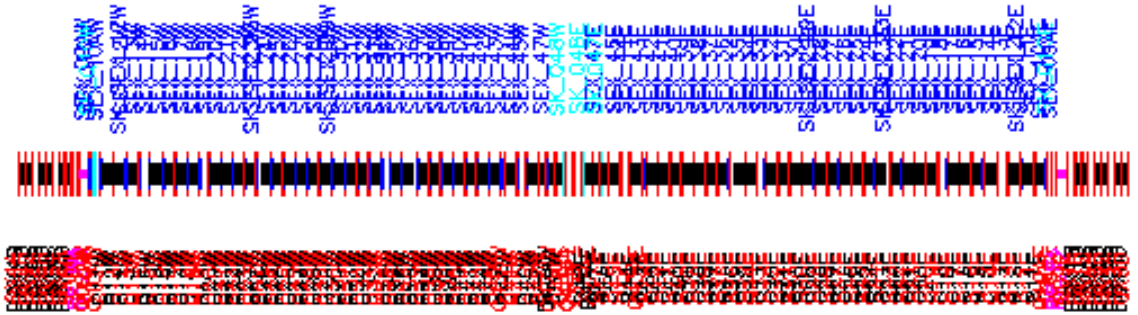
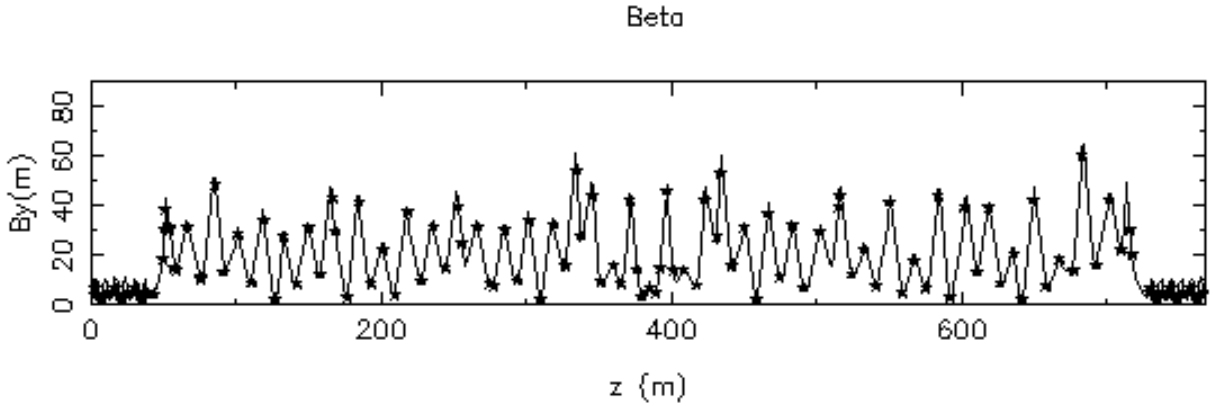
OSC Lattice Designs

- 1 GeV version of 6 GeV lattice
- Bypass with new undulator model

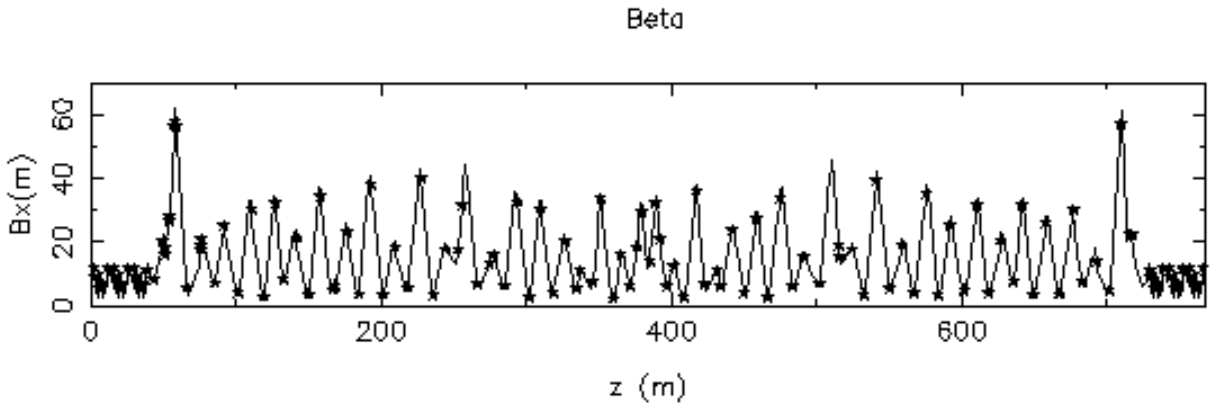
6 GeV Lattice

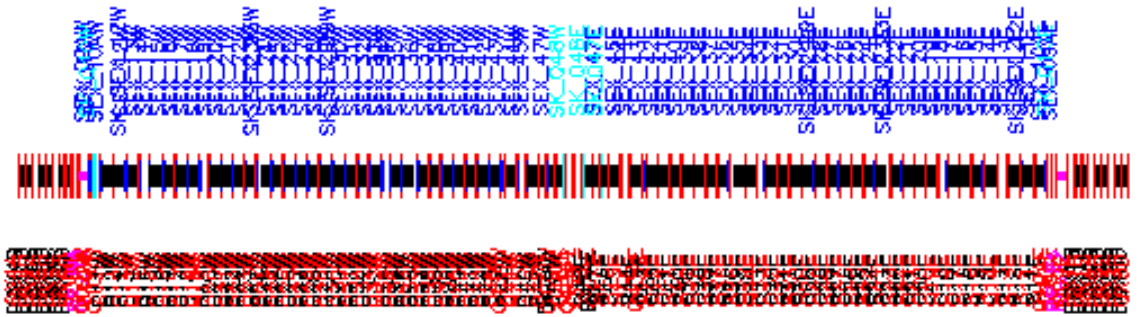


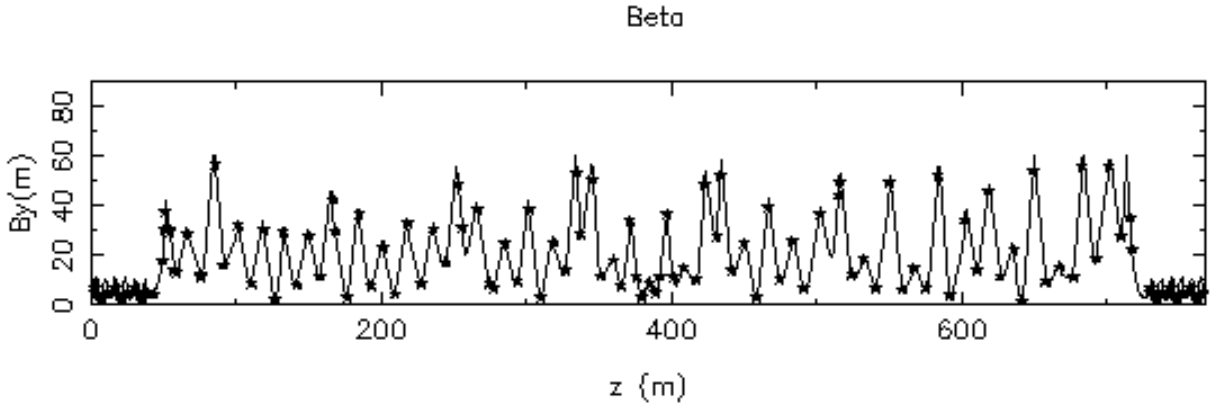




1 GeV Lattice, Wigglers On



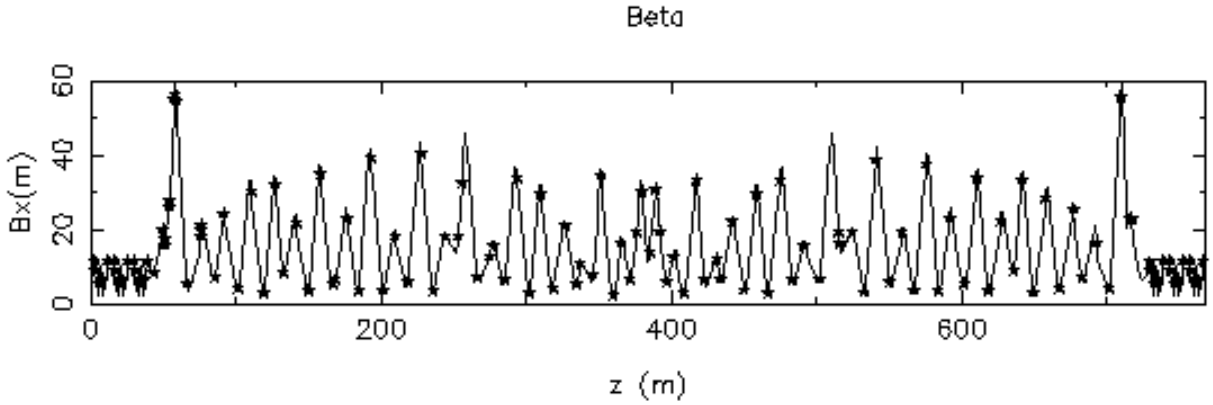


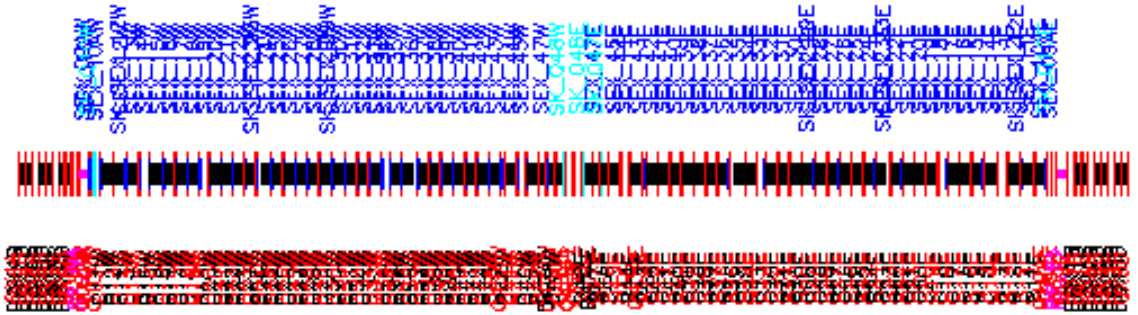


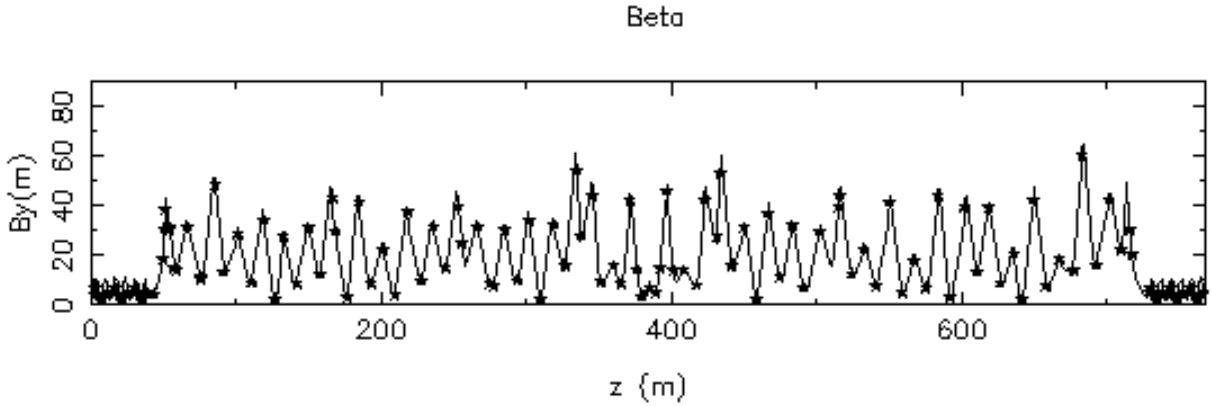
Optimize with Tao

- Use same procedure as for the bypass lattice to print out betas from old (6 GeV) lattice and use them as targets for new optimization

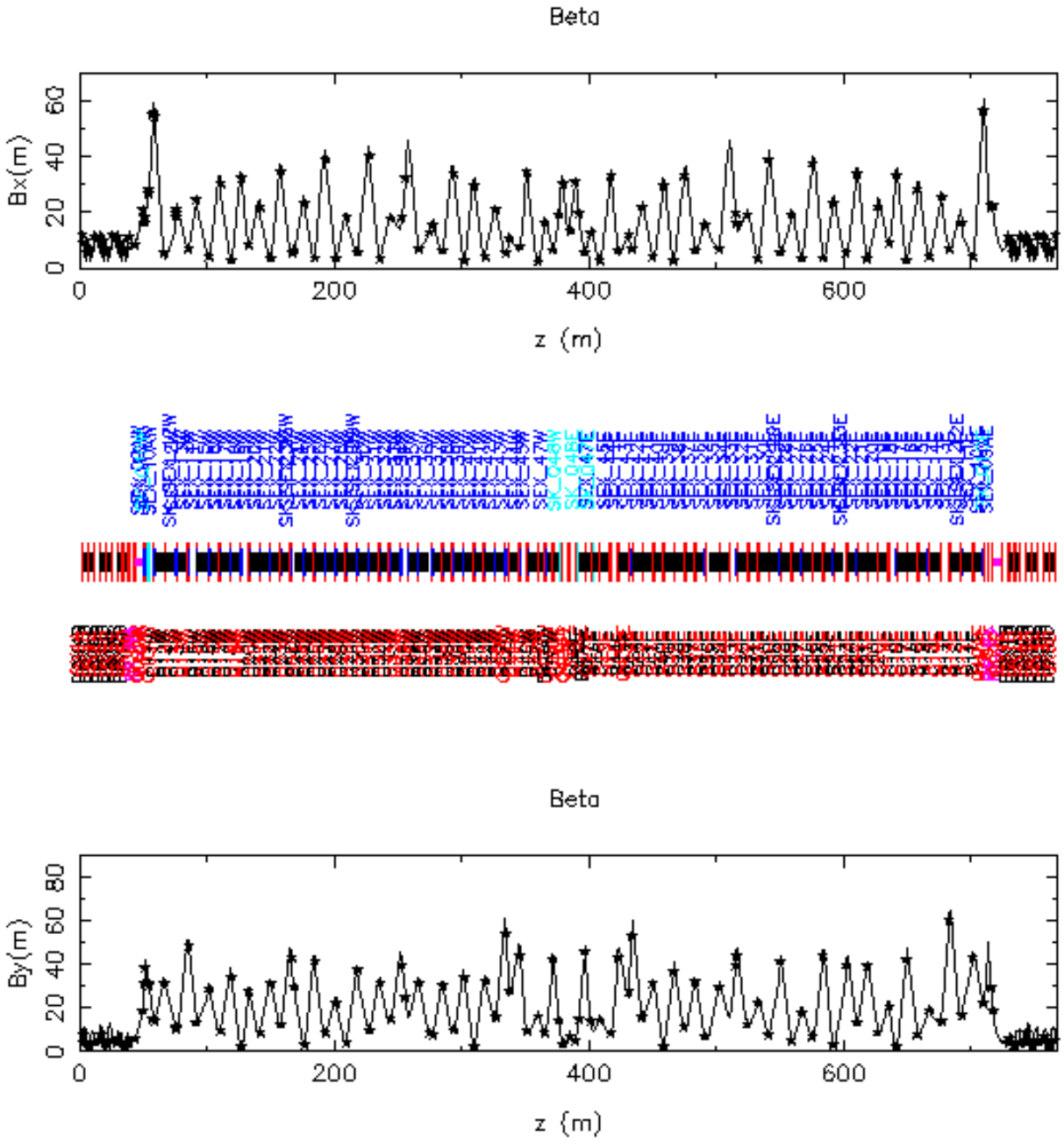
6 GeV Lattice





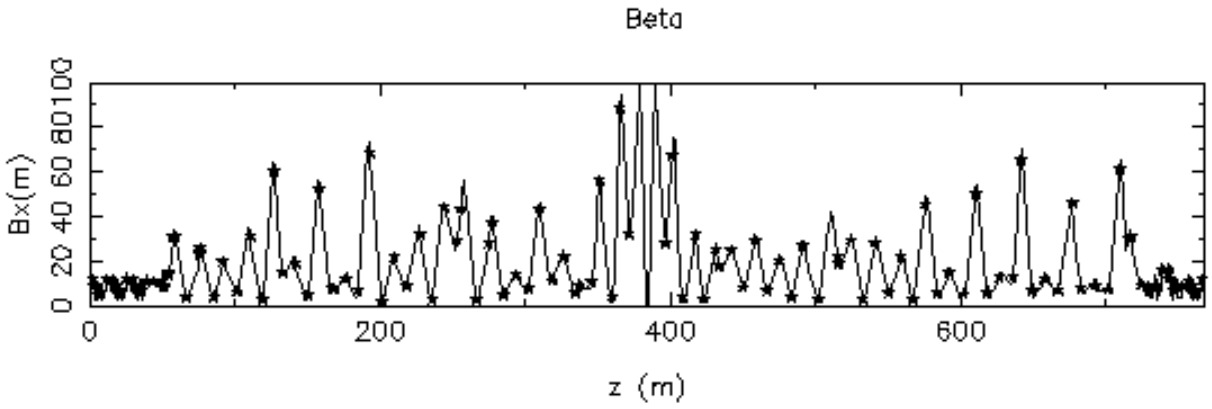


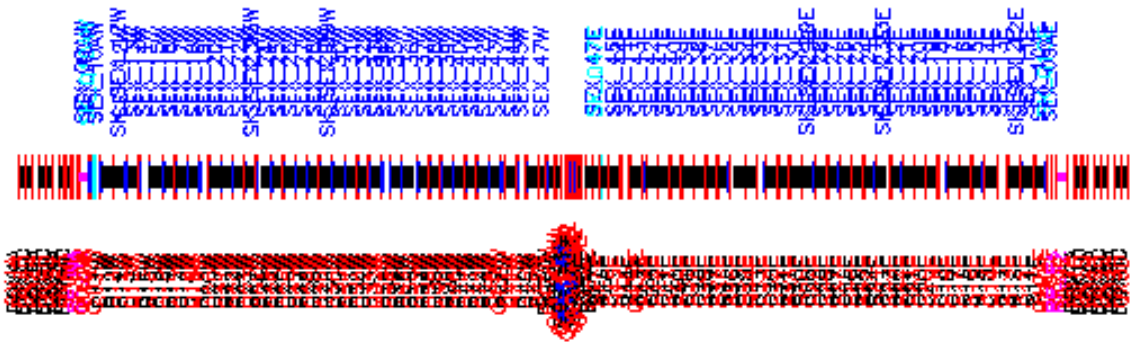
1 GeV Lattice, Wigglers On, Optimized

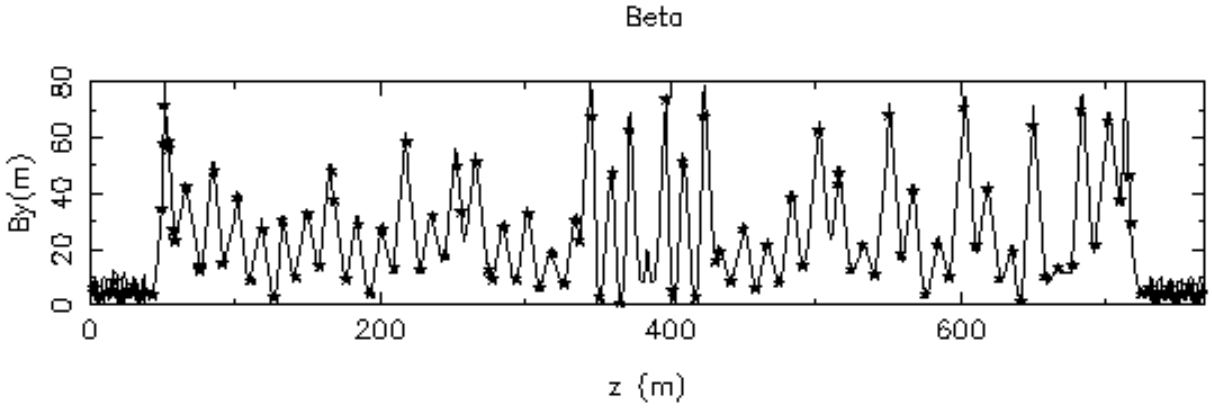


Bypass Optimization

Original Bypass







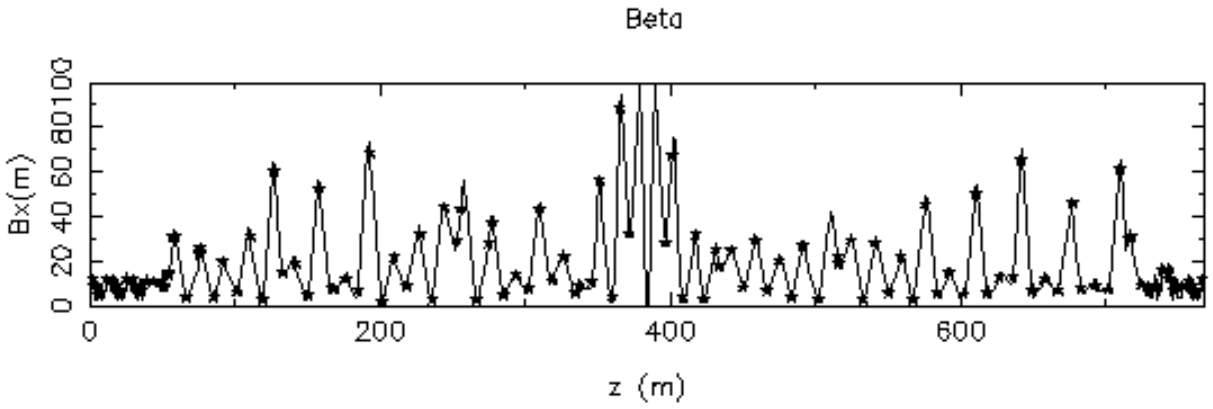
Emittance: 2.96 nm

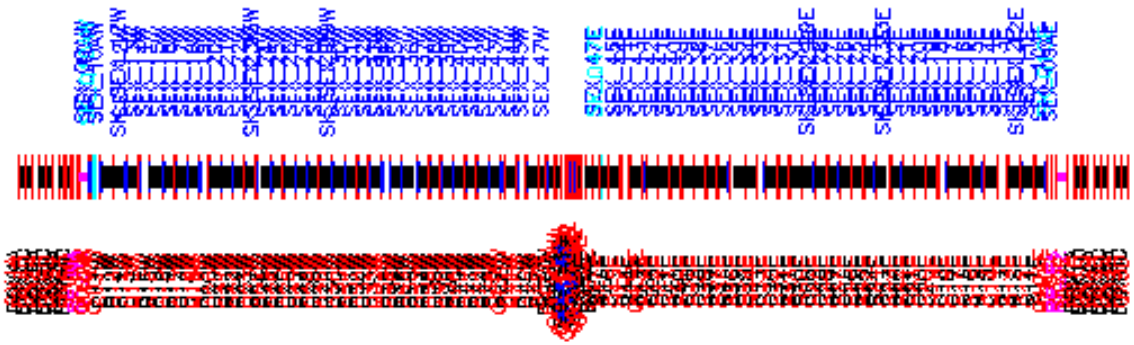
Acceptance: 30 nm

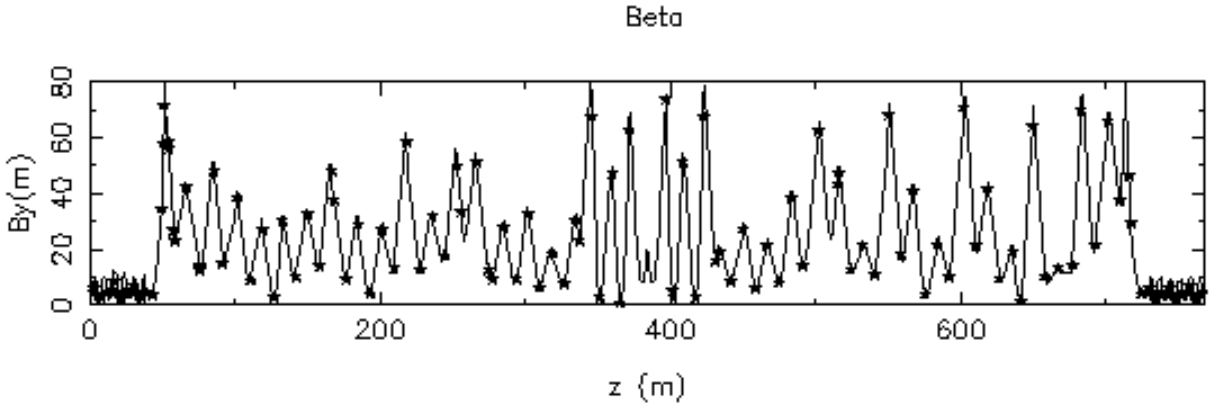
Ratio: 10.2

Momentum acceptance: 2.7%

Matched Bypass with New Undulator







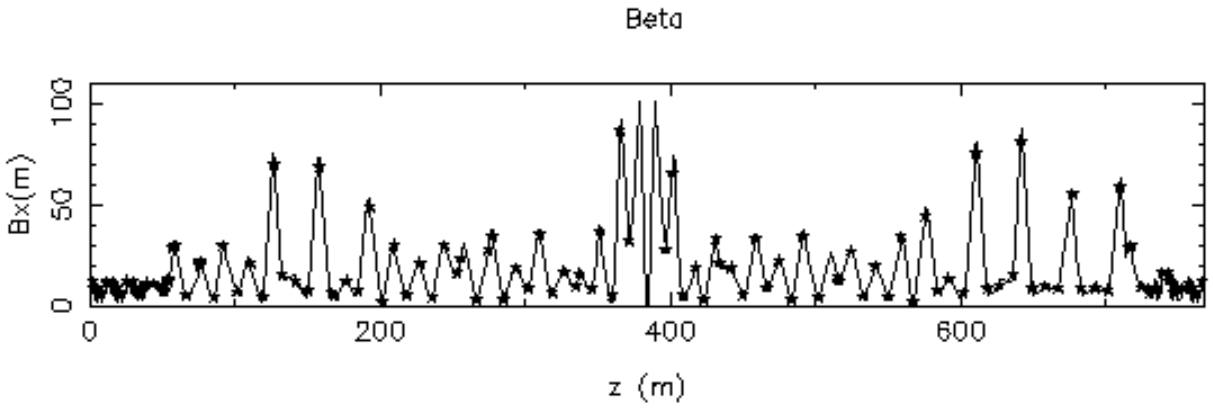
Emittance: 4.79 nm

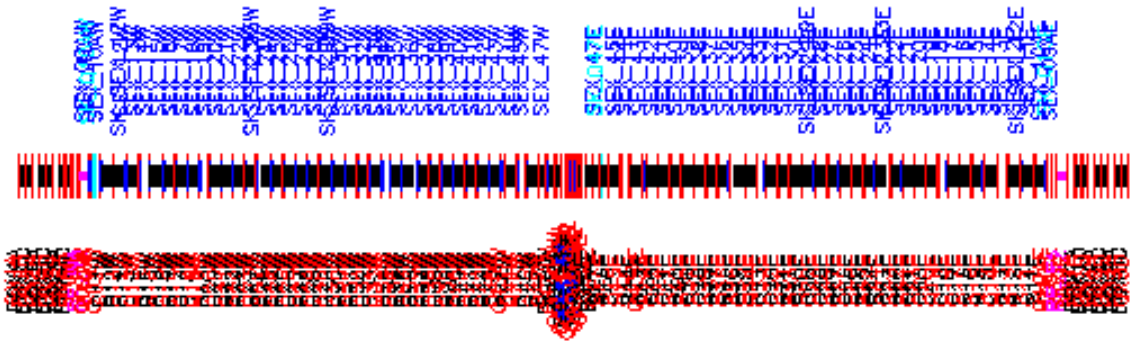
Acceptance: 31.8 nm

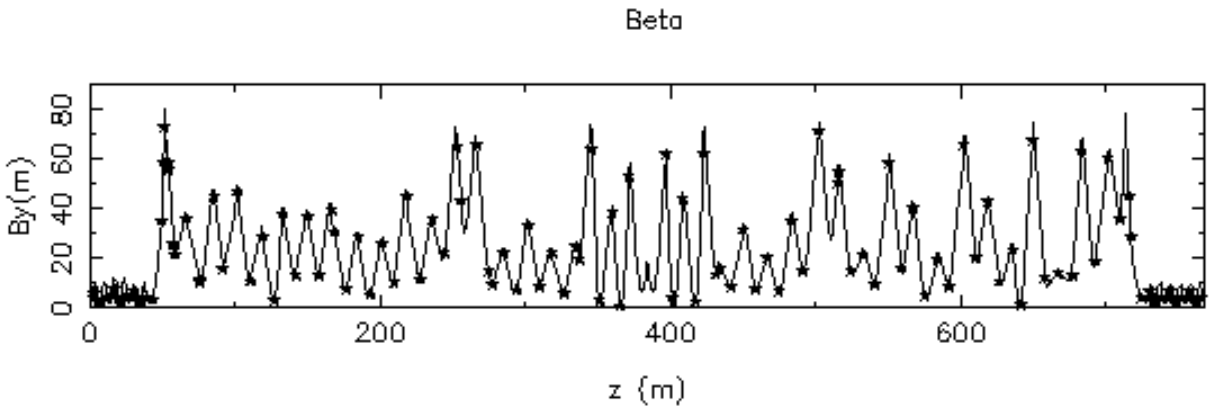
Ratio: 6.63

Momentum acceptance: 0.30%

Optimized Bypass with New Undulator







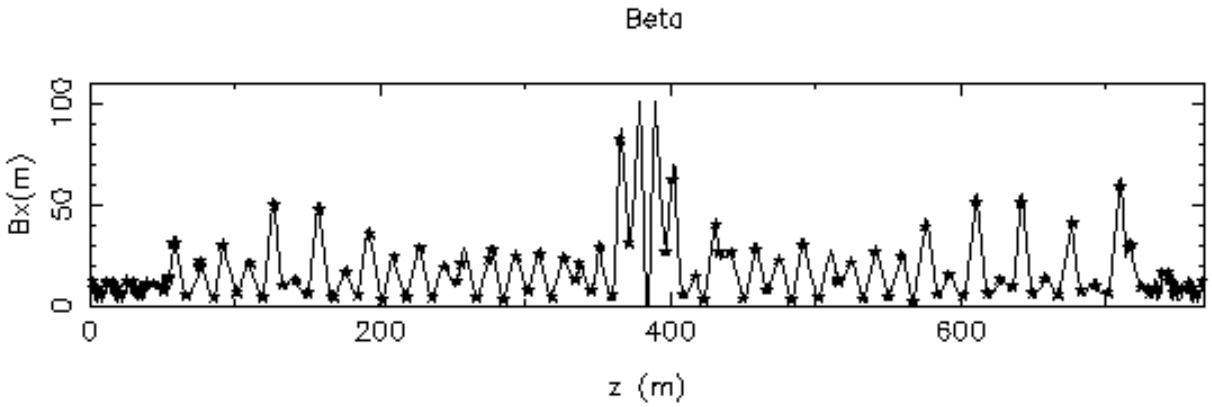
Emittance: 2.77 nm

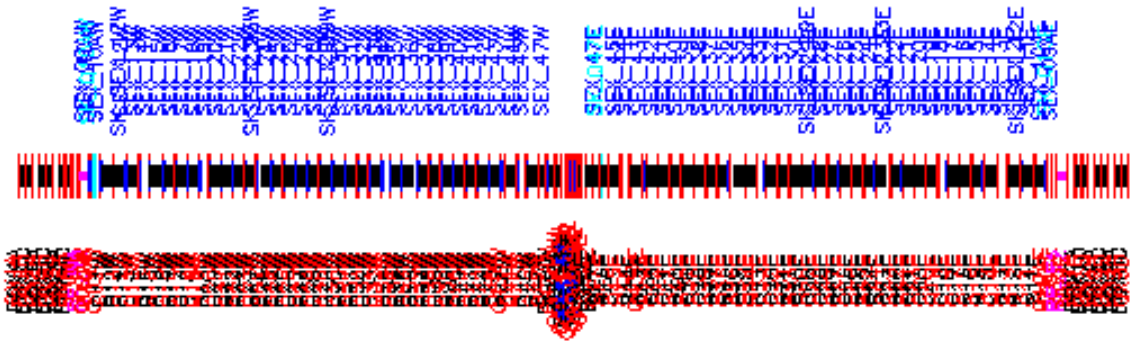
Acceptance: 18.9 nm

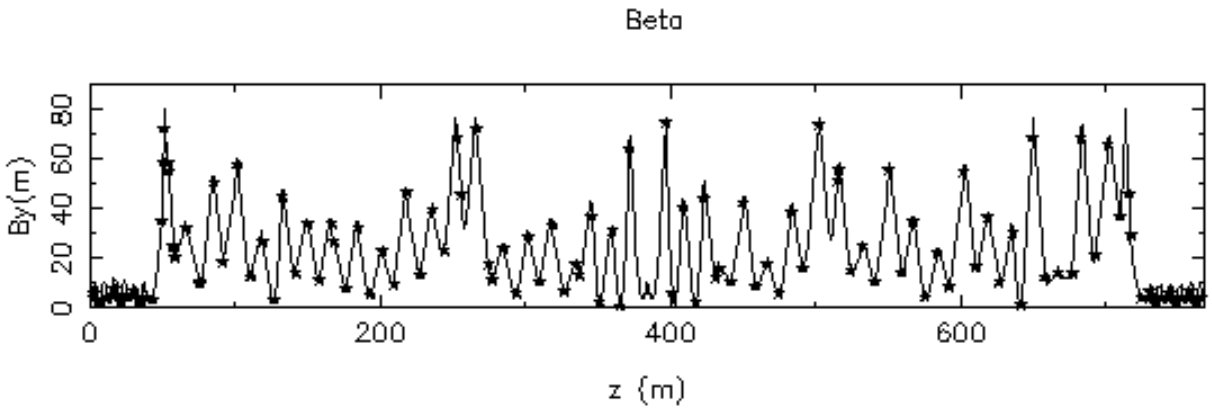
Ratio: 6.82

Momentum acceptance: 0.99%

Low-Emittance Bypass







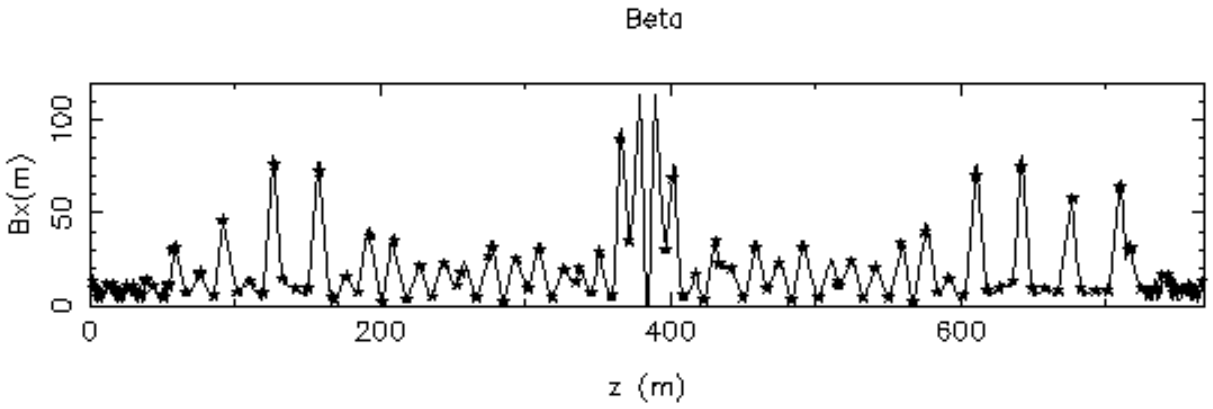
Emittance: 1.22 nm

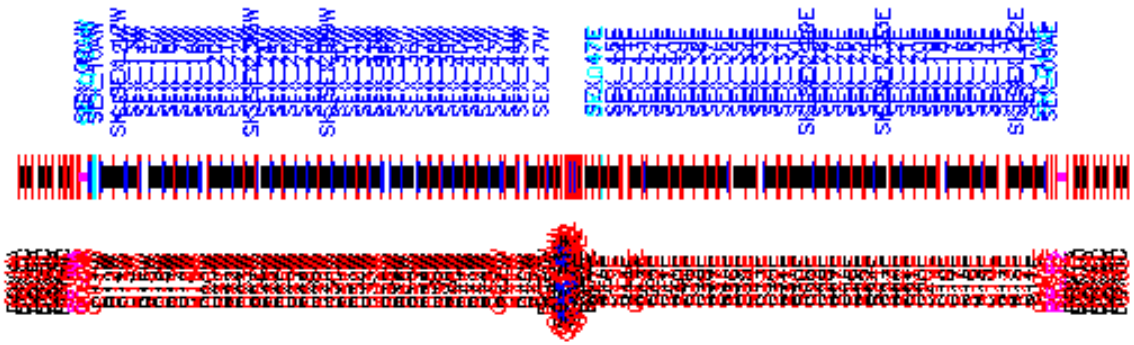
Acceptance: 9.10 nm

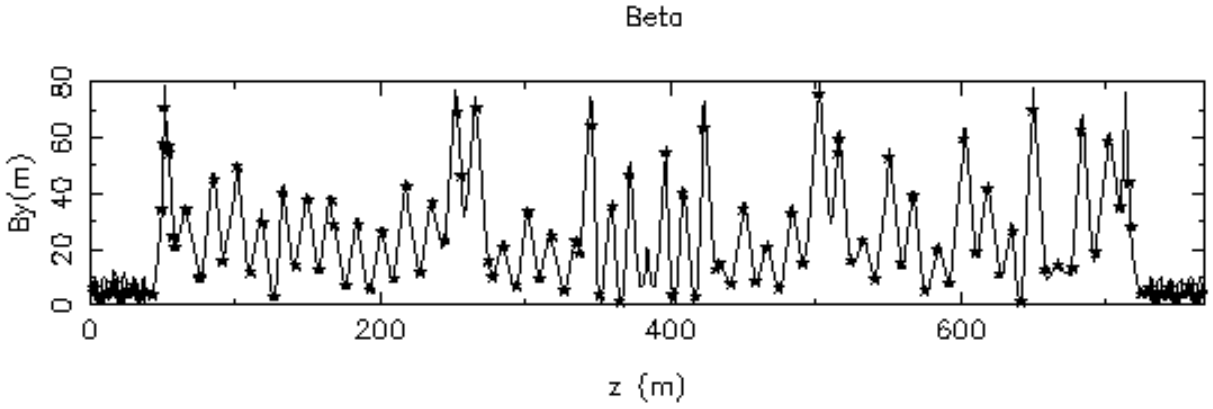
Ratio: 7.47

Momentum acceptance: 0.96%

Q0 off, Use CHESS-U Quads







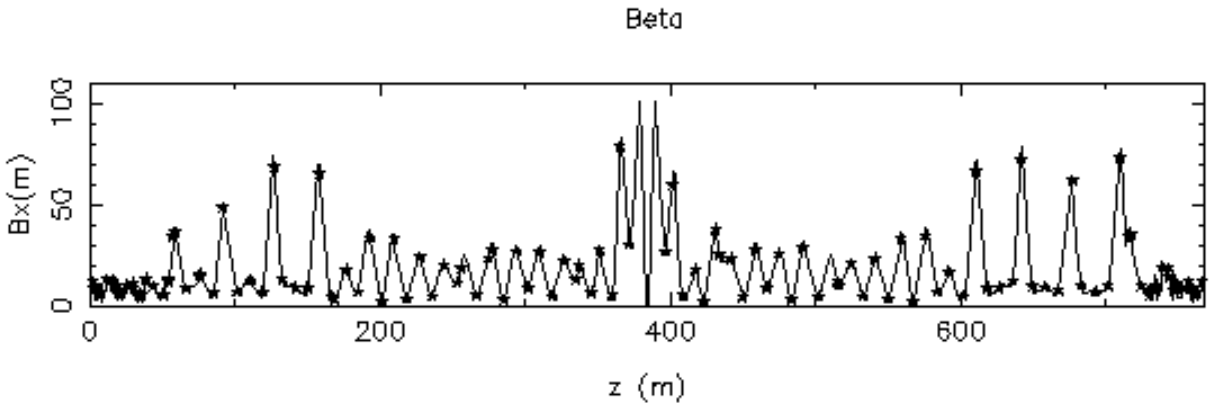
Emittance: 2.51 nm

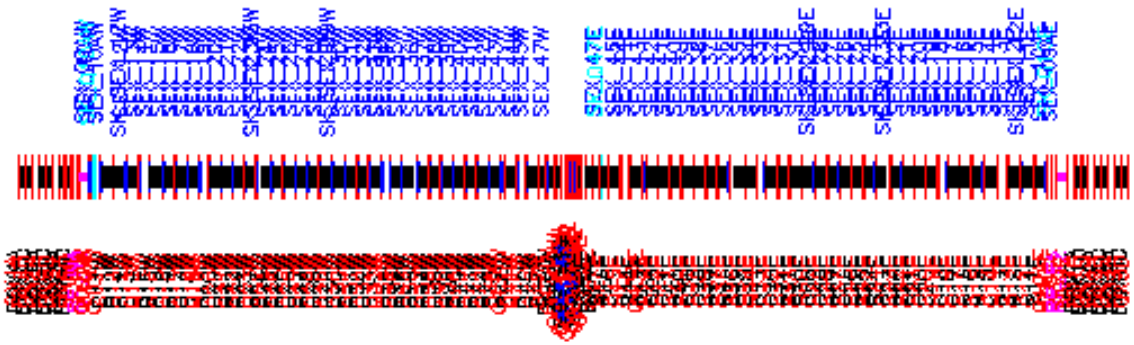
Acceptance: 17.6 nm

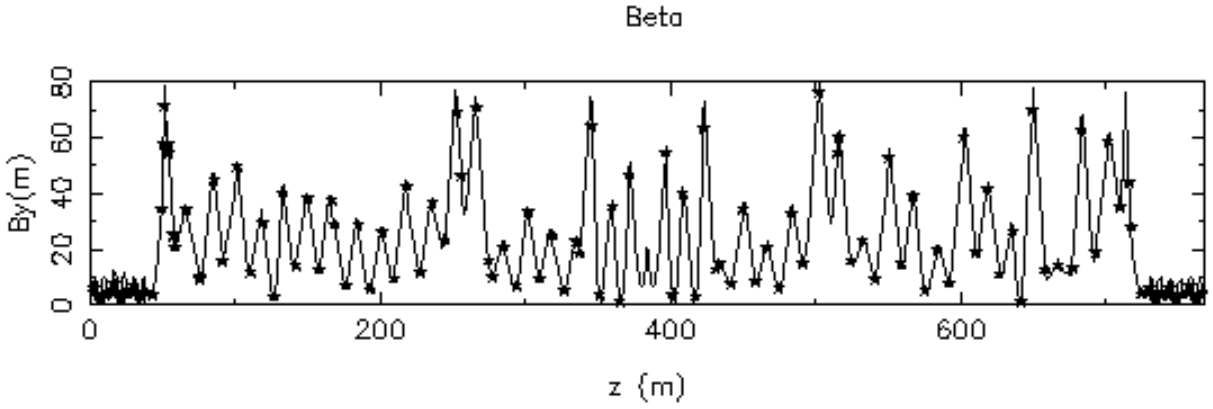
Ratio: 7.02

Momentum acceptance: 0.99%

Q0 on, Use CHESS-U Quads







Emittance: 2.24 nm

Acceptance: 15.5 nm

Ratio: 6.95

Momentum acceptance: 0.98%

Lessons from Optimization so Far

- If push harder on emittance acceptance ratio, get momentum acceptance of 0.04% - far too low
- Little improvement from re-adding Q0, removing optics constraints, or varying CHESS-U quads
- May try breaking symmetry...

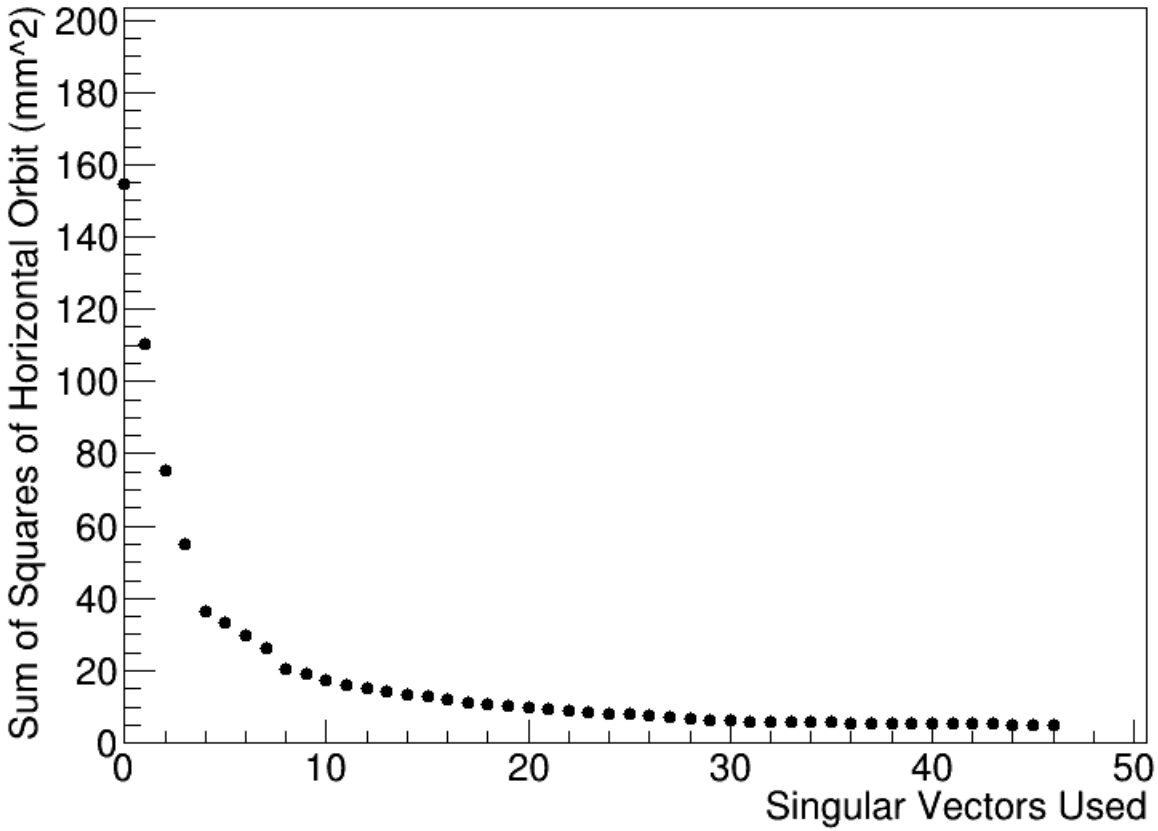
Backup Slides

- 4^{th} Harmonic OSC Radiation
- Synchrotron knobs that don’t harm x at e+ injection
- Synchrotron knobs that don’t harm x or x’ at injection

Energy Transfer from Harmonics

gamma*theta = 6	On-axis	50 Microns Off-axis	100 Microns Off-axis
1st Harmonic	174 meV	170 meV	160 meV
2nd Harmonic	-125 meV	-113 meV	-81 meV
3rd Harmonic	93 meV	70 meV	20 meV
4th Harmonic	-81 meV	-42 meV	

Don’t Harm Positron Injection x



Don’t Harm Electron Injection x or x’