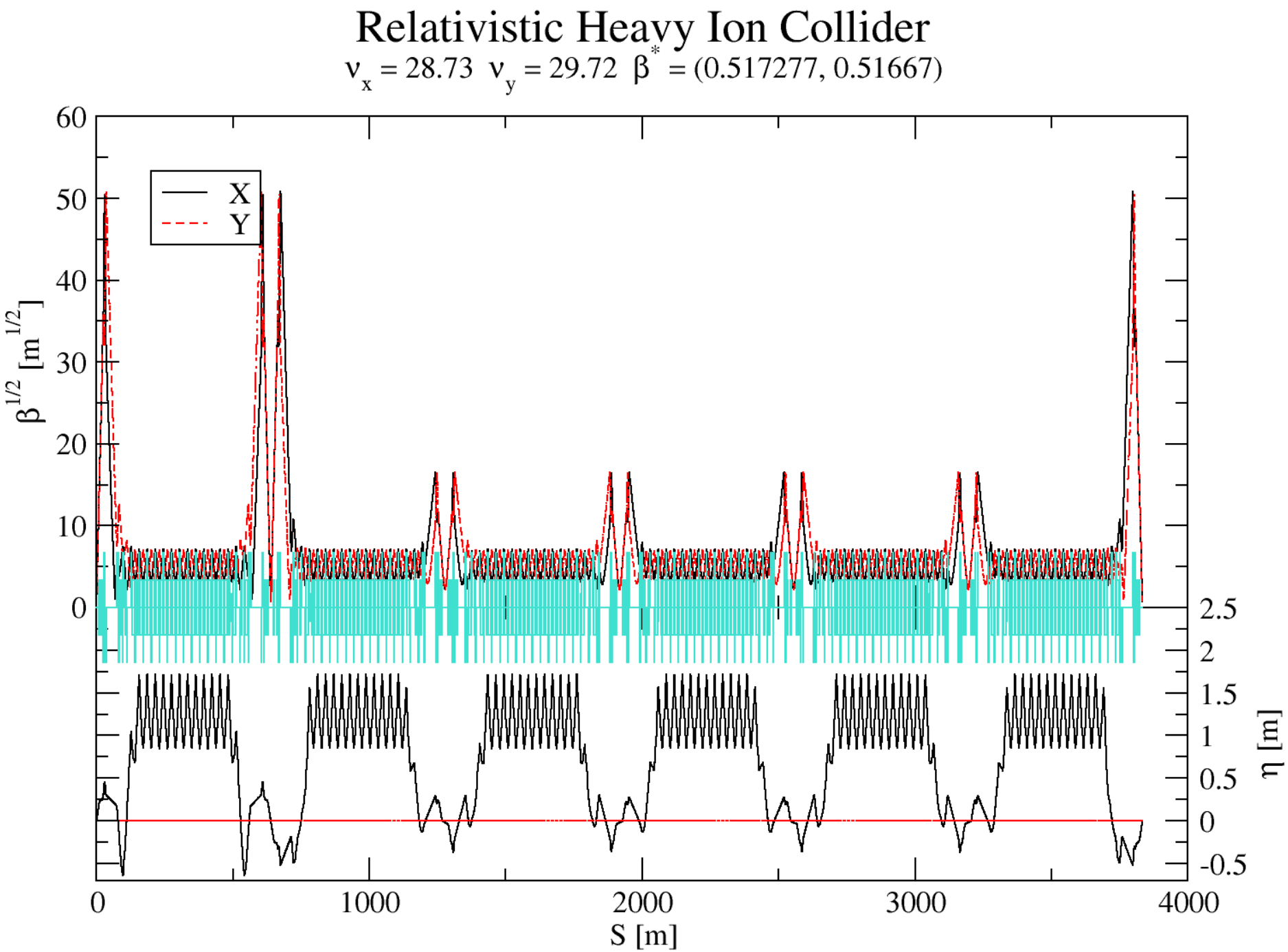
# 50 cm β* Optics for 100 GeV pp

- Optics: β functions and Dispersion
- Power Supply currents
- Chromatic effects

S. Tepikian, Jul 21, 2008


Relativistic Heavy Ion Collider
$\nu_x = 28.73$ $\nu_y = 29.72$ $\beta^* = (0.517277, 0.51667)$
X
Y
$\beta^{1/2}$ [$m^{1/2}$]
$\eta$ [m]
S [m]
0
10
20
30
40
50
60
1000
2000
3000
4000
-0.5
0.5
1
1.5
2
2.5

# Power Supply Currents

| | | | | | | |
|---|---|---|---|---|---|---|
| IQ1I | --> | 14 | <= | 51.381273 | <= | 199 |
| IQ1O | --> | 14 | <= | 55.637179 | <= | 199 |
| IQ2I | --> | -149 | <= | -25.169313 | <= | 149 |
| IQ2O | --> | -149 | <= | -18.802399 | <= | 149 |
| IQ3I | --> | -290 | <= | -81.384524 | <= | -14 |
| IQ3O | --> | -290 | <= | -88.828922 | <= | -14 |
| IQ456 | --> | 14 | <= | 171.802040 | <= | 430 |
| IQ7 | --> | 14 | <= | 14.082555 | <= | 590 |
| IQDA | --> | -265 | <= | 213.627485 | <= | 265 |
| IQFA | --> | 5 | <= | 149.999995 | <= | 150 |
| IQFB | --> | 5 | <= | 5.003720 | <= | 150 |
| IQT4I | --> | -100 | <= | 99.999367 | <= | 100 |
| IQT4O | --> | -100 | <= | 95.699771 | <= | 100 |
| IQT5I | --> | -100 | <= | -18.453175 | <= | 100 |
| IQT5O | --> | -100 | <= | -11.497818 | <= | 100 |
| IQT6I | --> | -100 | <= | -7.756294 | <= | 100 |
| IQT6O | --> | -100 | <= | -5.840795 | <= | 100 |
| IQF | --> | -Infinity | <= | 1945.394984 | <= | Infinity |
| IQD | --> | -Infinity | <= | 1885.461883 | <= | Infinity |

# Harmon Results

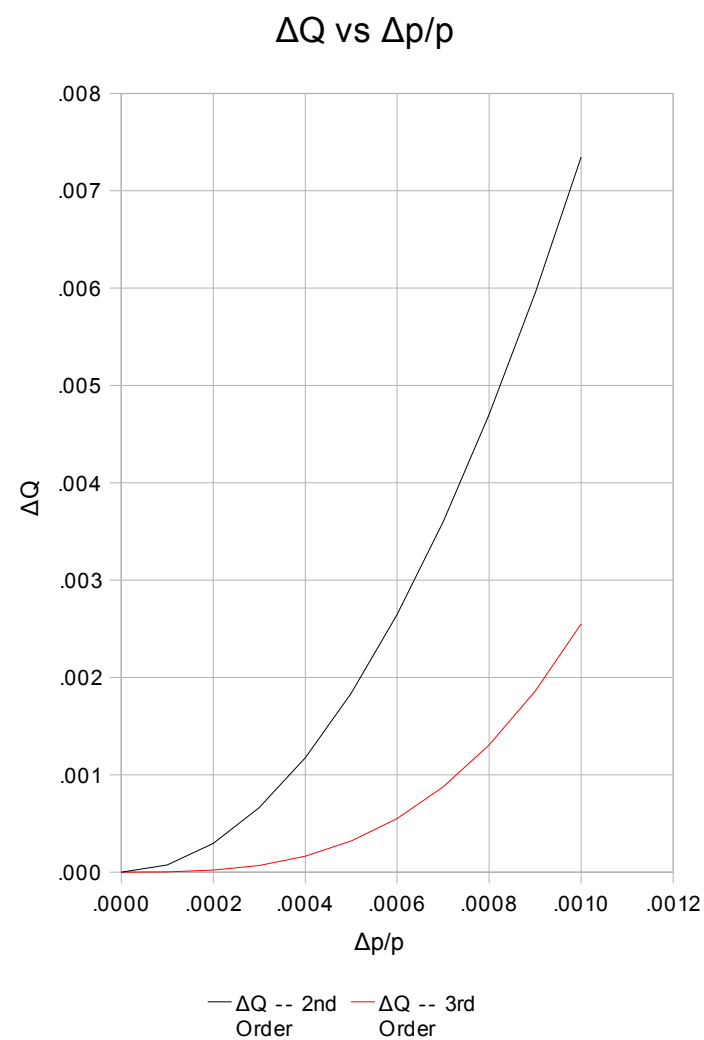
```
Derivatives of tune w.r.t. momentum:
                h o r i z o n t a l
          first          second          third
    2.000012E+00   -3.532080E+02    2.551551E+06

                 v e r t i c a l
          first          second          third
    1.999977E+00    7.346753E+03    3.057855E+05


 Tune shift with amplitude:
     d(Qx)/d(Ex)     d(Qy)/(dEy)     d(Qy)/d(Ex)
   -3.049236E+02   -2.091032E+02   -4.024290E+03
```

Two families of sextupole chromatic correction:

SD = -0.8126 $m^{-3}$ ~ 15.2 Amps
SF = 0.4288 $m^{-3}$ ~ 8 Amps



# 2nd Order Correction from Harmon

| | | | |
|---|---|---|---|
| SDOM | -1.2293 | 22.9 | Amps |
| SDOP | -0.4009 | 7.5 | Amps |
| SFOM | 0.4268 | 8.0 | Amps |
| SFOP | 0.4268 | 8.0 | Amps |
| SDIM | -0.8167 | 15.2 | Amps |
| SDIP | -0.8167 | 15.2 | Amps |
| SFIM | 0.3915 | 7.3 | Amps |
| SFIP | 0.4634 | 8.6 | Amps |

Third order chromatic effects are unchanged.