

Mini-Beta Insertion for the APS

M. Borland, 2/1/2002

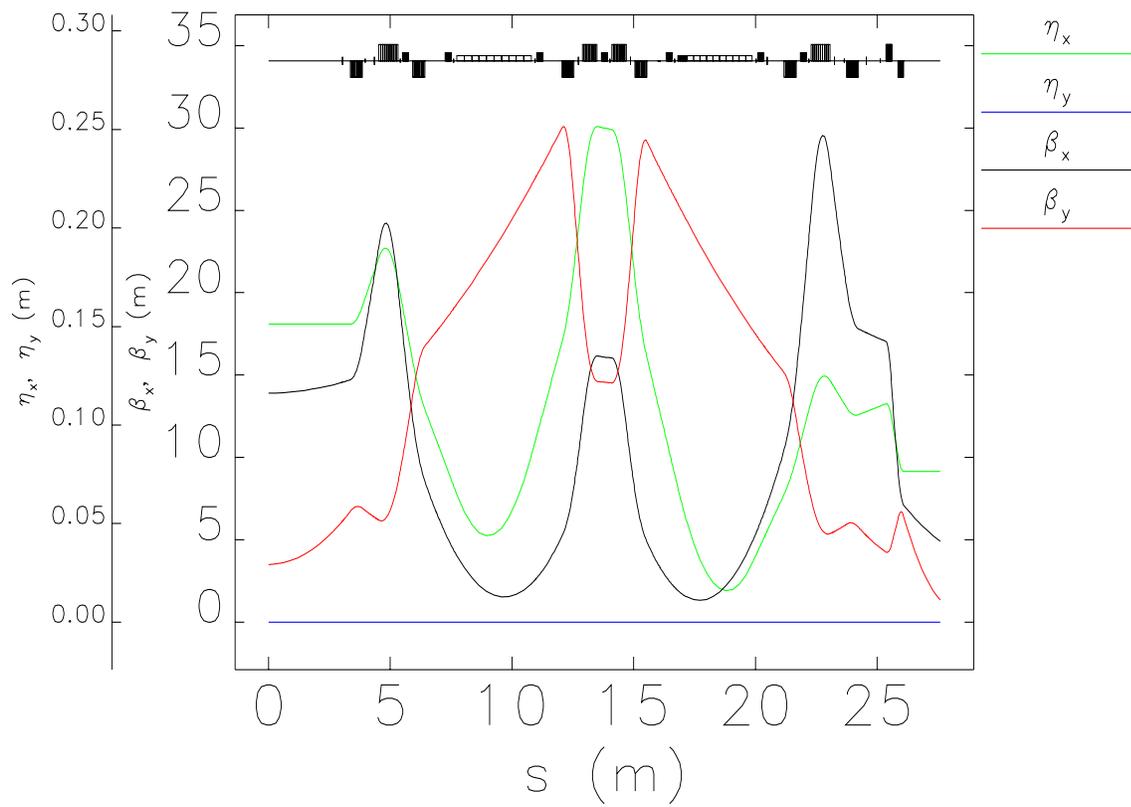
I've developed the optics for a mini-beta insertion for the APS. I assumed we wanted an inside ID vacuum chamber aperture of 3mm, compared to the present minimum of 5mm.

Scaling the beta-functions by $(3/5)^2$, I get a requirement of 5.0 m for betax and 1.3m for betay. This allows an ID of length 2.6 m. I inserted two additional quadrupoles of length 0.25m on either side of the ID, leaving 3.0 m for the ID and whatever has to go with it (e.g., BPMs, correctors). None of the existing components are changed, so the insertion could be turned off easily (provided the mini VC gap was opened).

A plot of the optics is attached. With one minibeta insertion, the tunes are 35.25 in x and 19.35 in y, nearly the same as the present low-emittance lattice. The emittance is unchanged at 3 nm.

The bad news? The new quadrupoles are quite strong, requiring integrated strength of 0.92 1/m---twice as great as the strongest quadrupole in the lattice now, but with only 0.25m length (compared to 0.8m). They might need to be superconducting or permanent magnet designs.

The figure below shows the beta functions for this insertion.



Twiss parameters for /home/oxygen51/BORLAND/aps/mring/miniBeta/aps3nmMB-02