

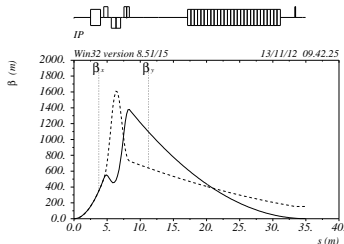
Higgs Factory Collider Ring

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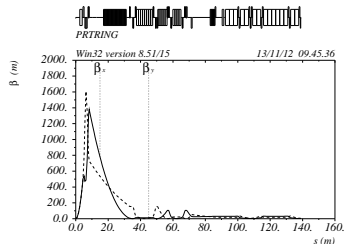
Muon Collider Higgs Factory Mini-Workshop, Fermilab,
November 13, 2012

50×50 GeV MC design revival

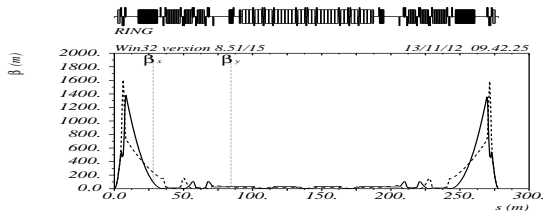
- Back in 2005 we had a design for the 50×50 GeV collider ring.
- I'm trying to revive this design and scale it to 62.5×62.5 GeV.



$\delta u' p_{\text{eC}} = 0.$
Table name = TWISS



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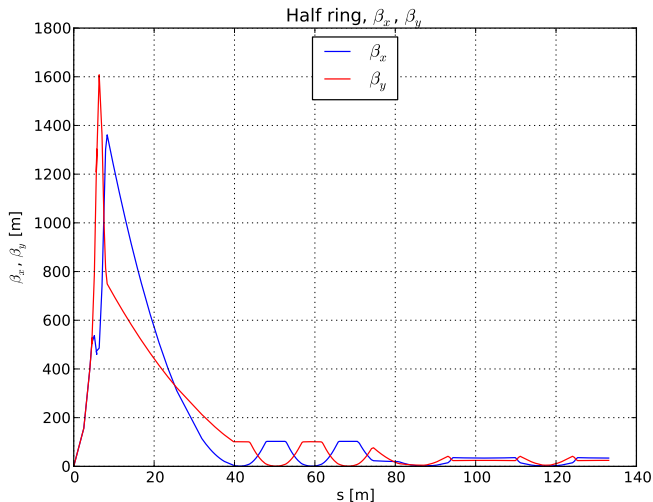


Parameters of the scaled design

Parameter	Desired	Current
Beam energy, GeV	62.5	62.5
β^* , [m]	0.05	0.04
β_{max} , [m]	1000	1600
Beam size at collision, $\sigma_{x,y}$, [m]	$13 \cdot 10^{-5}$	$13 \cdot 10^{-5}$
Storage turns	1000	1000
Circumference, [m]	300	266
Betatron tunes	-	0.862/0.639
Norm. trans. emittance, [π mm rad]	0.3	0.3
Norm. long. emittance, [π mm rad]	1.0	1.0

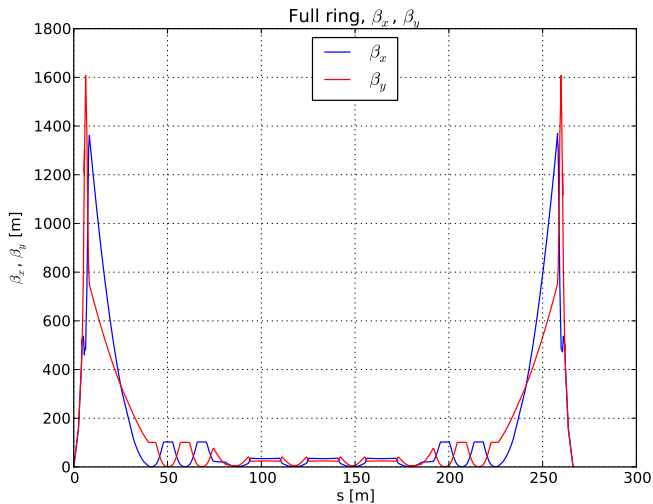
Table: Parameters: desired vs current

Beta functions of the half-ring

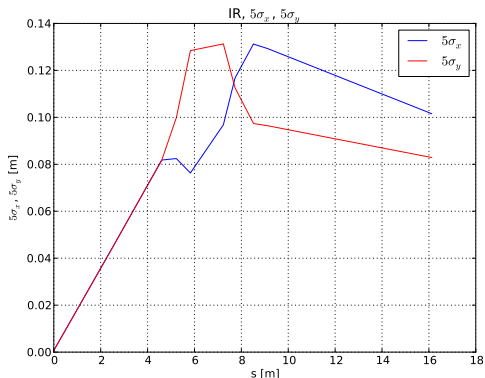


Half-ring = final focus + chromaticity correction + matching into arc + arc.

Beta functions of the full ring



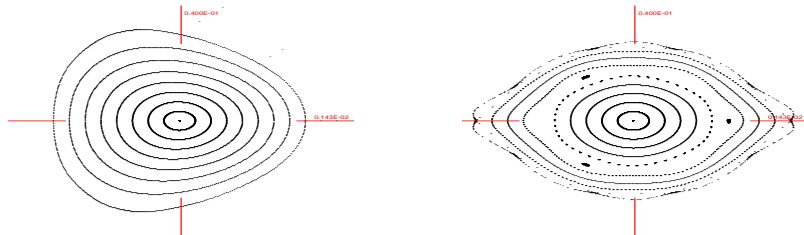
Beam envelopes @ IR, magnet parameters



Magnet	Q1	Q2	Q3	D
Aperture, [m]	0.10	0.14	0.14	0.14
Field, [T]	11.3	-12.9	12.9	10.0
Length, [m]	0.63	1.4	0.79	1.5

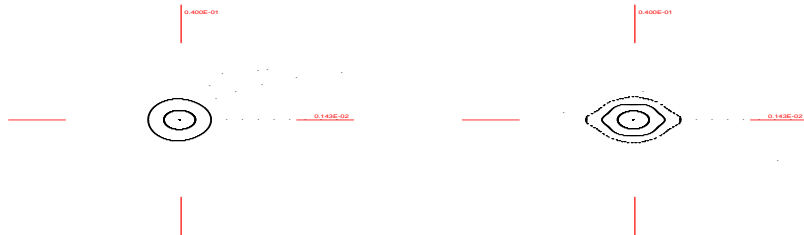
Table: Magnet parameters

Dynamic aperture, no fringe fields



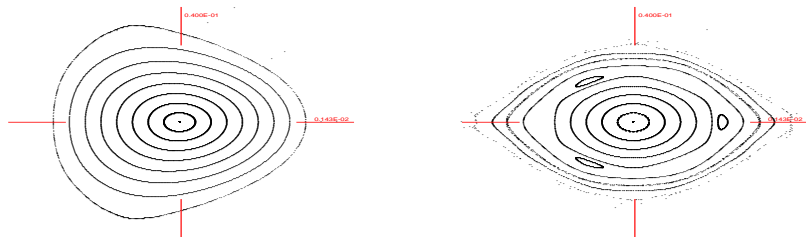
- Dynamic aperture **without** fringe fields. Phase space portraits in $(x - p_x)$ (left) and $(y - p_y)$ (right), particles are launched along x or y respectively in steps of one σ . Horizontal scale is 10σ .

Dynamic aperture, with fringe fields



- Dynamic aperture **with** fringe fields. Phase space portraits in $(x - p_x)$ (left) and $(y - p_y)$ (right), particles are launched along x or y respectively in steps of one σ . Horizontal scale is 10σ .

Dynamic aperture, without fringe fields in IR



- Dynamic aperture **without** fringe fields in IR and with fringe fields everywhere else. Phase space portraits in $(x - p_x)$ (left) and $(y - p_y)$ (right), particles are launched along x or y respectively in steps of one σ . Horizontal scale is 10σ .

- β_{max} is larger than the desired 1000 m.
- Dipole-first layout, dipole 2.5 m away from IP.
- Fringe fields in IR.
- Magnet fields.

Thanks!