

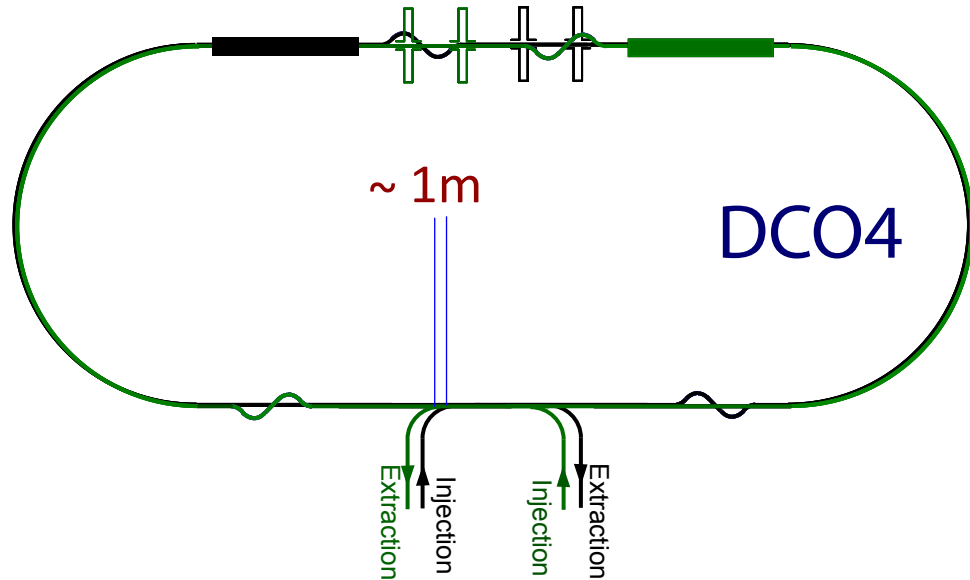
DR 3.248 km DTC Lattice

28 June 2011

D. Rubin

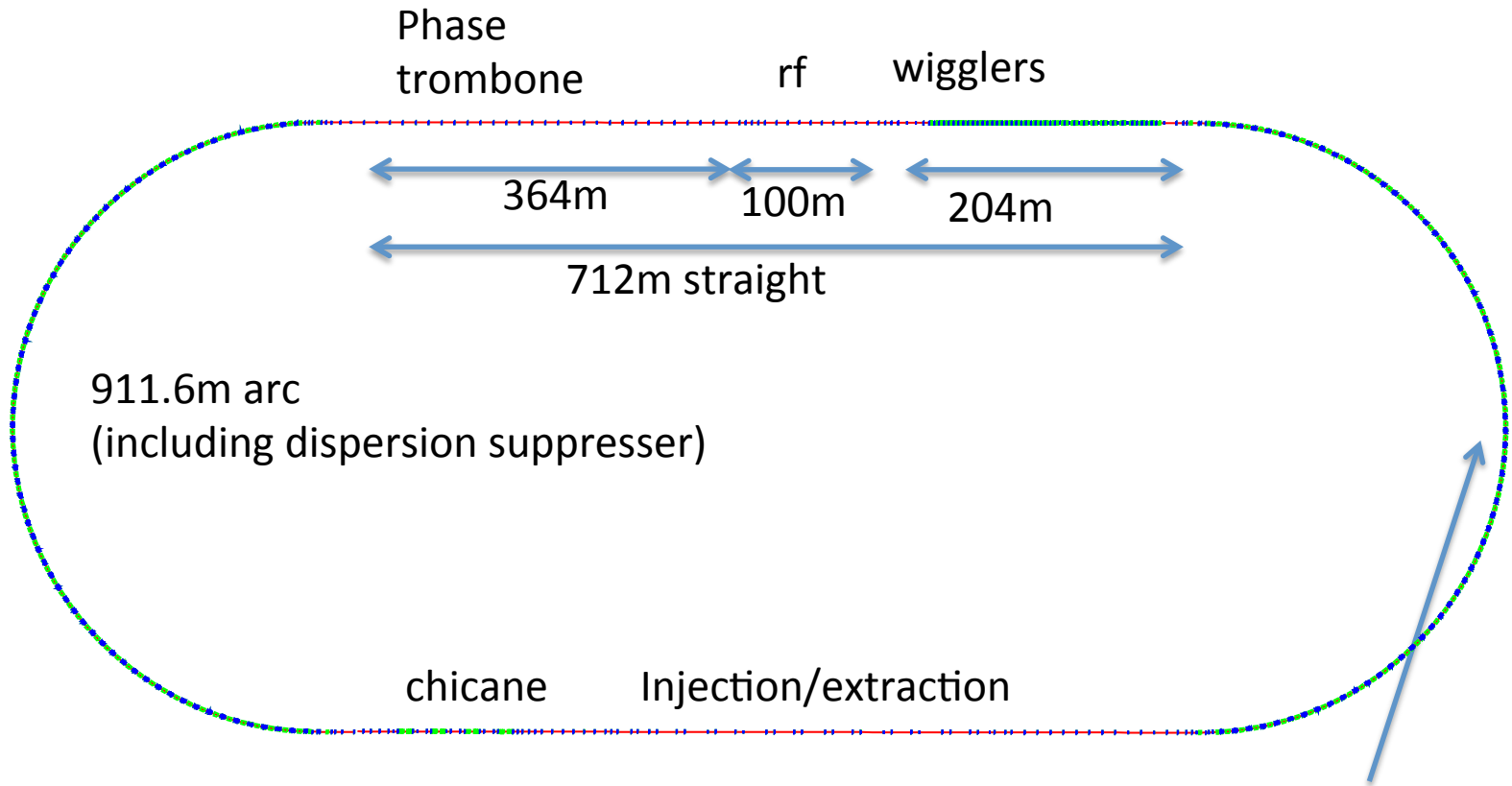
Modification with respect to DCO4

Start with DCO4 with
6.4m circumference



1. Eliminate one of two circumference changing chicanes
2. Eliminate 5 of 12 phase trombone cells
3. Reduce number of wiggler cells from 44 to 27 ,
wiggler period -> 32cm (vs 40cm), 12 poles
4. Modify RF straight so that cryostats for two positron rings are interleaved
(12 cavities are required. There is space for 16)
5. Eliminate 4 of 7 FODO cells in injection straight
6. Circumference = 3.2km, straight = 712m, arc = 911m

3.2485km circumference

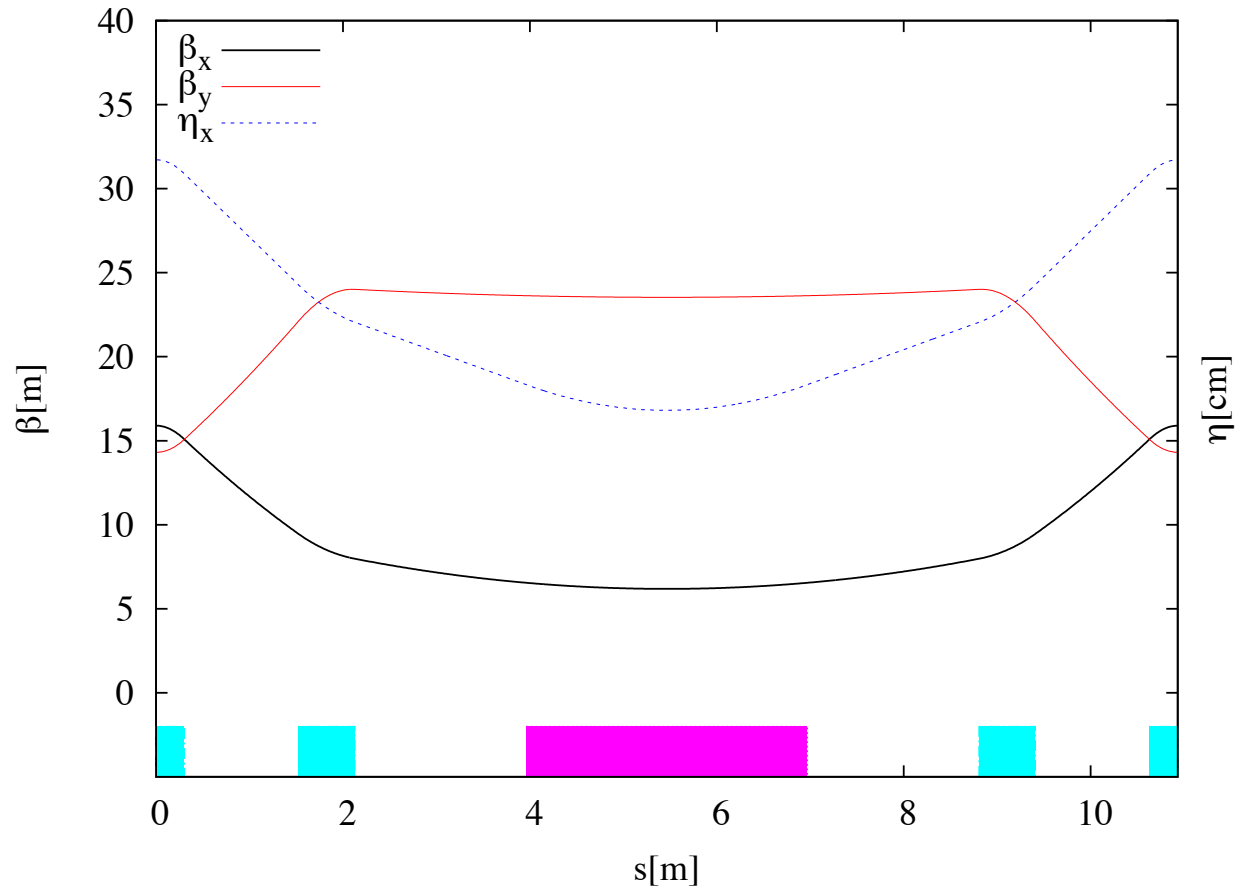


The arc is assembled from 75 FDBDF (focus/defocus/bend/defocus/focus) "TME variant" arc cells.

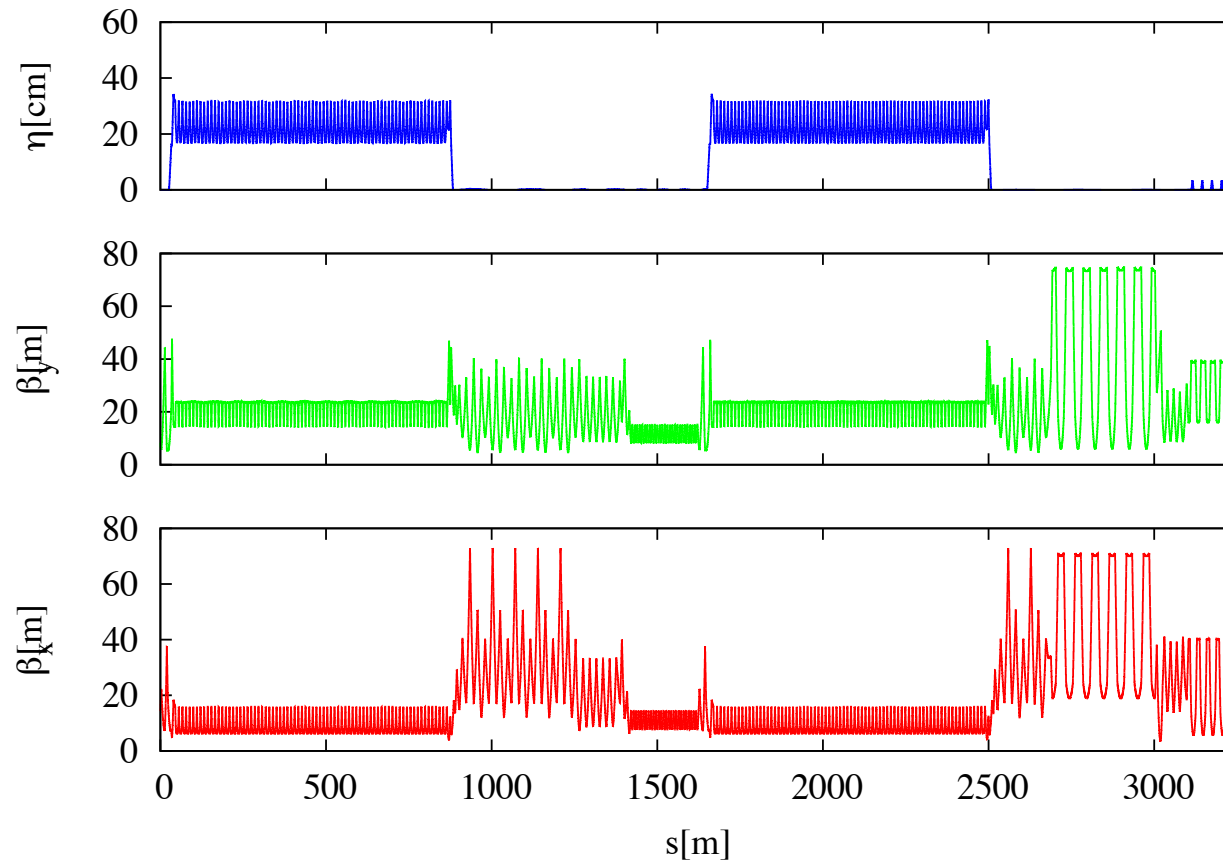
Cell length = 10.931m

Bend length = 3m

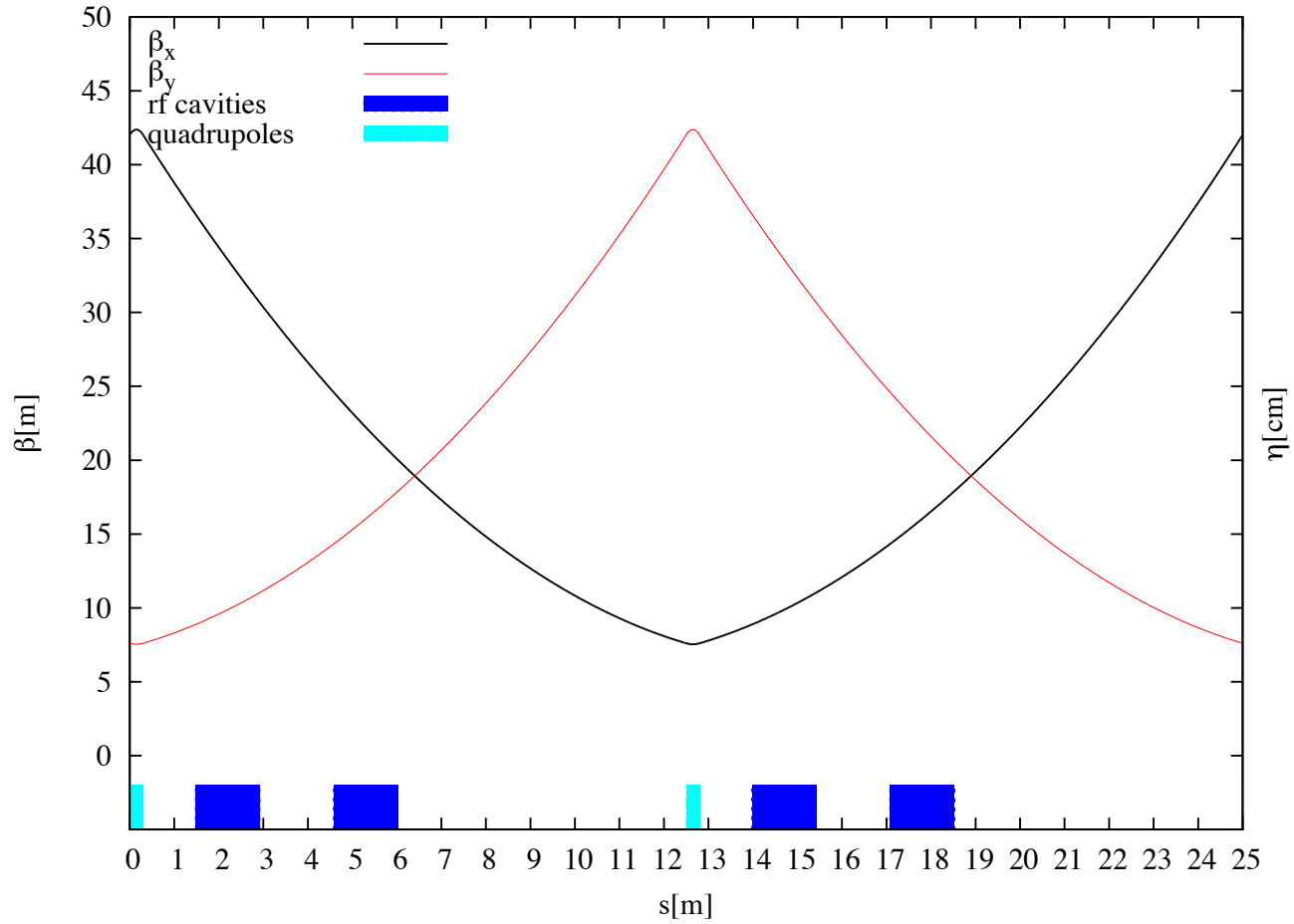
Arc cell - FDBDF



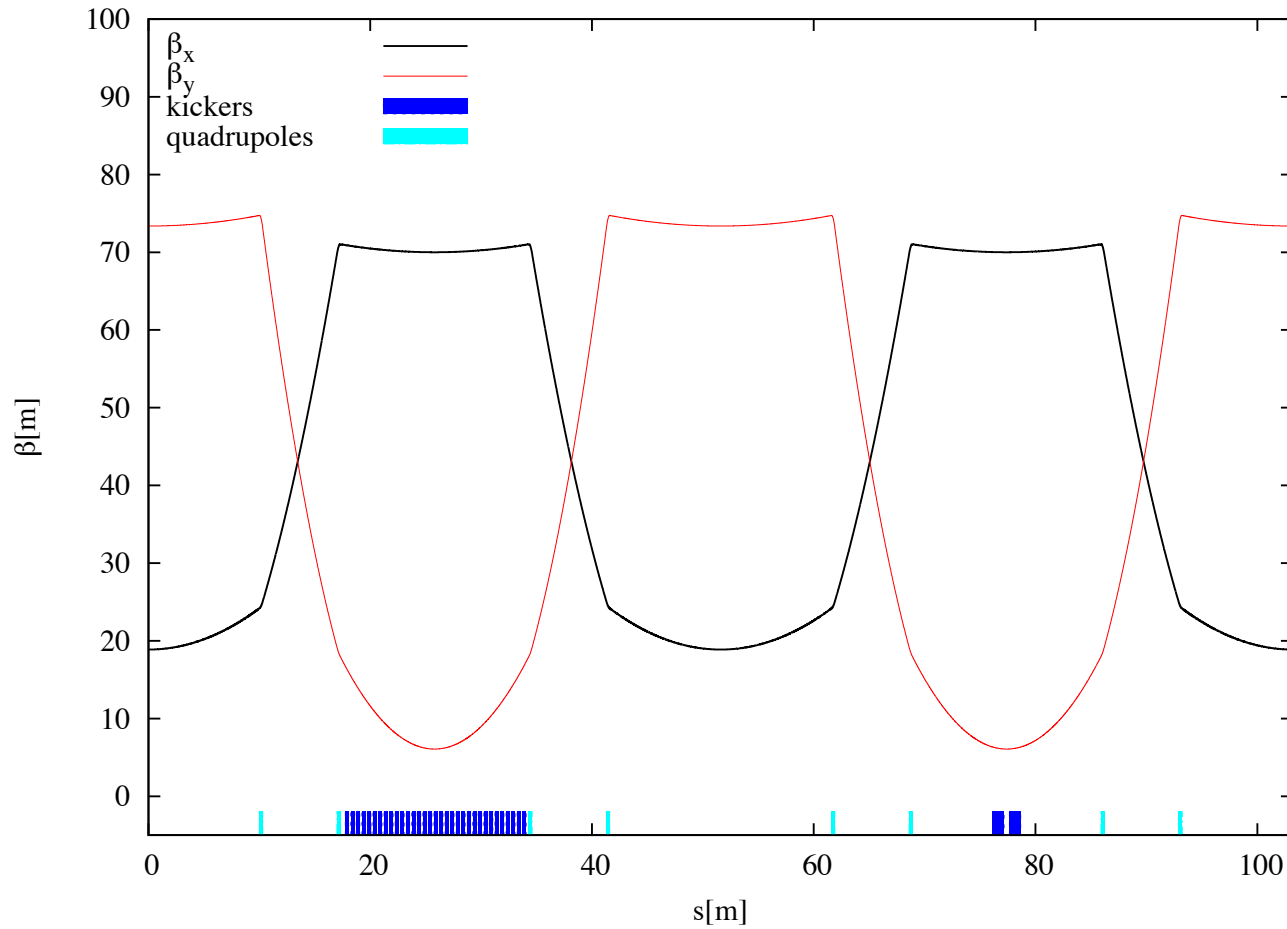
Bmad_7-27wig. – 712m straight



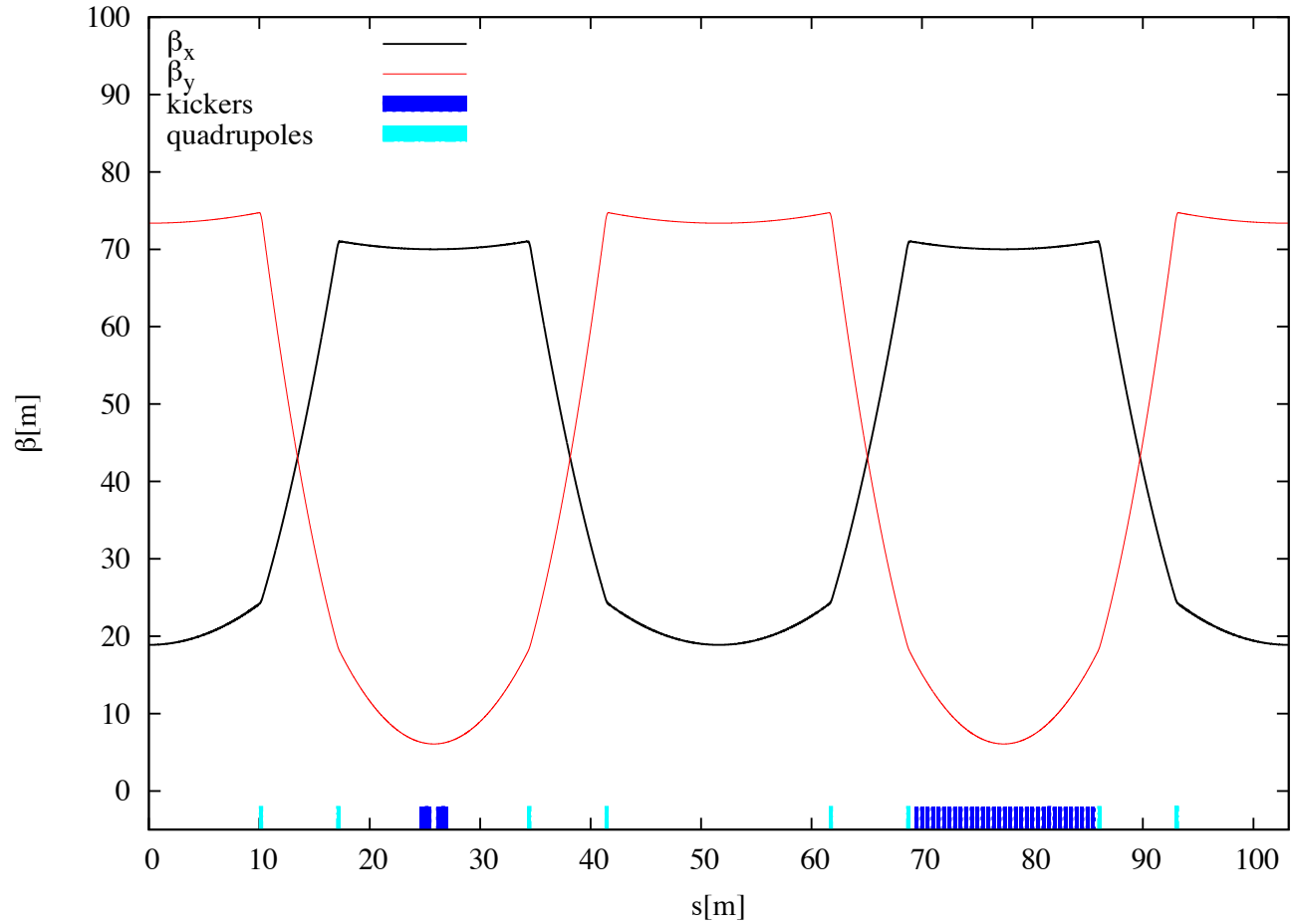
RF cells



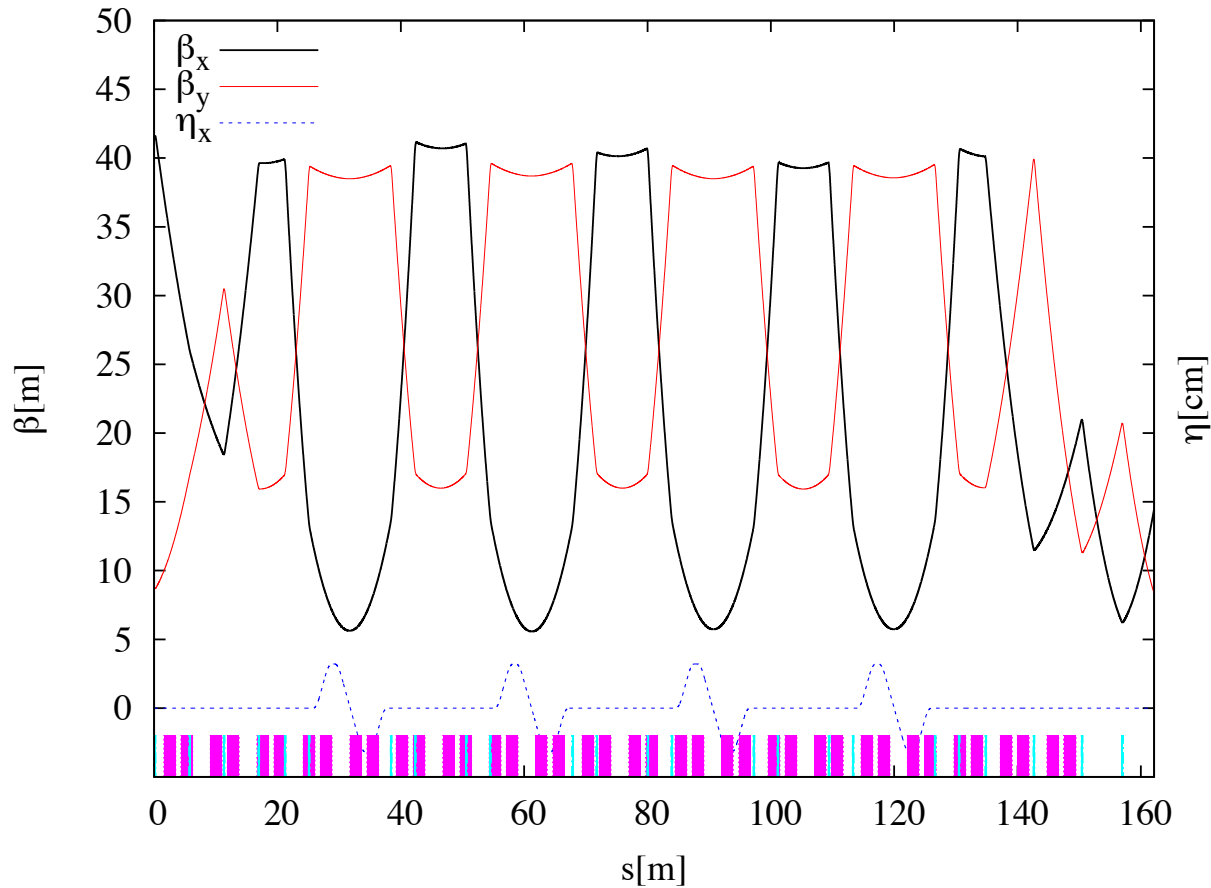
Extraction straight



Injection straight



Circumference changing chicane



wiggler

32cm wiggler params

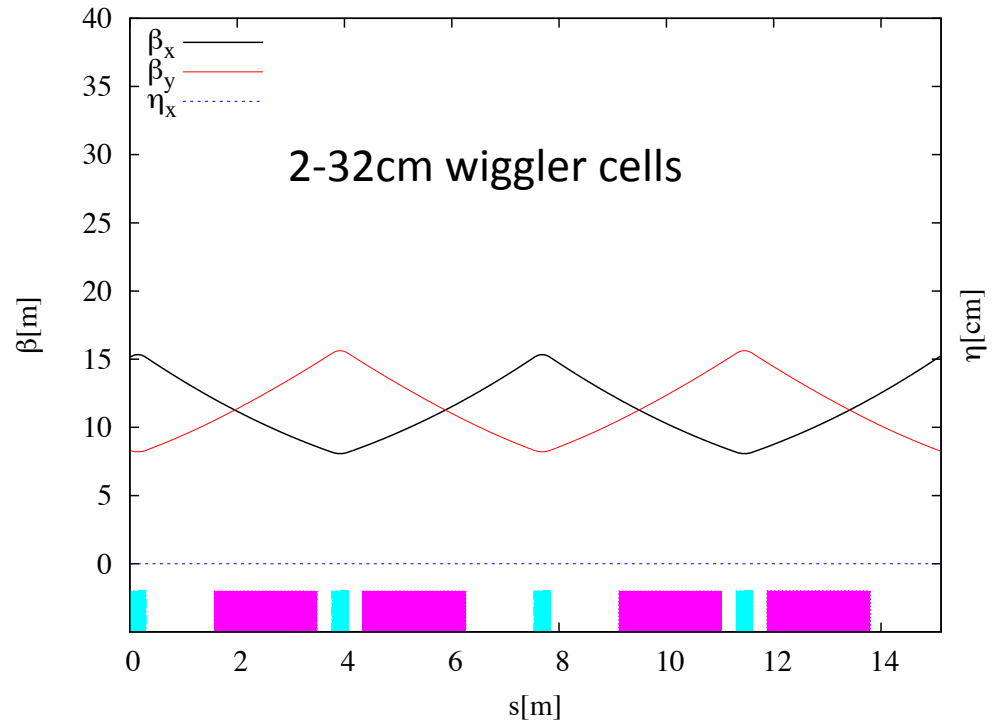
12 poles

32cm period

Wiggler length = 3.84

Cell length = 7.56 m

27 wiggler cells



3.248km ring with FDBDF arc cells and 712m straight

Parameter	10 Hz(Low)	5 Hz (Low)	5 Hz (High)
Circumference	3.248 km	3.248 km	3.248 km
RF frequency	650 MHz	650MHz	650 MHz
τ_x/τ_y [ms]	13.5	24.1	24.1
σ_s [mm]	6	6	6
σ_δ	0.134%	0.11%	0.11%
α_p	3.3×10^{-4}	3.3×10^{-4}	3.3×10^{-4}
$\gamma\epsilon_x$ [μm]	2.7	4.4	4.4
RF [MV] (12 cavities) Total/Per cav	19.7/1.64	14 /1.17	14/1.17
ξ_x/ξ_y	-51.5/-44.6	-51.5/-43.9	-51.5/-43.9
Wigglers- $N_{\text{cells}}@B[\text{T}]$	27@2.1	27@1.5	27@1.5
Energy loss/turn [MeV]	8.0	4.5	4.5
sextupoles	3.41/-4.34	3.41/-4.34	3.41/-4.34
Power/RF coupler @400mA [kW]	267	150	300

RF

The lattice can accommodate 16 RF cavities

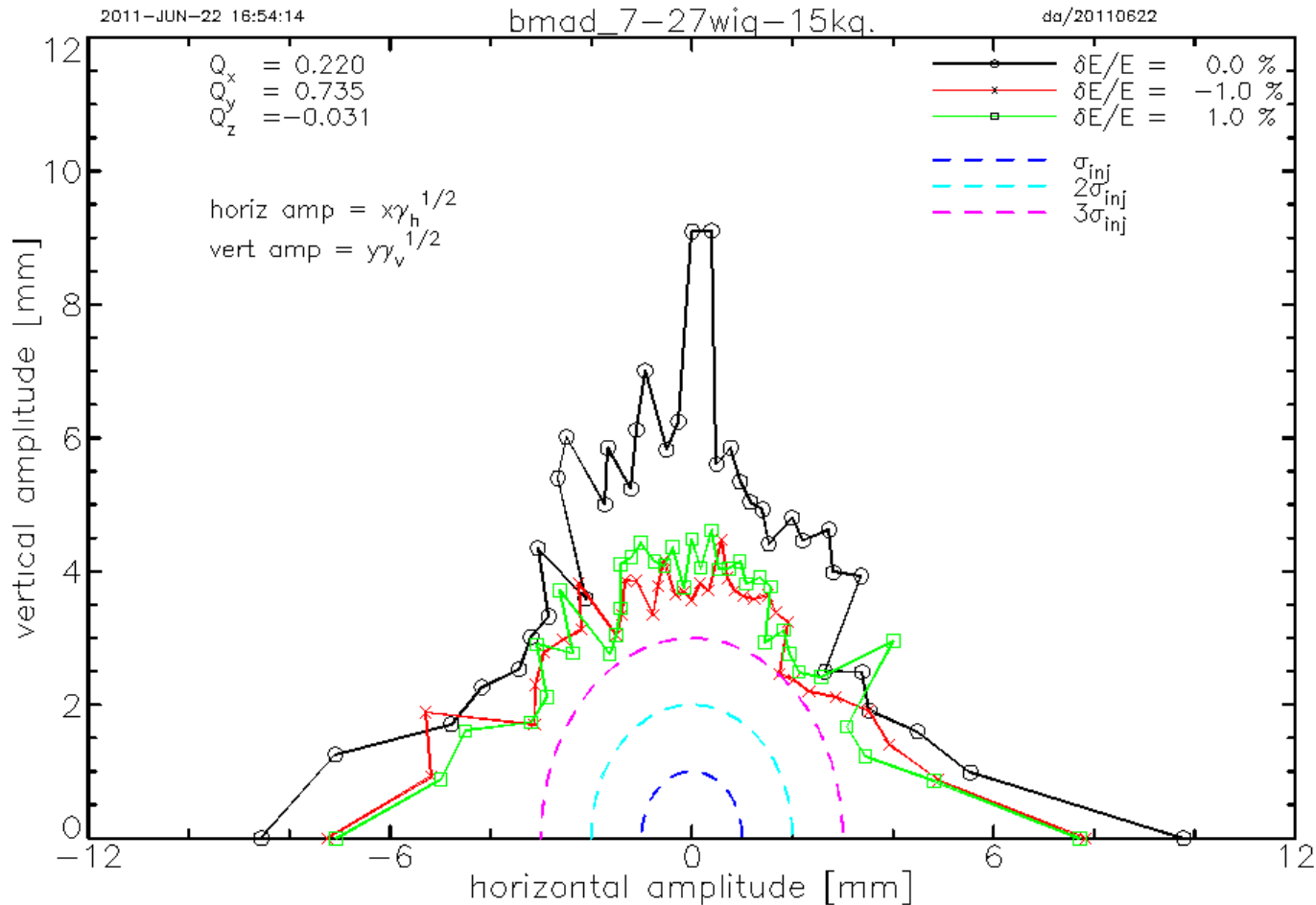
If we assume 12 then

Voltage/ cavity in 10Hz mode is 1.64

Power/coupler in 5Hz, high power mode is 300kW

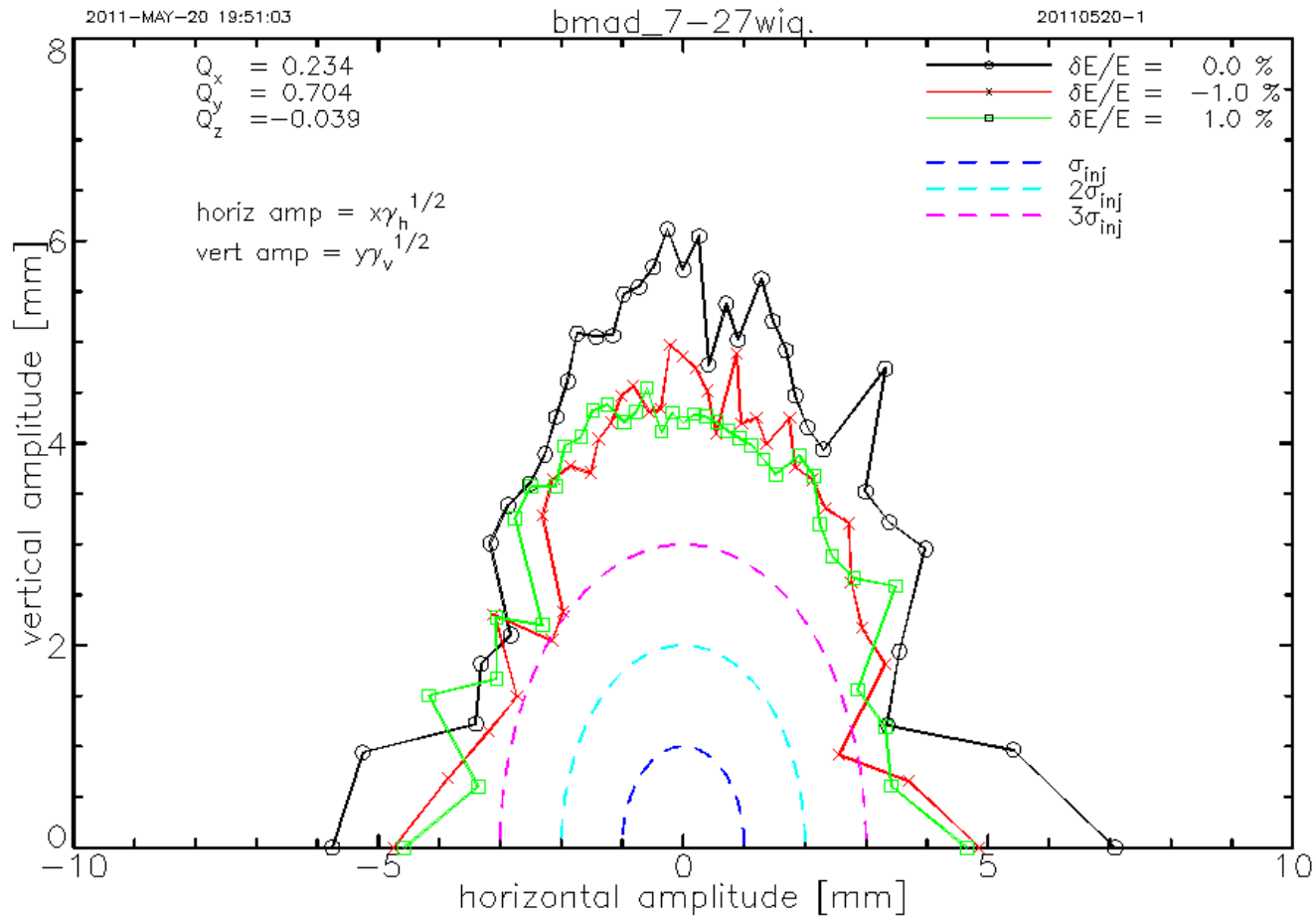
Dynamic aperture

5 Hz



Periodic type wiggler model, includes vertical focusing and cubic nonlinearity

Dynamic aperture 10 Hz



Periodic type wiggler model, includes vertical focusing and cubic nonlinearity

Magnet count

Element	Length[m]	Strength	Number
Arc Dipoles	3	2.26 kG	150
Circumference changing chicane dipoles	1	2.68 kG	28
Other dipoles	2	< 2.26 kG	4
Arc Quadrupoles	0.6	< 0.6 m ⁻²	450
Quadrupoles in dispersion suppressor and straights	0.3	< 0.55 m ⁻²	210
Sextupoles	0.3	< 4.34 m ⁻³	600
RF cavities	3	< 1.64MV	12
Wigglers	1.92	54	54