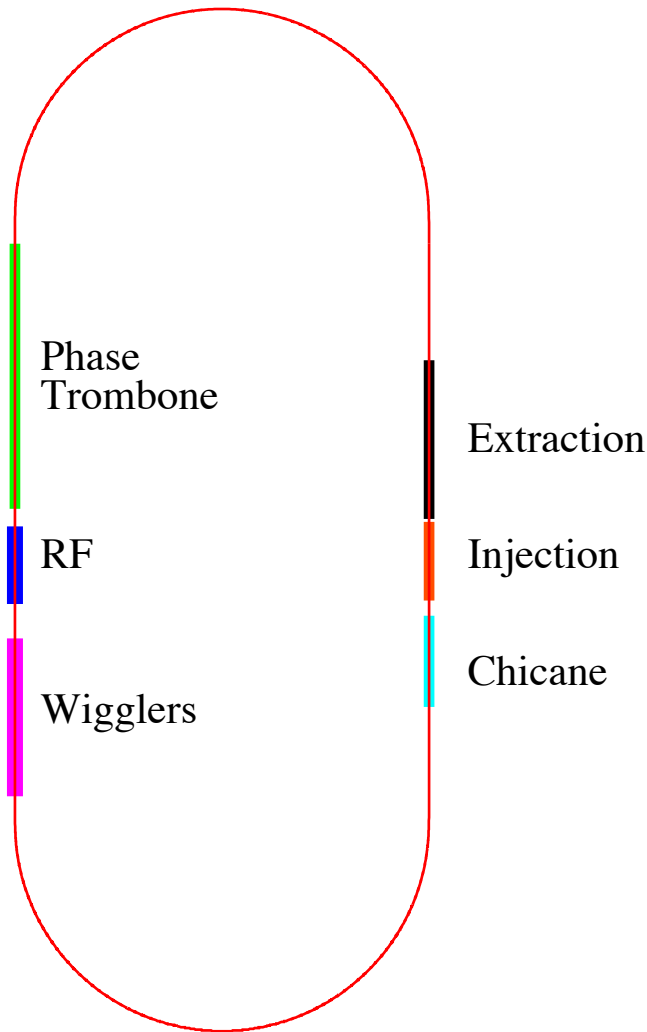


# DR 3.242 km DTC Lattice

7 July 2011

D. Rubin

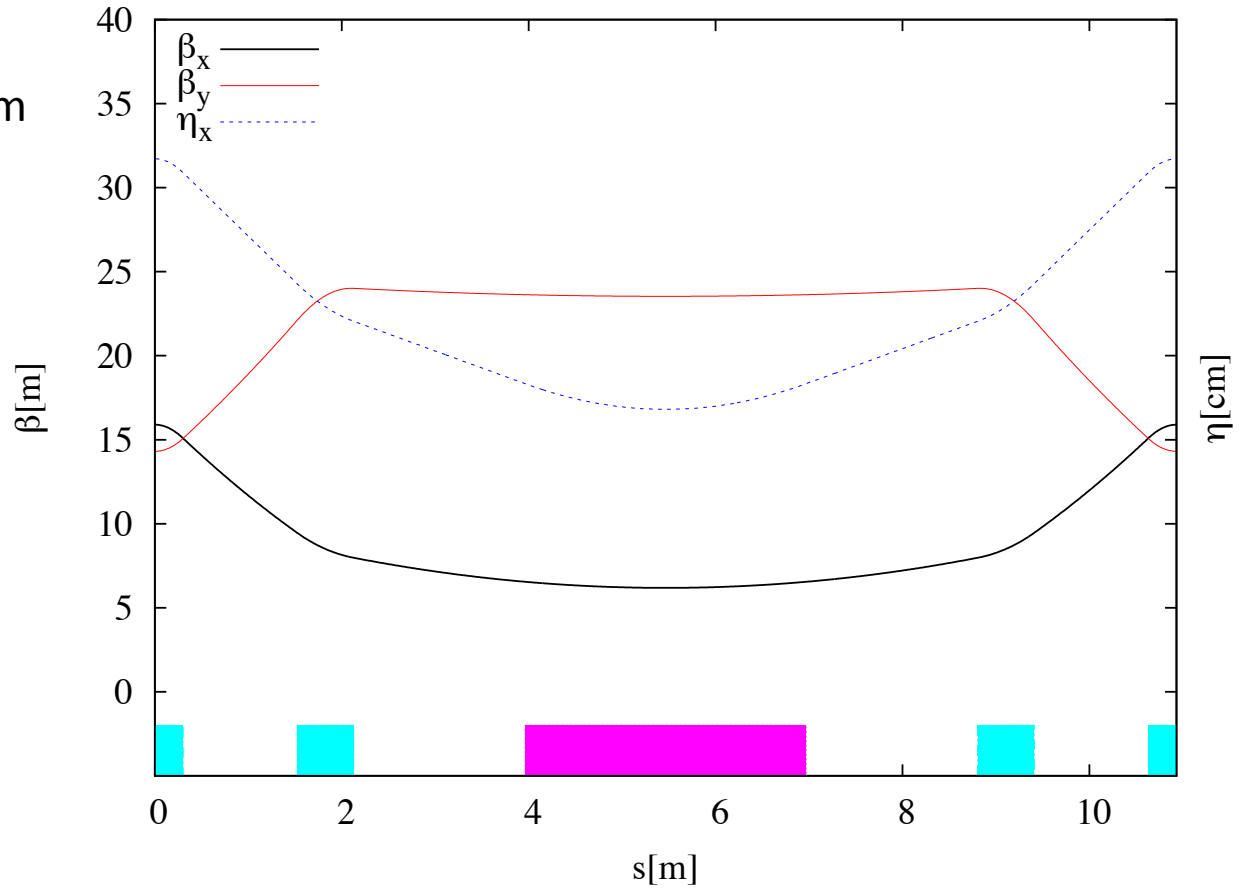
# DTC01 layout



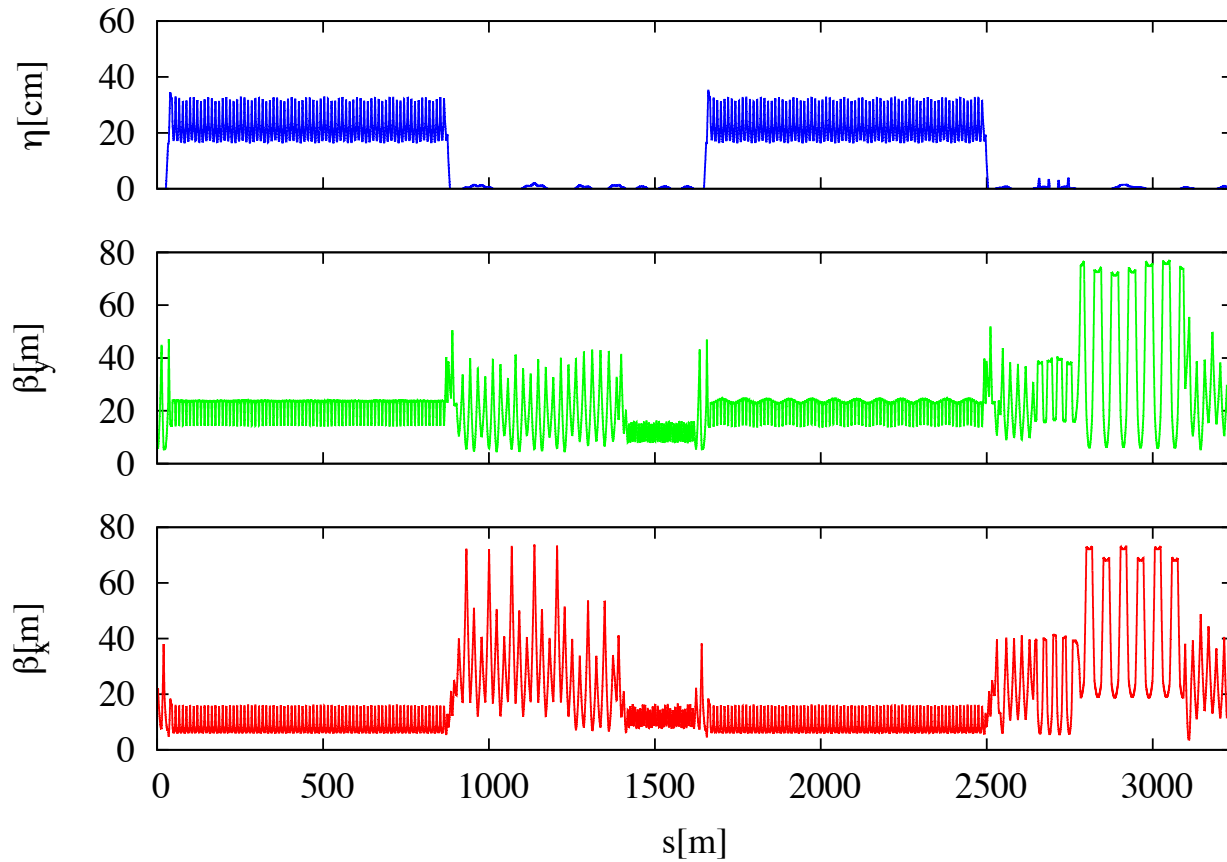
1. Circumference = 3242.9m, 712m straights
2. ~ 6 phase trombone cells
3. 54 – 1.92m long wigglers  
wiggler period = 32cm  
12-poles  
 $B_{\max} = 2.1\text{T}$
4. Space for 16 RF cavities  
Cryostats for upper and lower positron rings  
are interleaved

# Arc cell - FDBDF

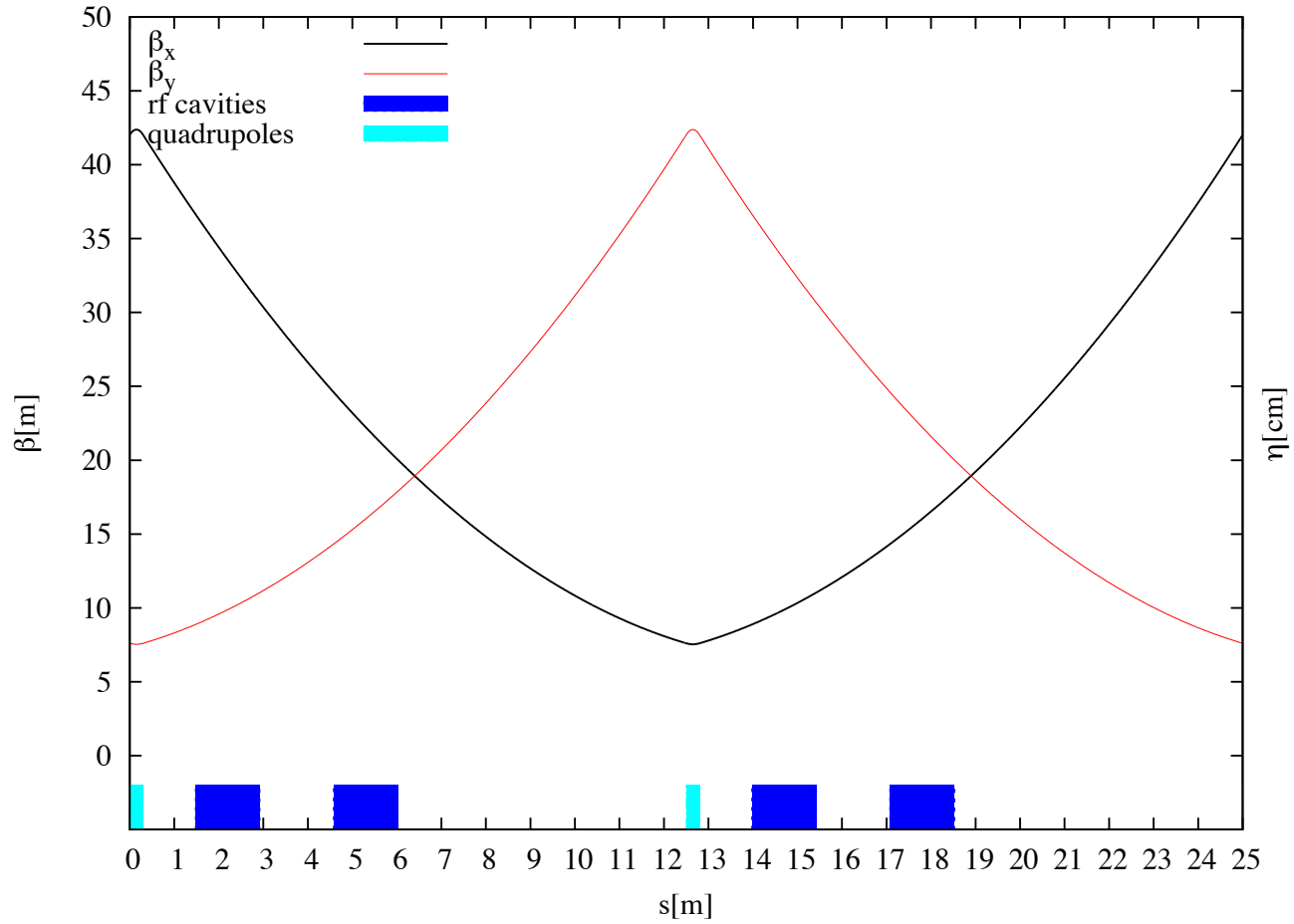
Cell length = 10.93m  
Bend length = 3.0m  
75 cells/arc



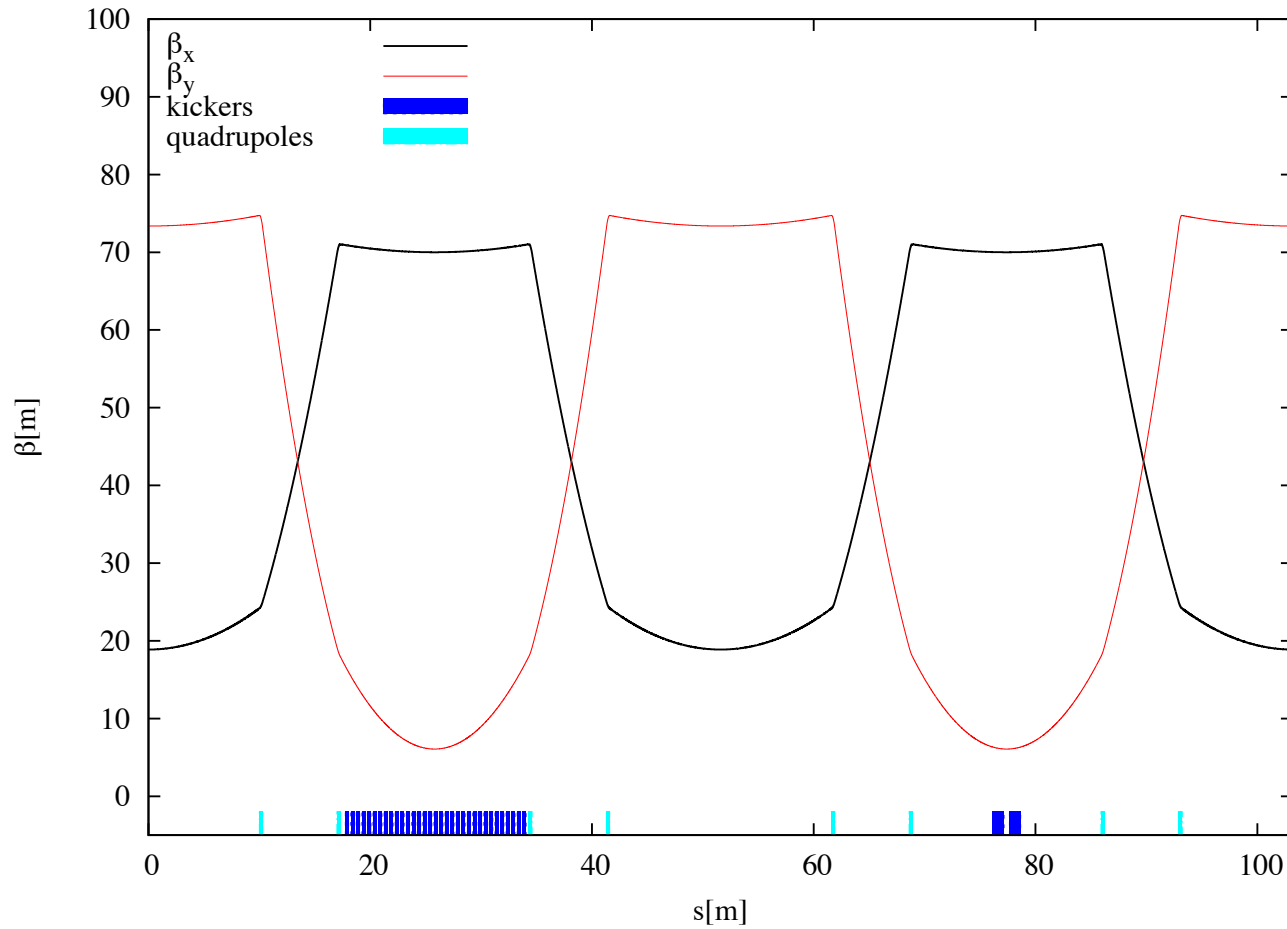
# DTC01 lattice functions



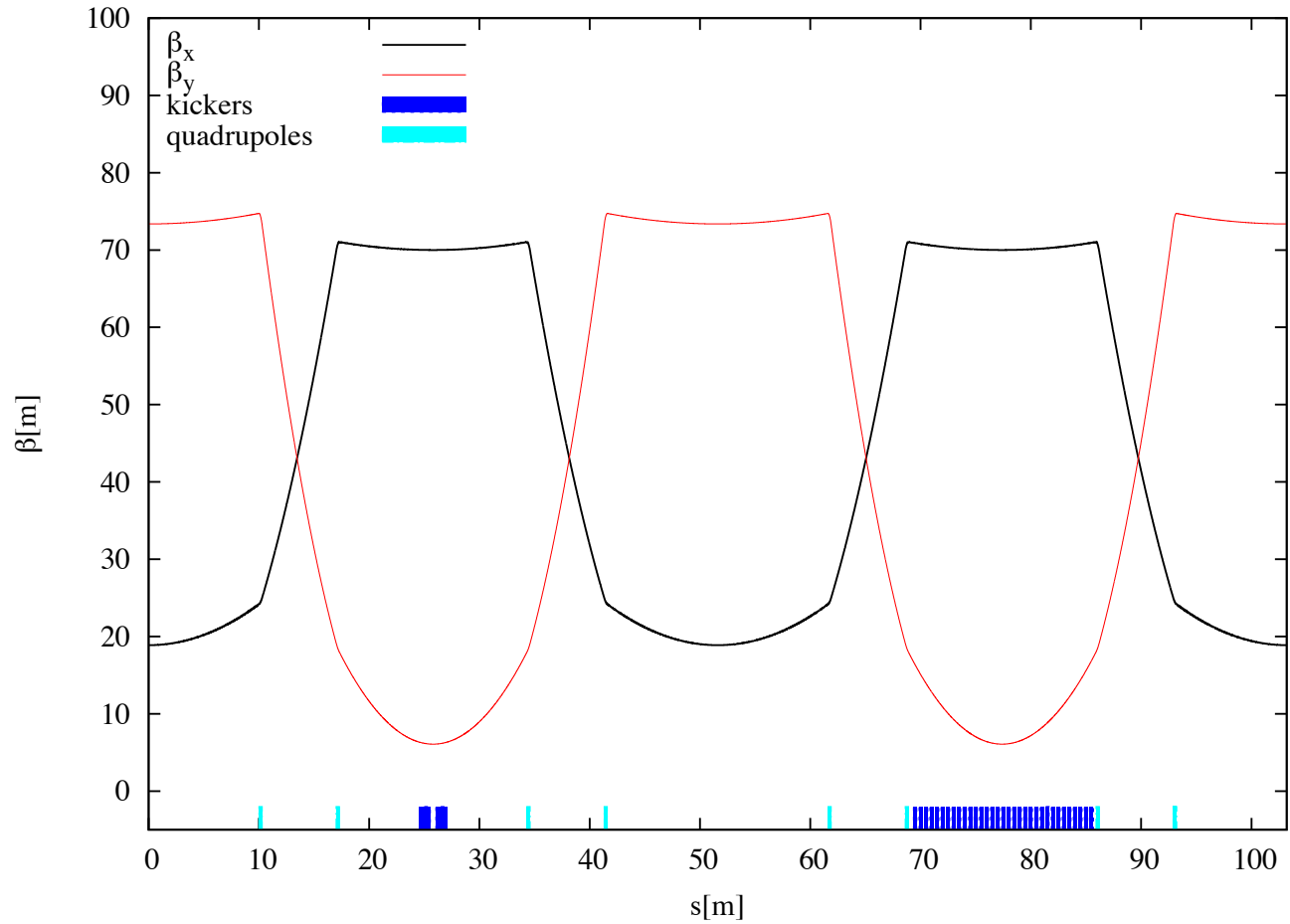
# RF cells



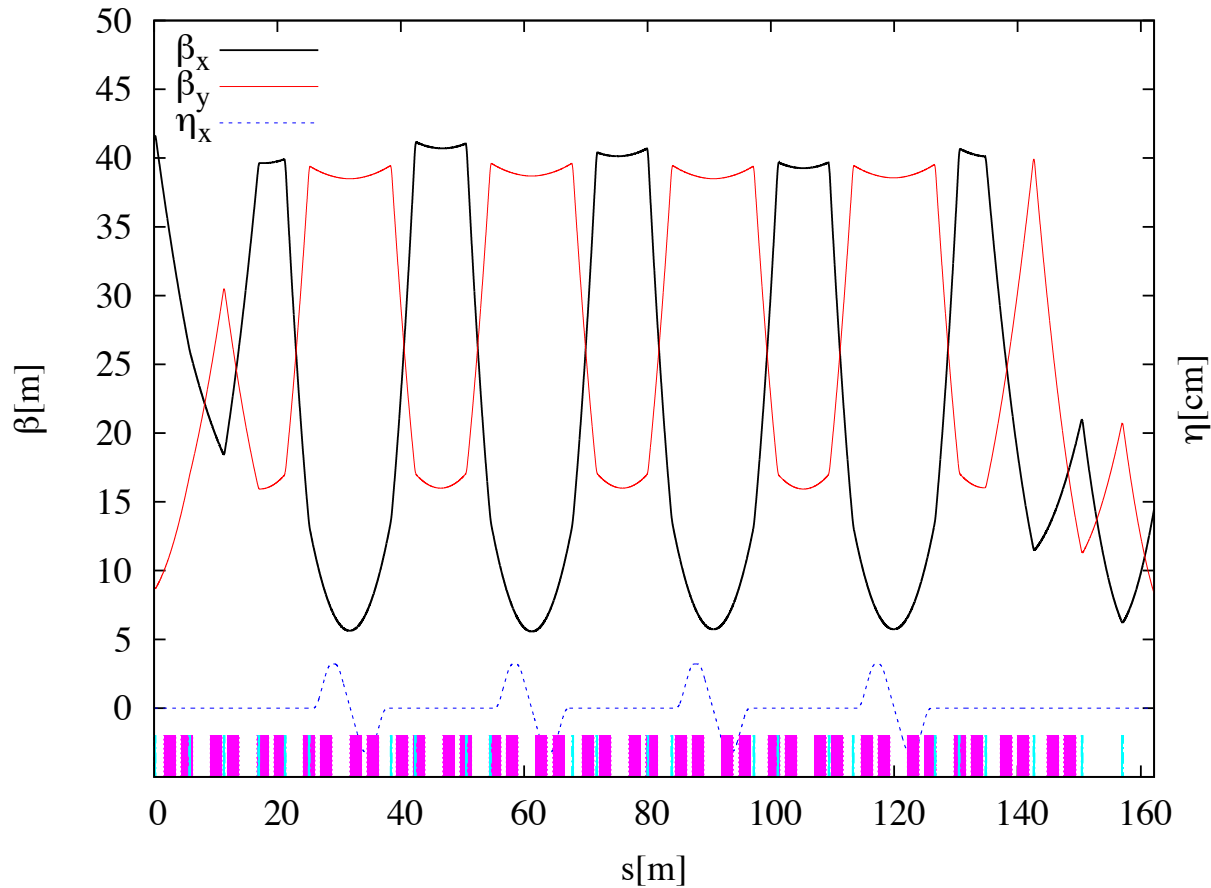
# Extraction straight



# Injection straight



# Circumference changing chicane





# wiggler

32cm wiggler params

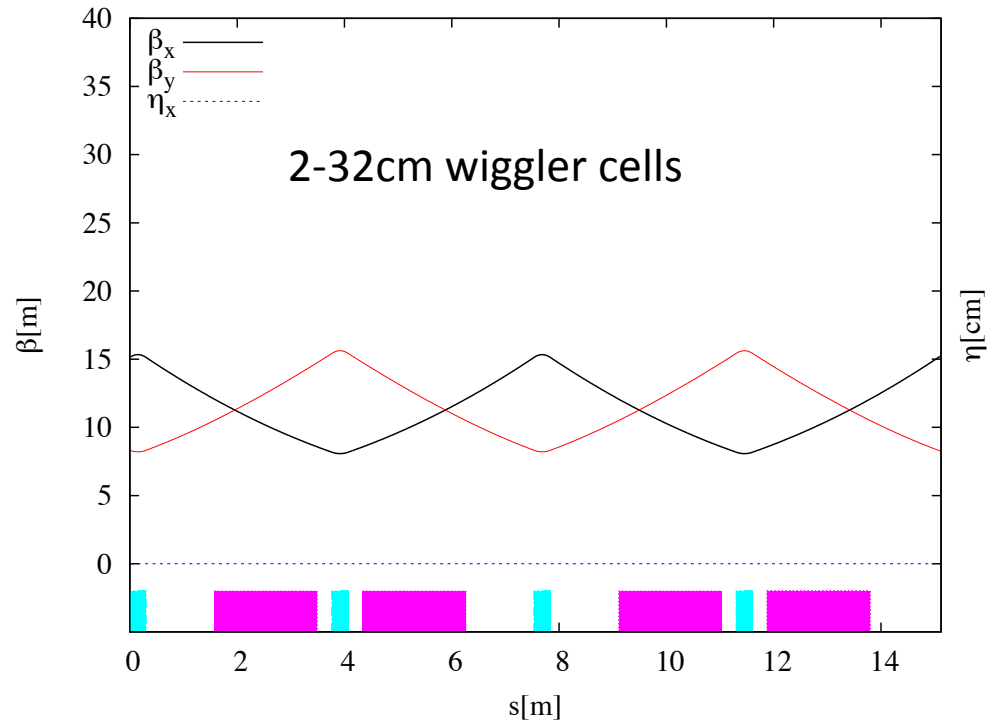
12 poles

32cm period

Wiggler length = 1.92m

Cell length = 7.56 m

27 wiggler cells



# DTC01

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
$\tau_x/\tau_y$ [ms]	13.5	24.1	24.1
$T_z$ [ms]	6.7	12.0	12.0
$\sigma_s$ [mm]	6	6	6
$\sigma_\delta$	0.134%	0.11%	0.11%
$\alpha_p$	$3.3 \times 10^{-4}$	$3.3 \times 10^{-4}$	$3.3 \times 10^{-4}$
$\gamma\epsilon_x$ [ $\mu\text{m}$ ]	2.6	4.6	4.6
RF [MV] (12 cavities) Total/Per cav	19.7/1.64	14 /1.17	14/1.17
$\xi_x/\xi_y$	-50.9/-44.1	-51.3/-43.3	-51.3/-43.3
Wigglers- $N_{\text{cells}}$ @B[T]	27@2.1	27@1.5	27@1.5
Energy loss/turn [MeV]	8.0	4.5	4.5
sextupoles	3.34/-4.34	3.34/-4.23	3.34/-4.23
Power/RF coupler @400mA [kW]	267	150	300

# RF

The lattice can accommodate 16 RF cavities

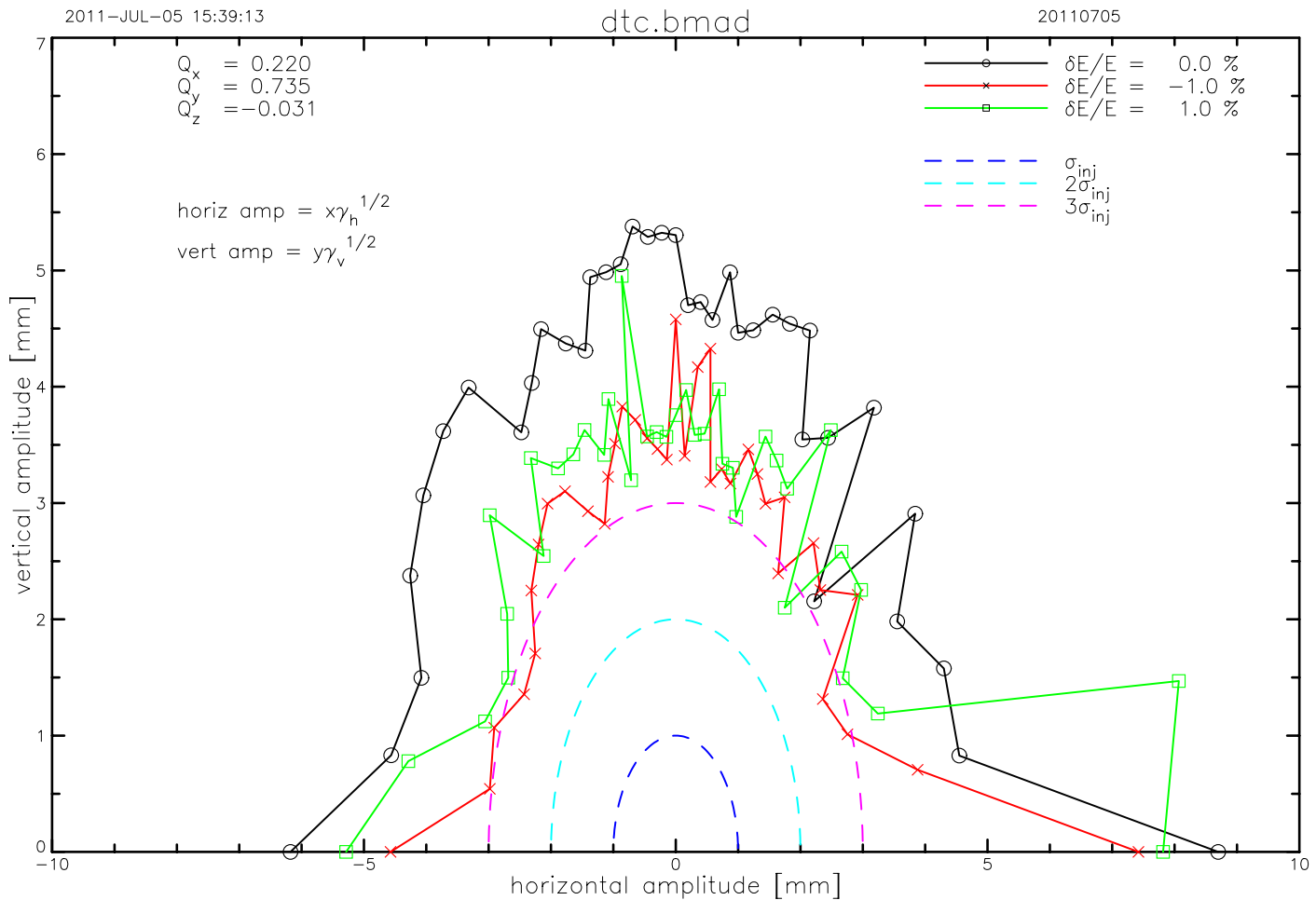
If we assume 12 then

Voltage/ cavity in 10Hz mode is 1.64

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

# Dynamic aperture

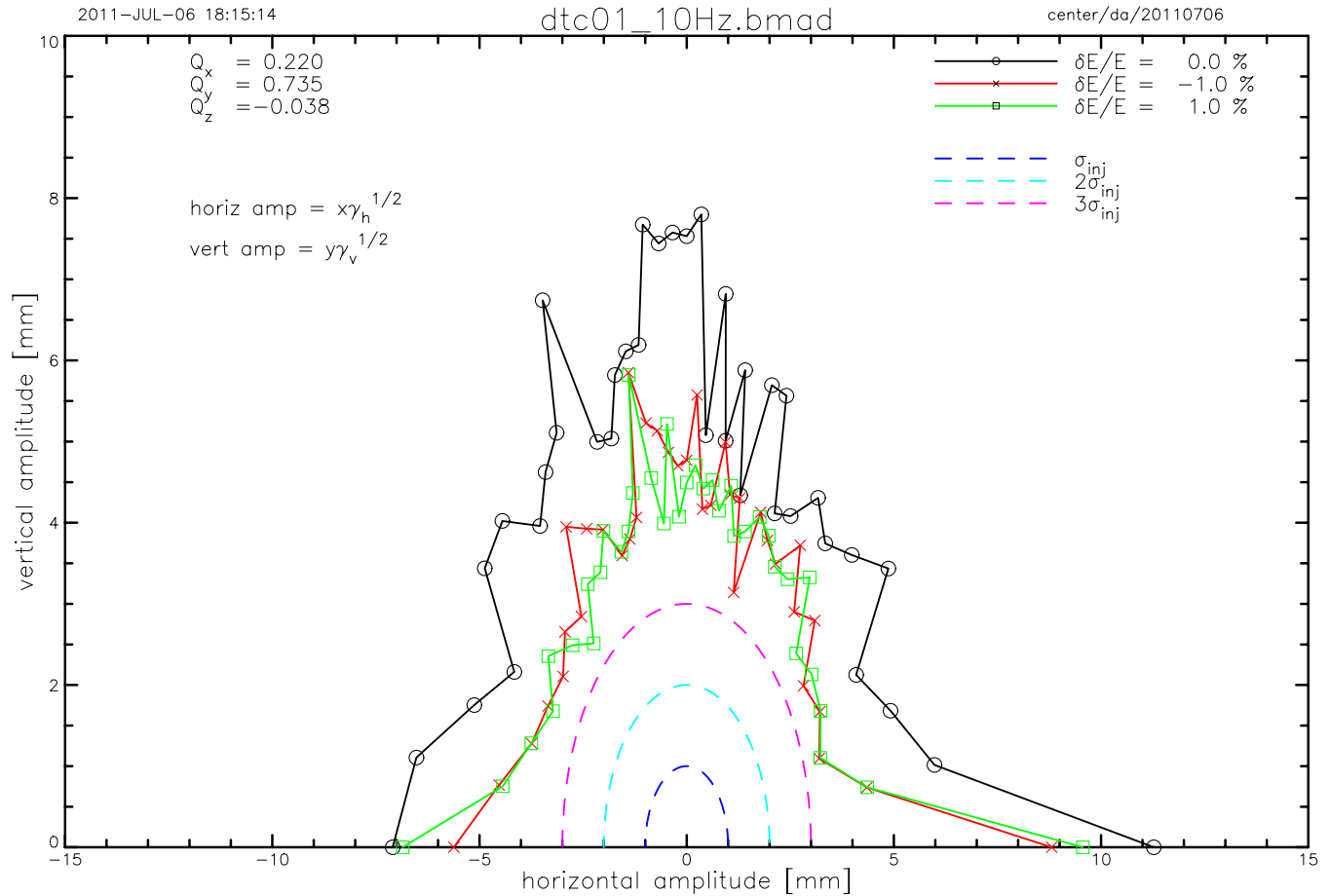
## 5 Hz



*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	2.28 kG	150
Circumference changing chicane dipoles	1	2.68 kG	28
Other dipoles	2	< 2.28 kG	4
Arc Quadrupoles	0.6	< 0.6 m <sup>-2</sup>	450
Quadrupoles in dispersion suppressor and straights	0.3	< 0.55 m <sup>-2</sup>	211
Sextupoles	0.3	< 4.34 m <sup>-3</sup>	600
RF cavities	3	< 1.64MV	12
Wigglers	1.92	54	54