DR 3.2 km Lattice

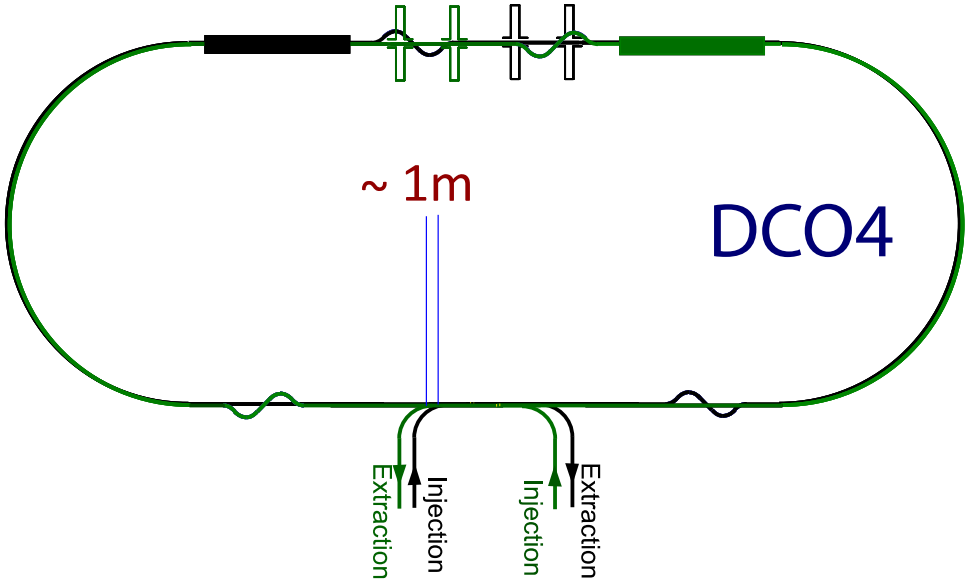
ALCPG meeting

20 March 2011

D. Rubin

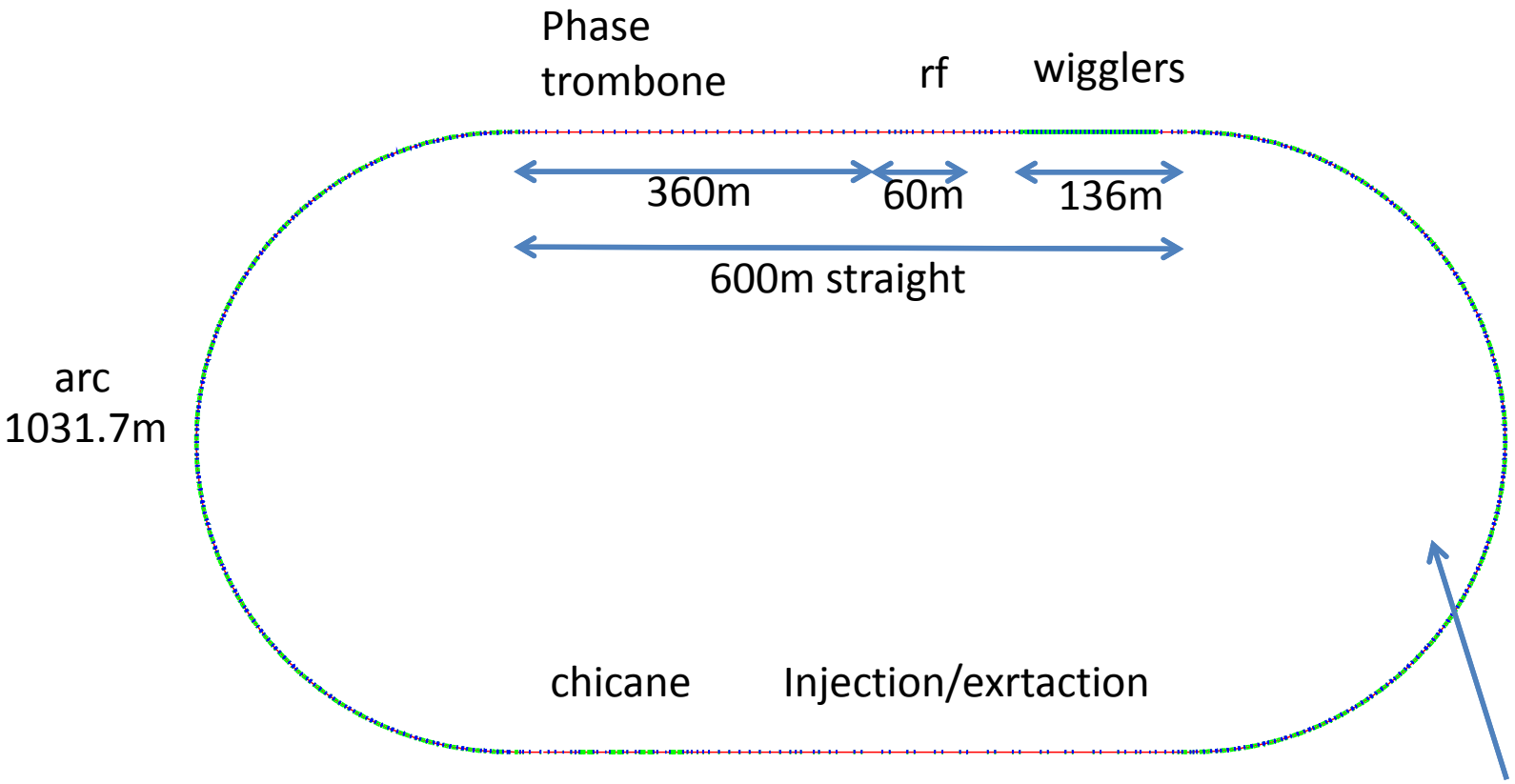
Reduce length of straights

Start with DCO4 with 6.4m circumference



1. Eliminate one of two circumference changing chicanes
2. Eliminate one of two phase trombone sections
3. Reduce number of wiggler cells from 44 to 16
4. Reduce number of RF lattice cells from 5 to 3 (leaving 12 cavities)
5. Eliminate 3 of 7 FODO cells in injection straight

Then make the 3.2km circumference by increasing the number of arc cells

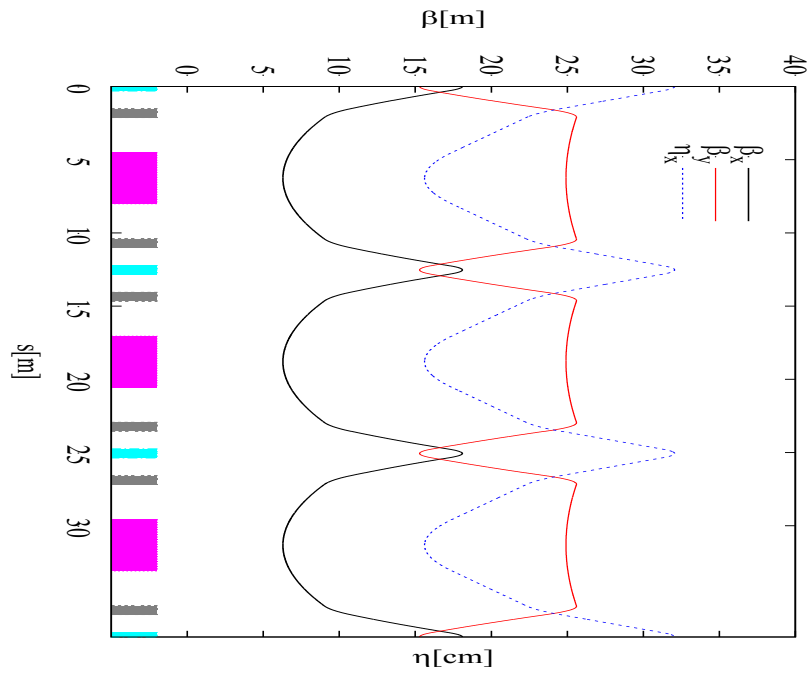


The arc is assembled from dsb3_2-like arc cells.
The number of cells is increased from 13 in dsb3_2 to 19
and the bend angle of each cell is reduced to ¾ of dsb3_2

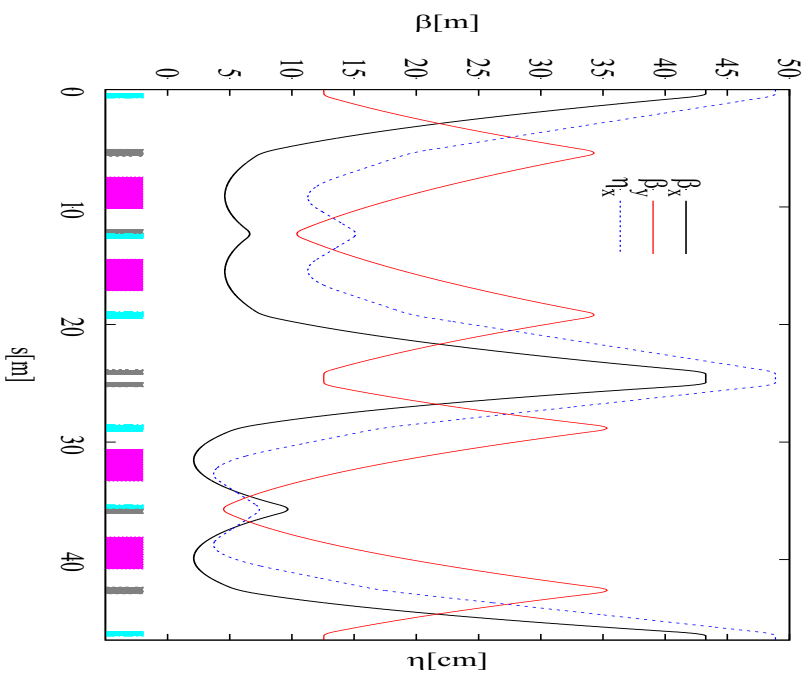
3.2km ring with DSB3_2 arc cells and alternative arc with 600m straight

Parameter	DSB3_2 arc	alternative arc
Circumference	3.2 km	3.2 km
RF frequency	650 MHz	650MHz
τ_x/τ_y	26ms/17ms	26ms/17ms
σ_s	6mm	6mm
σ_δ	1.21×10^{-3}	1.22×10^{-3}
α_p	1.07×10^{-4}	3.04×10^{-4}
$\gamma\varepsilon_x$	3.8/6.6 µm	5.5/7.7 µm
RF voltage (12 cavities)	5/7 MV	16/22 MV
ξ_x/ξ_y	-99/-65	-55/-41
Wigglers- 16 cells	1.6T/2.1T	1.6T/2.1T
Energy loss/turn [MeV]	4.2/6.7	4.1/6.5
sextupoles	5.48/-6.3	3.1/-3.9
Power/RF coupler @400mA	140/223 kW	137/217 kW

Arc

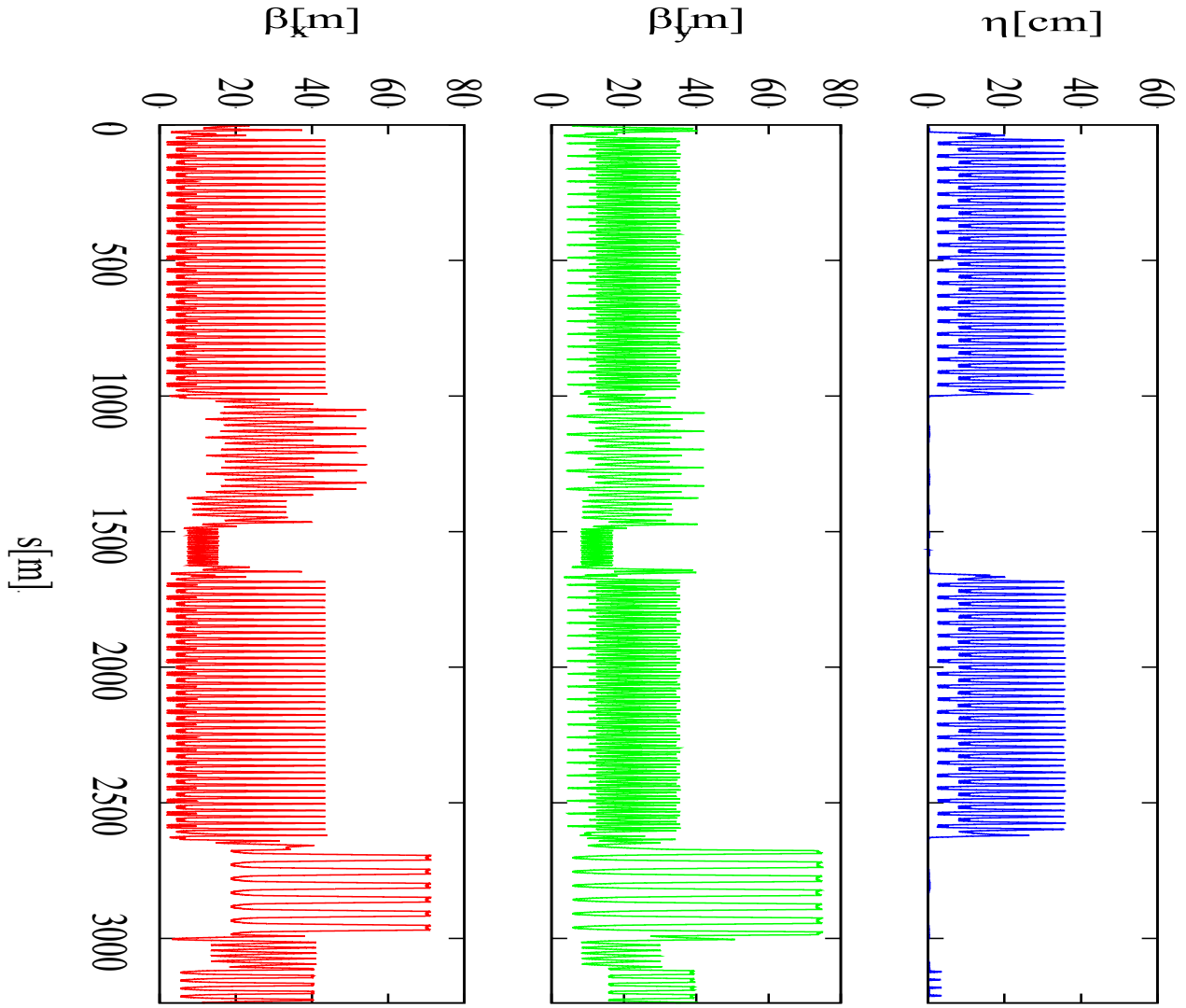


alternative

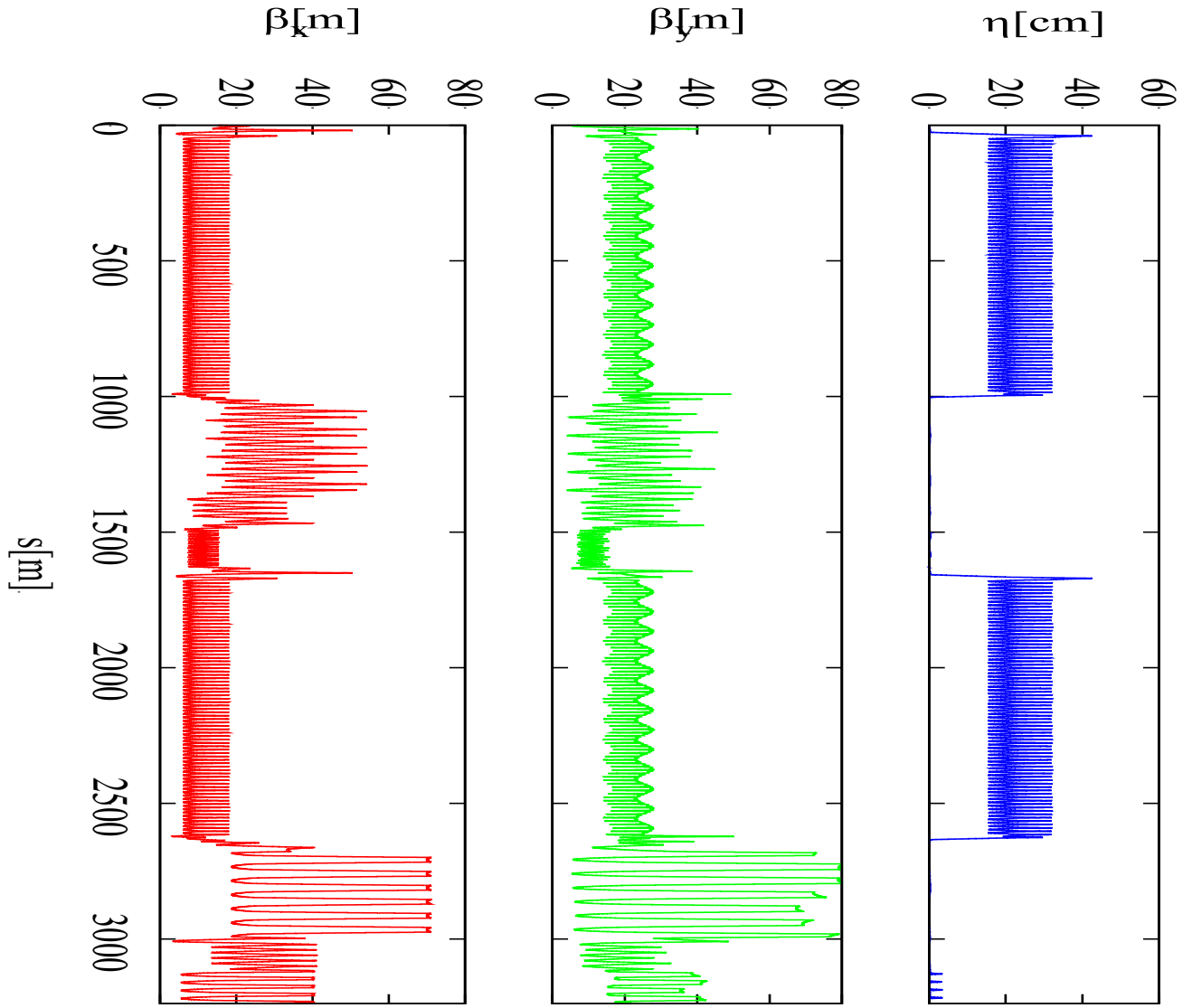


DSB3_2

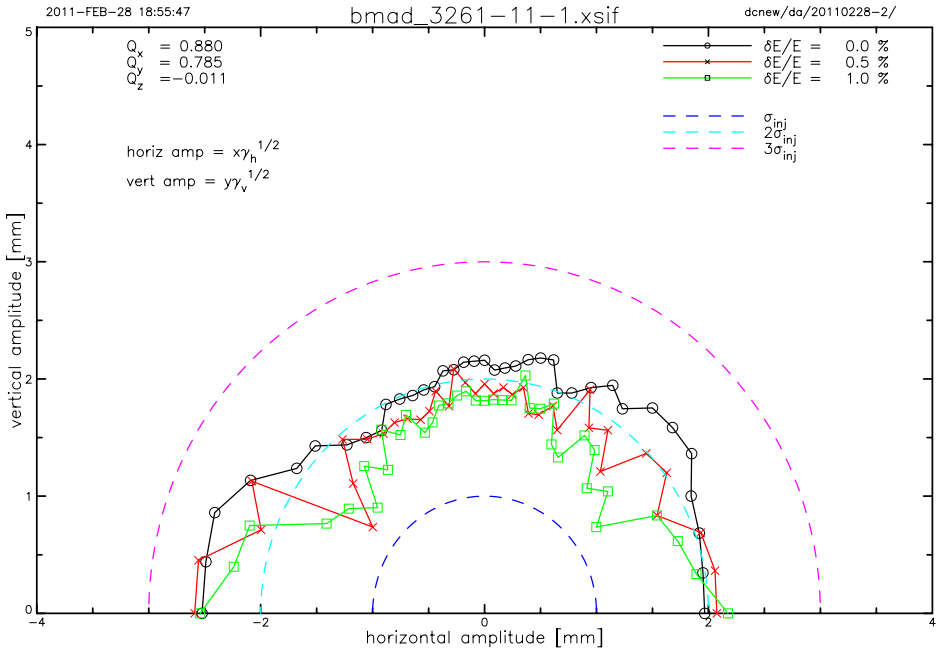
Dsb3_2 arc – 600m straight



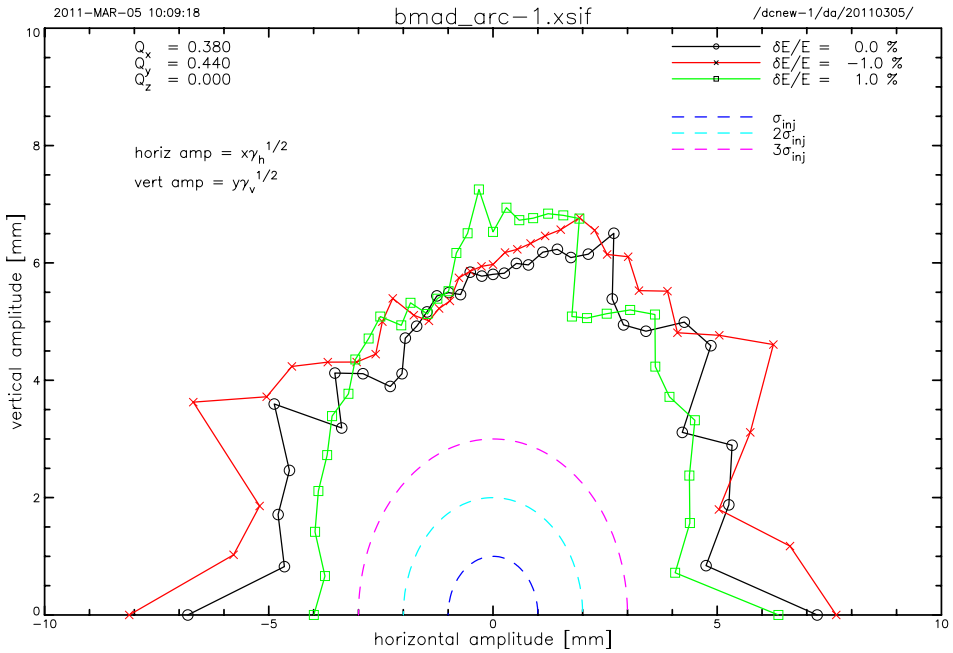
Alternative arc – 600m straight



Dynamic aperture



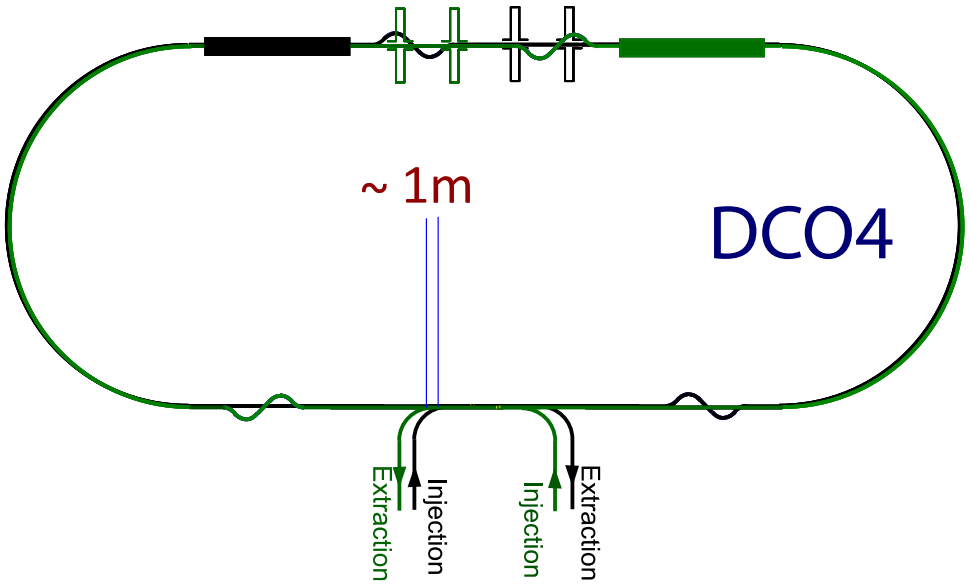
DSB3_2



alternative

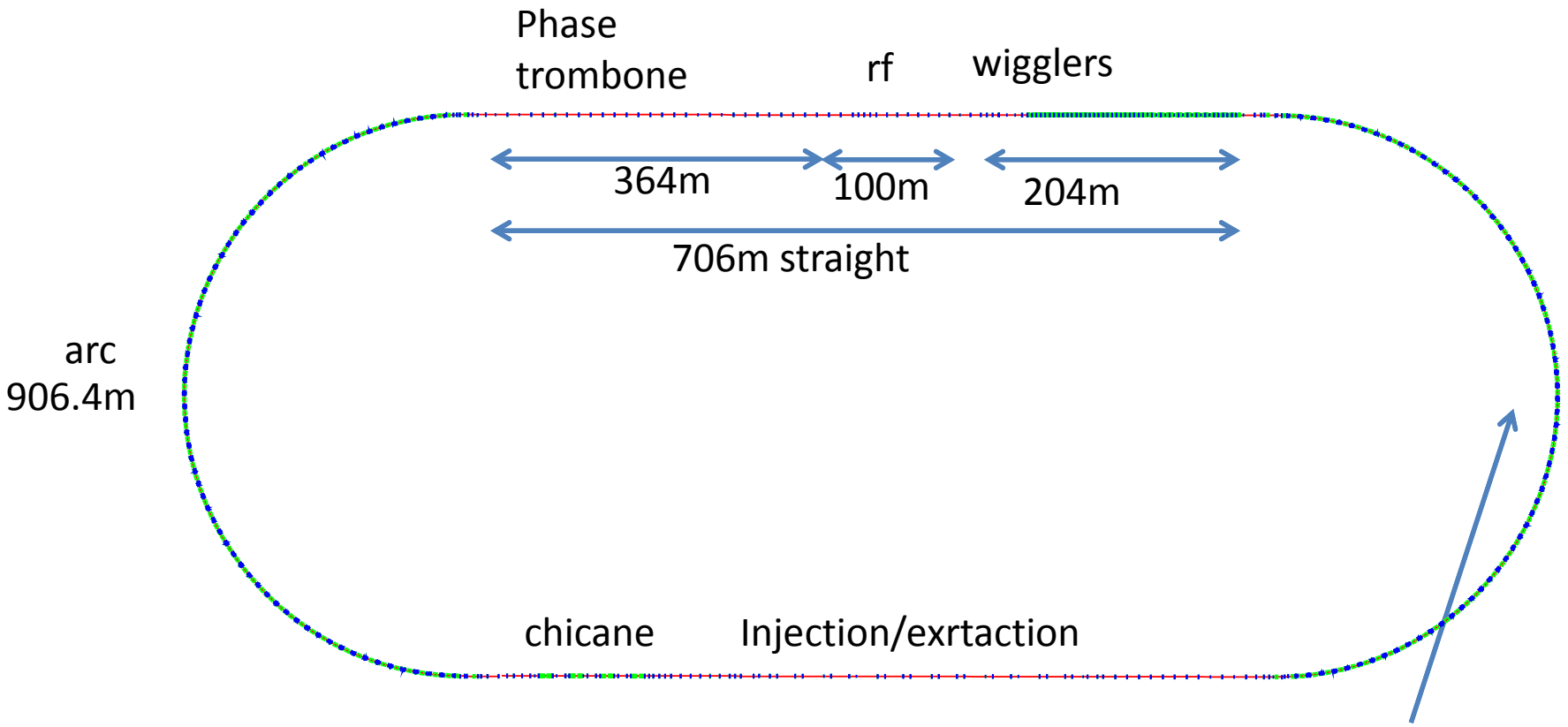
Start Again to Reduce length of straights

Start with DCO4 with 6.4m circumference



1. Eliminate one of two circumference changing chicanes
2. Eliminate 4 of 12 phase trombone cells
3. Reduce number of wiggler cells from 44 to 24
4. Include all 5 RF lattice (20 cavities)
5. Eliminate 4 of 7 FODO cells in injection straight

Then make the 3.2km circumference decreasing the number of arc cells and adjusting bend angle

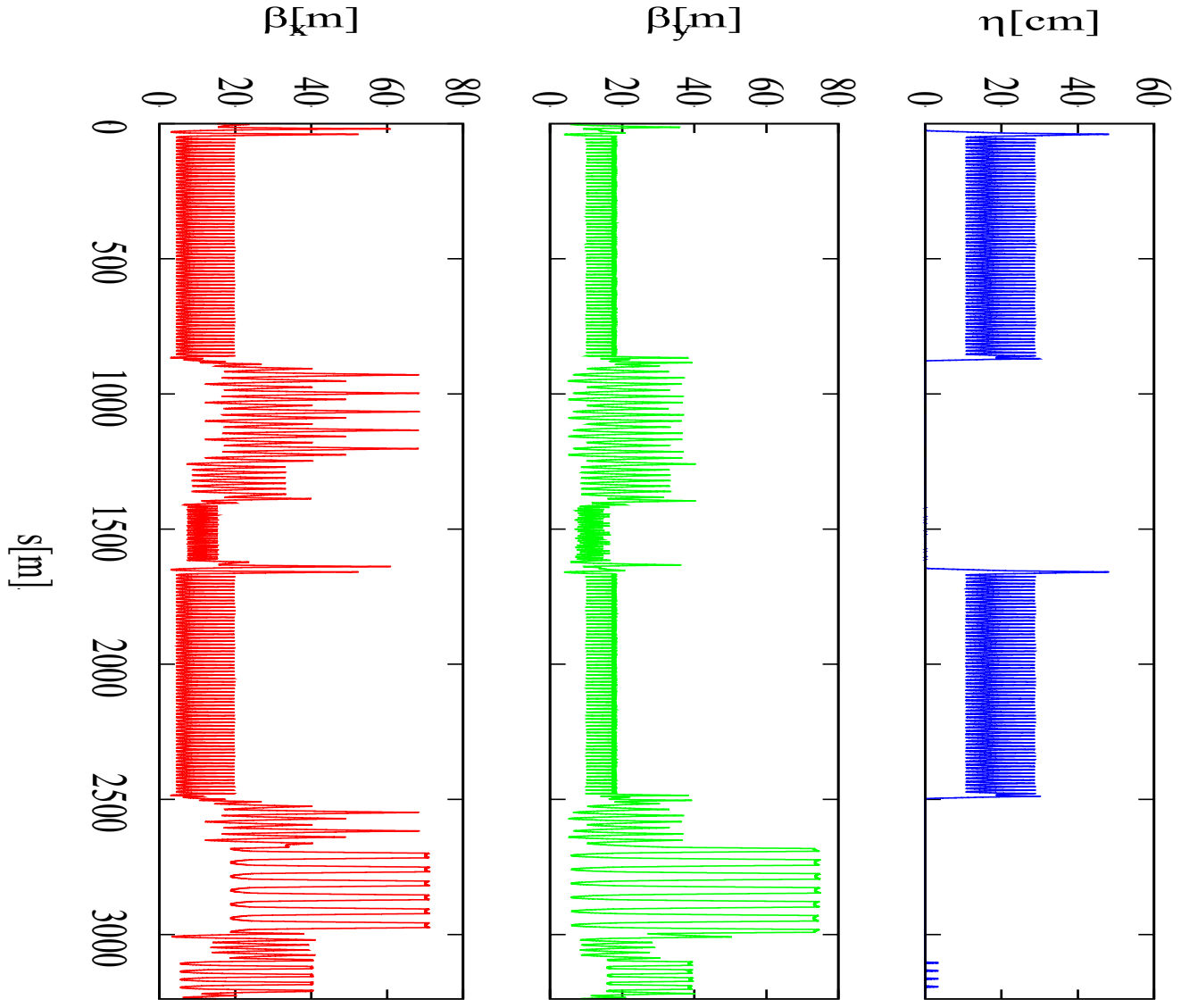


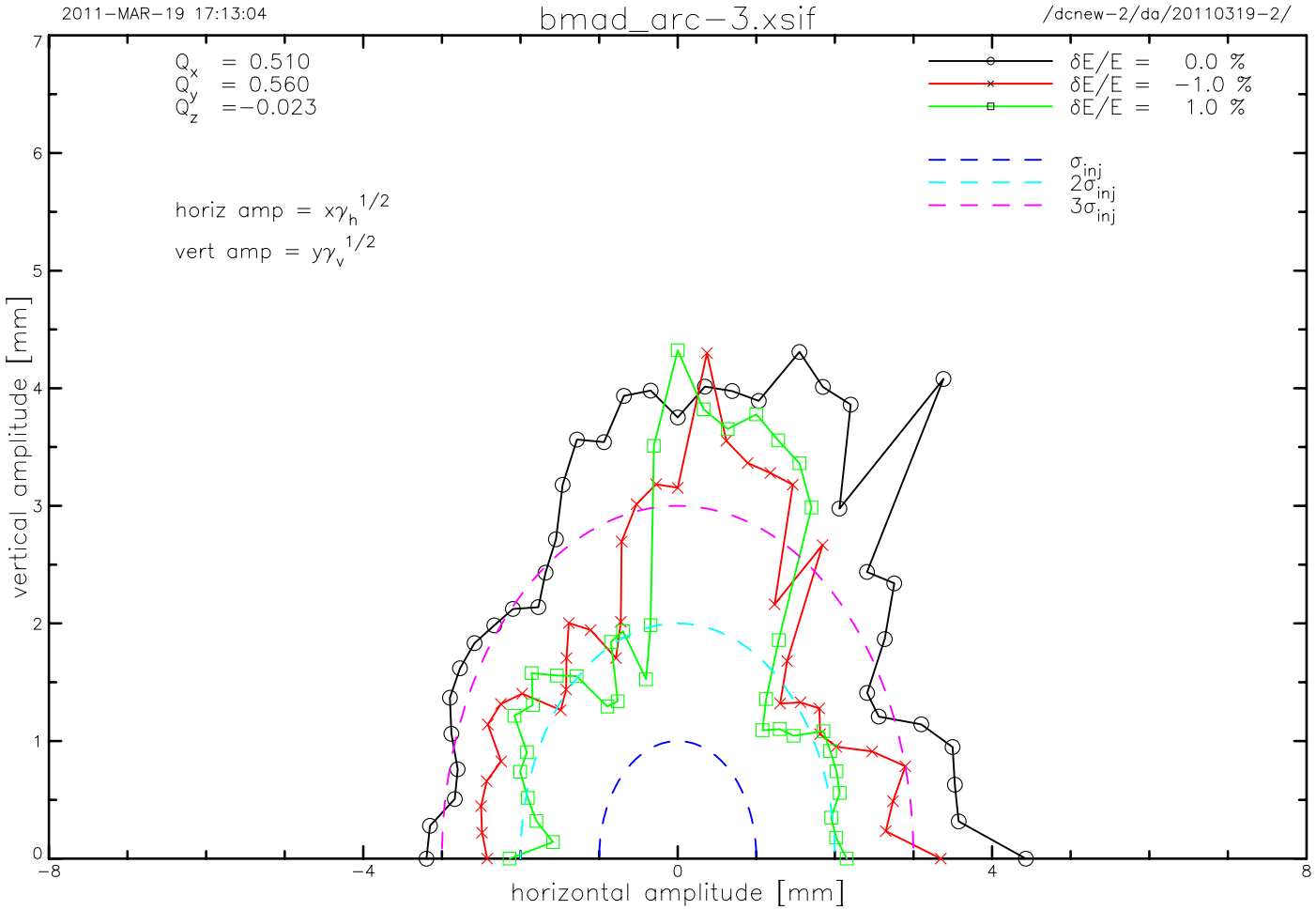
The arc is assembled from “alternative” arc cells.
The number of cells is decreased from 75 in to 65 and the bend angle of each cell is increased accordingly

3.2km ring with 700m straight & alternative arc cell

Parameter	bmad_arc-3(alternative arc)
Circumference	3.24 km
RF frequency	650 MHz
τ_x/τ_y	20ms/14ms
σ_s	6mm
σ_δ	1.24×10^{-3}
α_p	2.2×10^{-4}
$\gamma\varepsilon_x$	7.9/5.8 μm
RF voltage (20 cavities)	11/14 MV
ξ_x/ξ_y	-67/-43
Wigglers	16cells @1.6T/ 24cells @2.0T
Energy loss/turn [MeV]	5.5/7.9
Sextupoles	4.15/-6
RF Power/coupler @400mA	111/158 kW

Alternative arc – 700m straight




2011-MAR-19 17:13:04
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Q_y = 0.560
Q_z = -0.023
horiz amp = x γ_h^1/2
vert amp = y γ_v^1/2
δE/E = 0.0 %
δE/E = -1.0 %
δE/E = 1.0 %
σ_inj
2σ_inj
3σ_inj
vertical amplitude [mm]
horizontal amplitude [mm]
0
1
2
3
4
5
6
7
-8
-4
0
4
8