



SB2009 lattice update

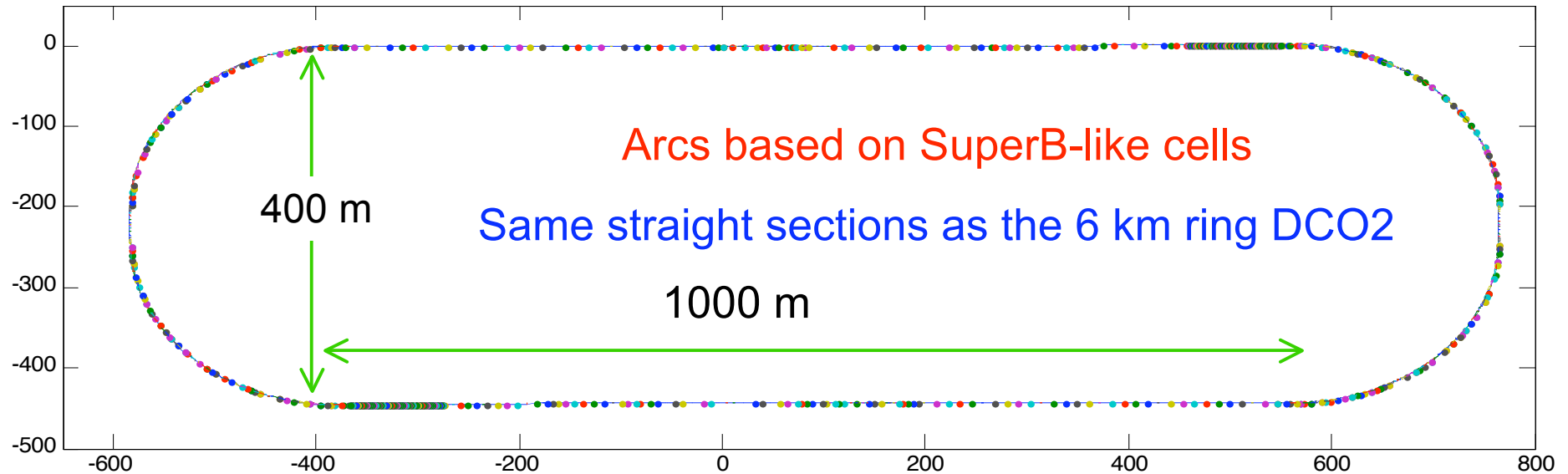
M. Biagini, S. Guiducci

LCWA09

October 1, 2009



SB2009 Ring Layout

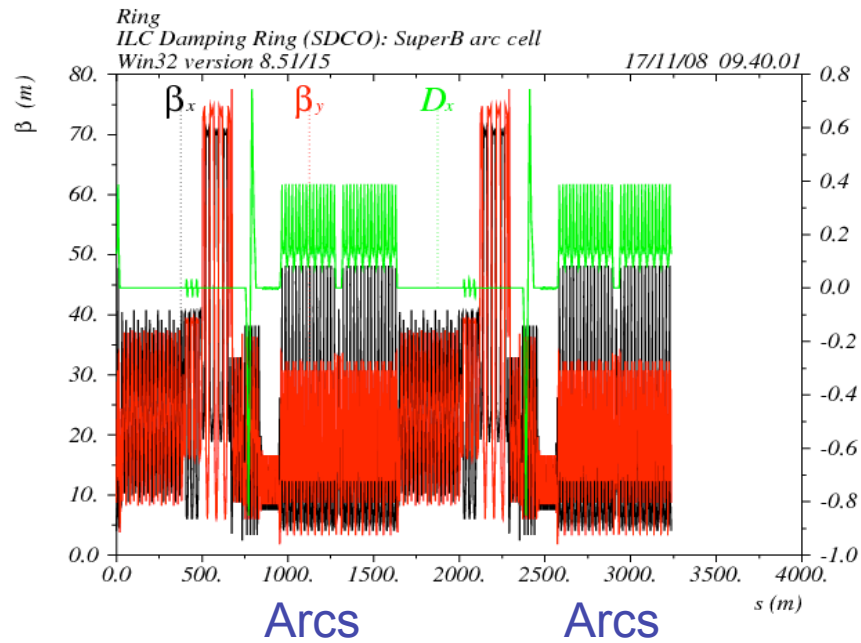


The lattice presented at LCWS08, Chicago has been updated to have injection extraction in the same straight section

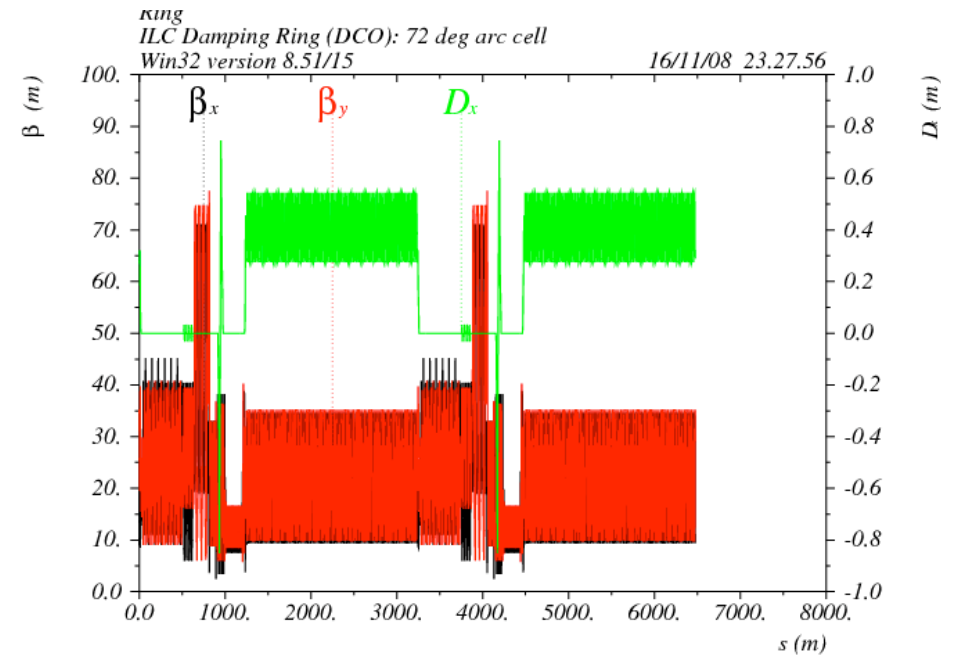
We have used the straight sections of the new 6 km lattice DCO4



Ring



SB2009
DSB 3.2 Km



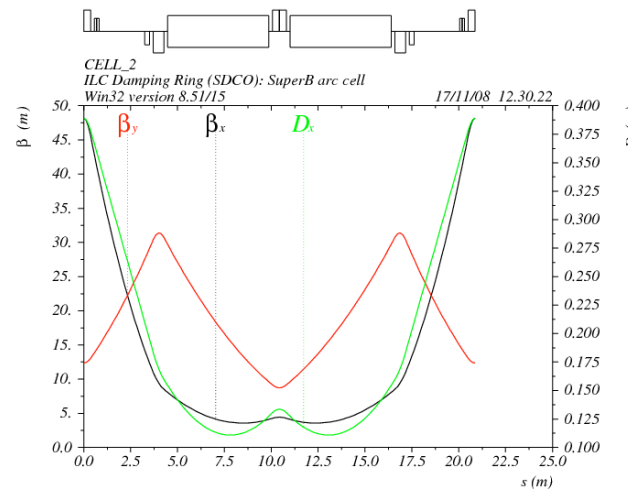
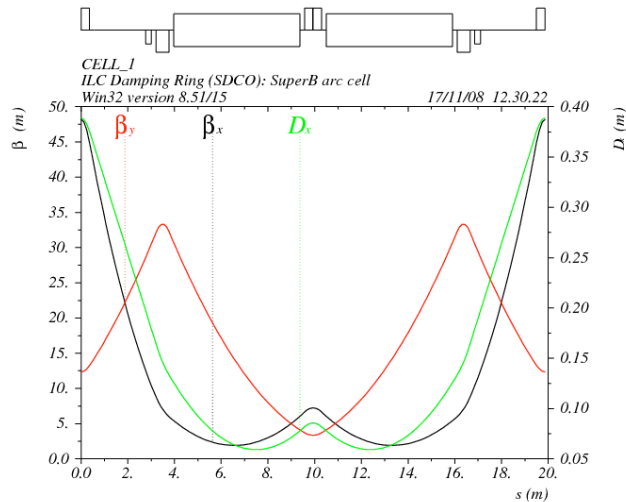
Present baseline
DCO2 6.4 Km



Features

- Arcs contain alternating cells with different phase advances:
 - cell #1: $L=20$ m, $\mu_x = 0.72$, $\mu_y = 0.27$
 - cell #2: $L=21$ m, $\mu_x = 0.5$, $\mu_y = 0.2$
- Emittance and momentum compaction can be tuned by changing the x-phase advance/cell in cell#1

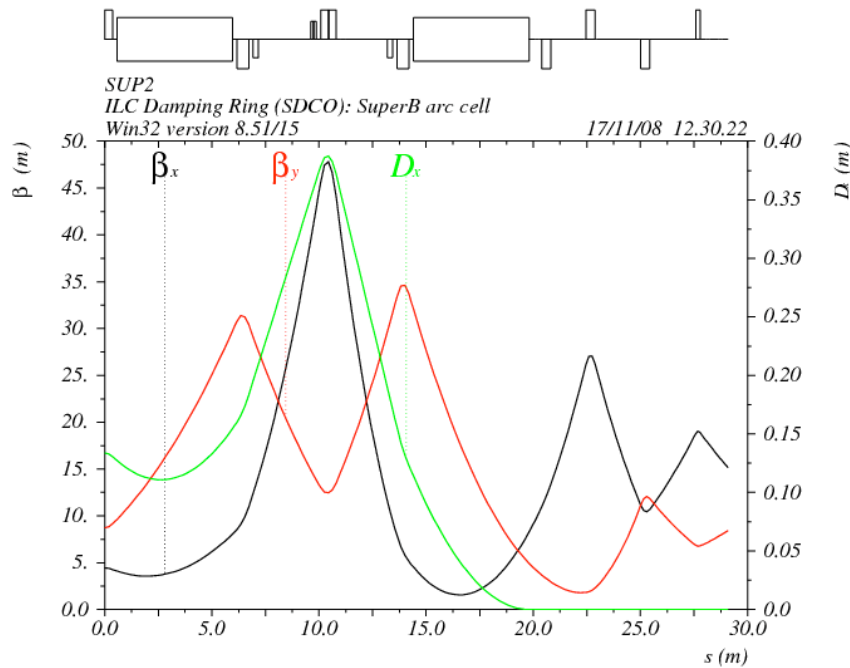
SuperB-like cells



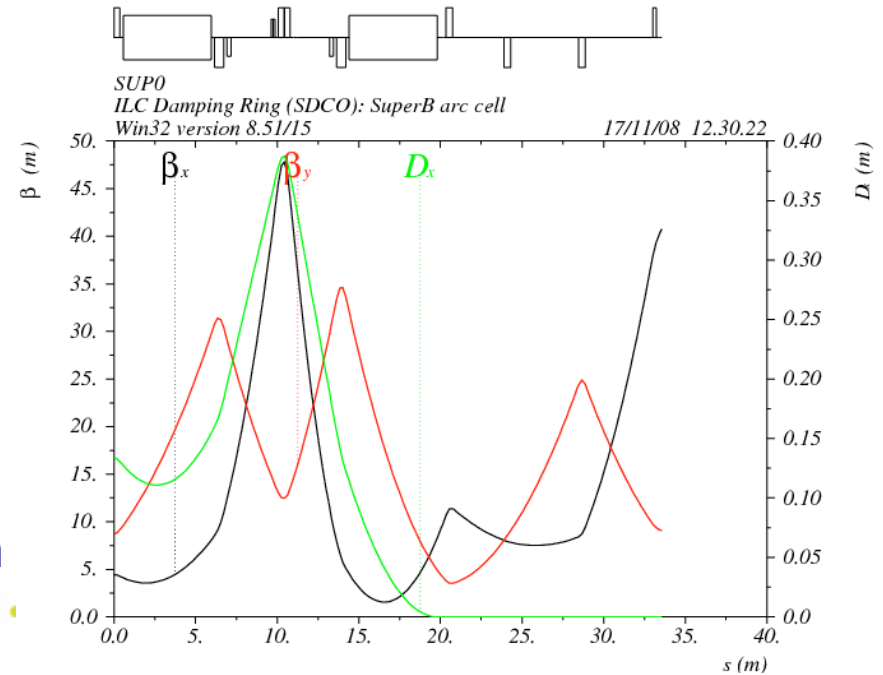
Lattice and
Dynamic Aperture
optimization in
progress



Dispersion suppressors



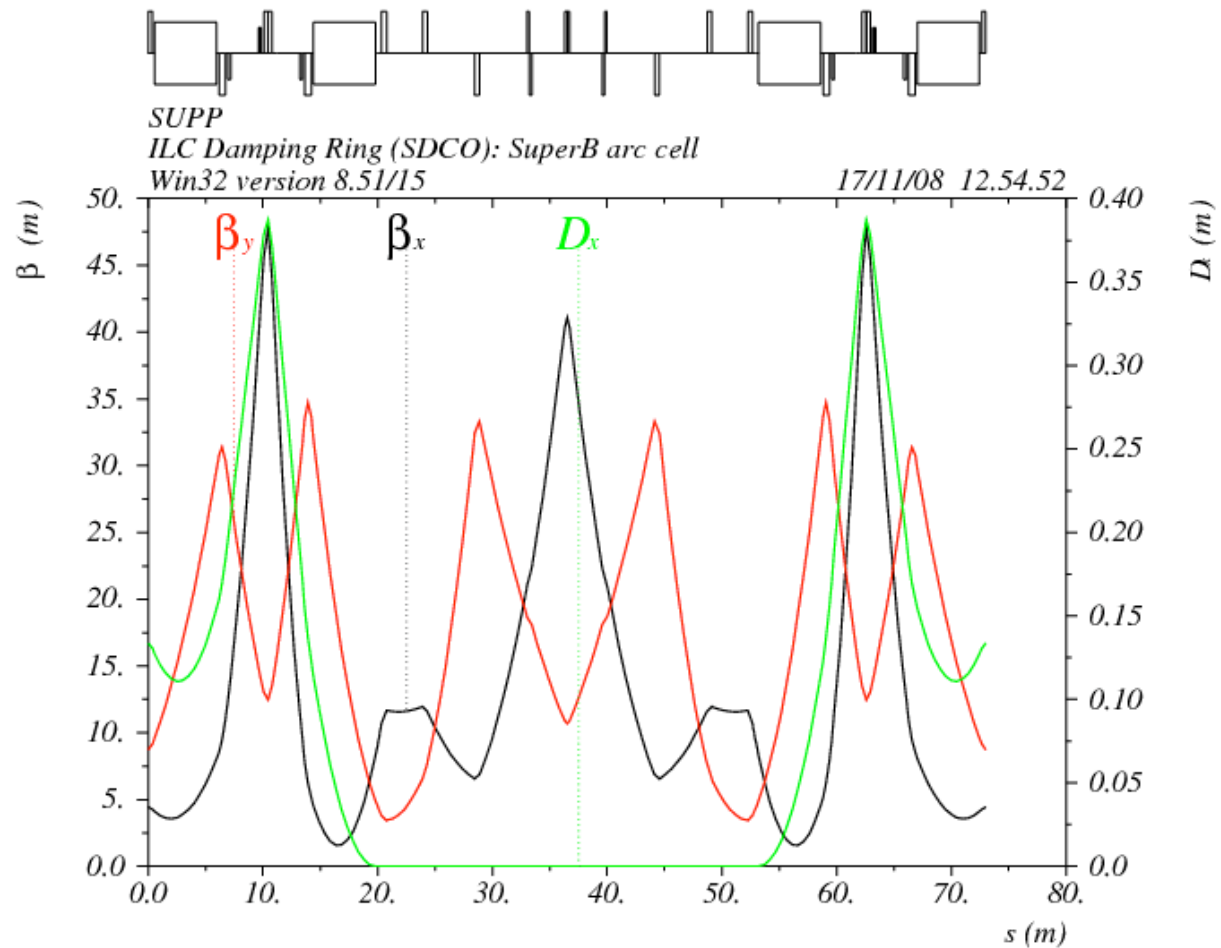
Matching to wiggler section



Matching to tune trombone section



Middle-arc section for phase tuning between sextupoles



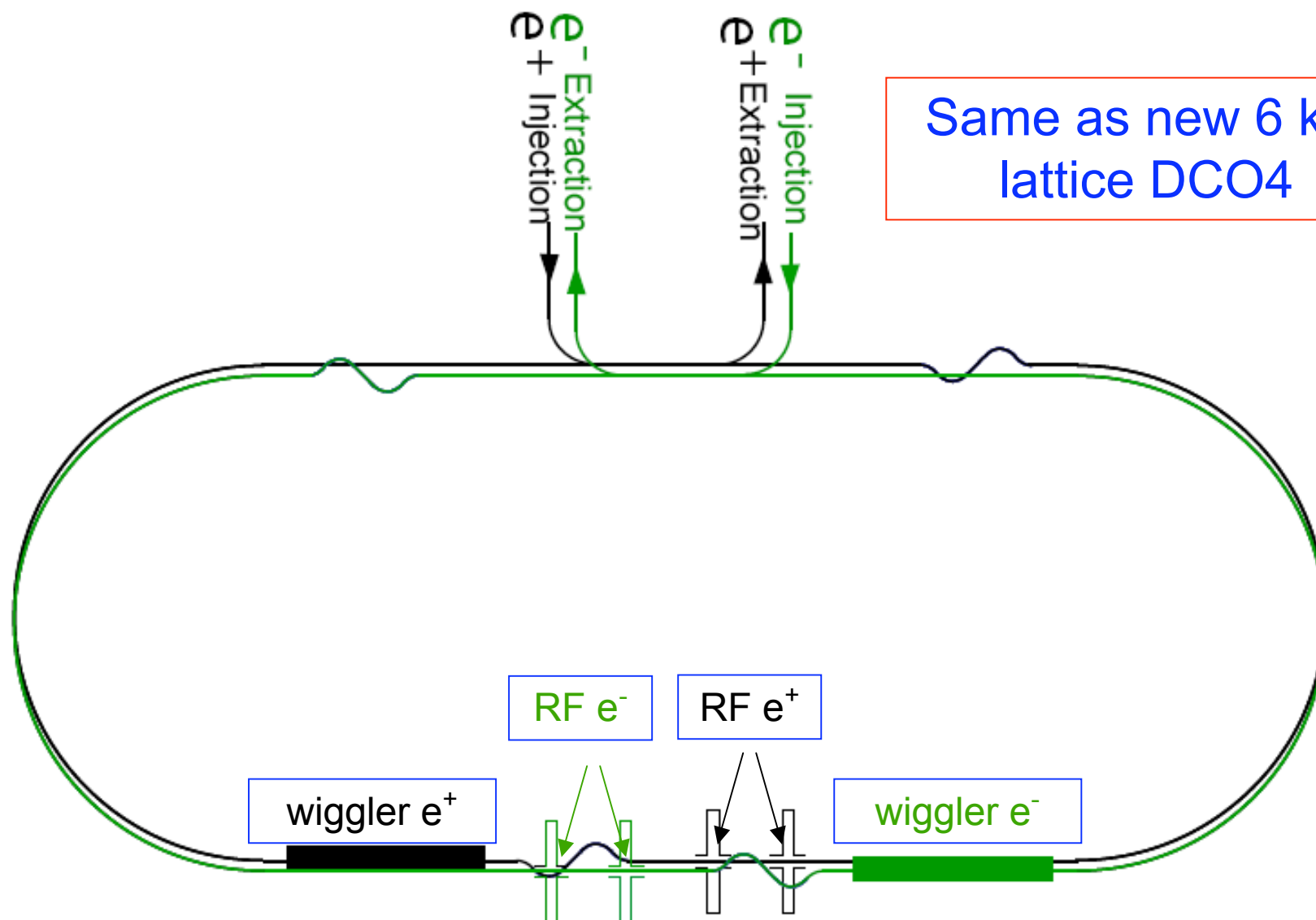


Parameters

Circumference (m)	3238.22	RF frequency (MHz)		650	
Energy (GeV)	5	RF voltage (MV)		11	
Bunch length (mm)	6	Harmonic number		7021	
Natural X chromaticity	-102	Natural Y chromaticity		-66	
X phase advance/cell#1	0.72	0.6	0.65	0.75	0.78
Normalized ϵ_x (μm)	3.4	4.3	3.5	3.9	5.5
Momentum compaction $\times 10^{-4}$	1.8	1.4	1.5	2.1	2.7
Transverse damping time (ms)	20.6	21	21	20.2	19.6
Max β_x in cell #1 (m)	50	80	60	45	45
Max D_x in cell #1 (m)	0.4	0.3	0.3	0.5	0.6



e^+/e^- Rings Layout



Same as new 6 km lattice DCO4

wiggler e^+

RF e^-

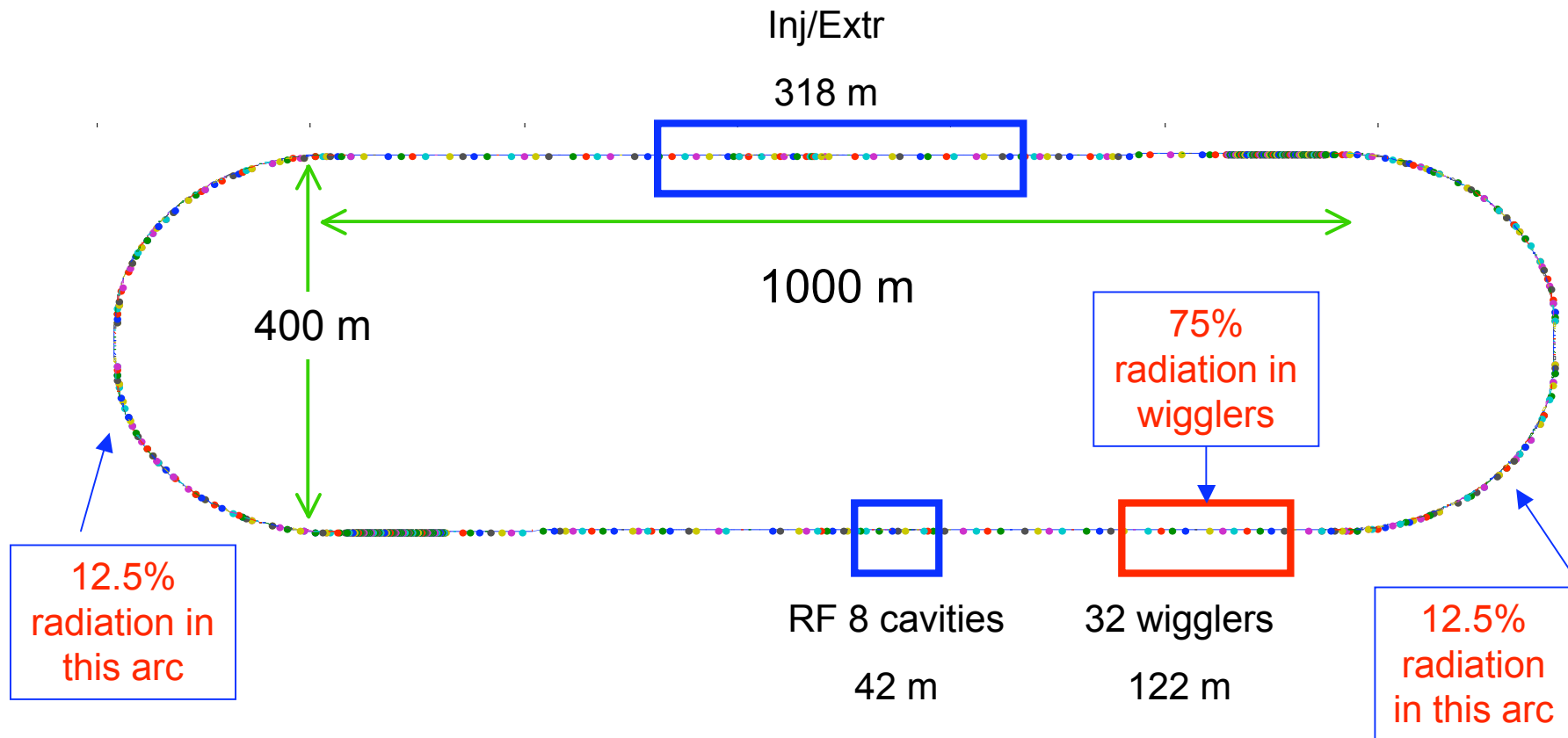
RF e^+

wiggler e^-



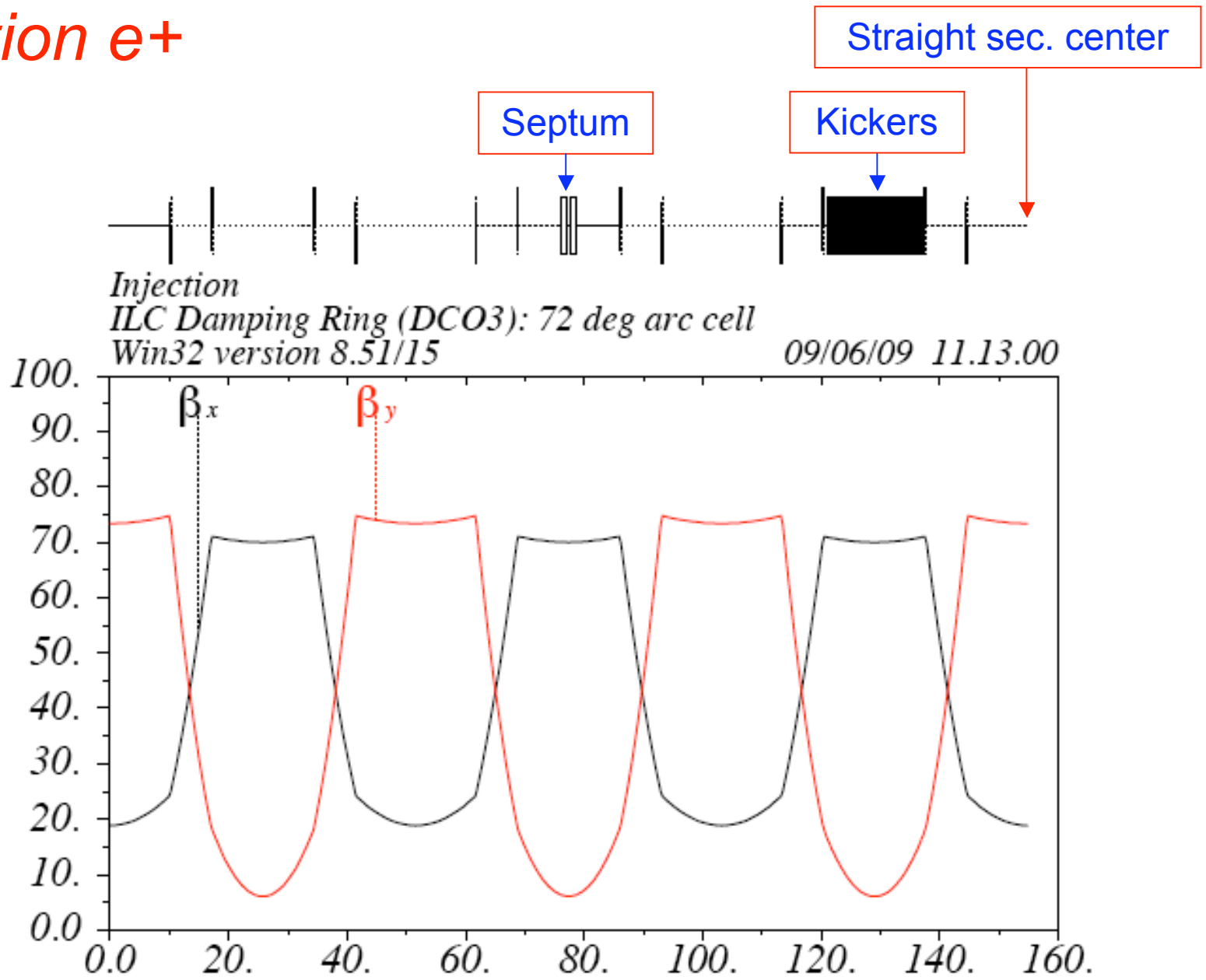
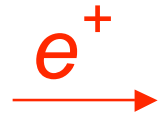
SB2009 - DSB3 LATTICE

STRSECI: INJ/EXTRACTION

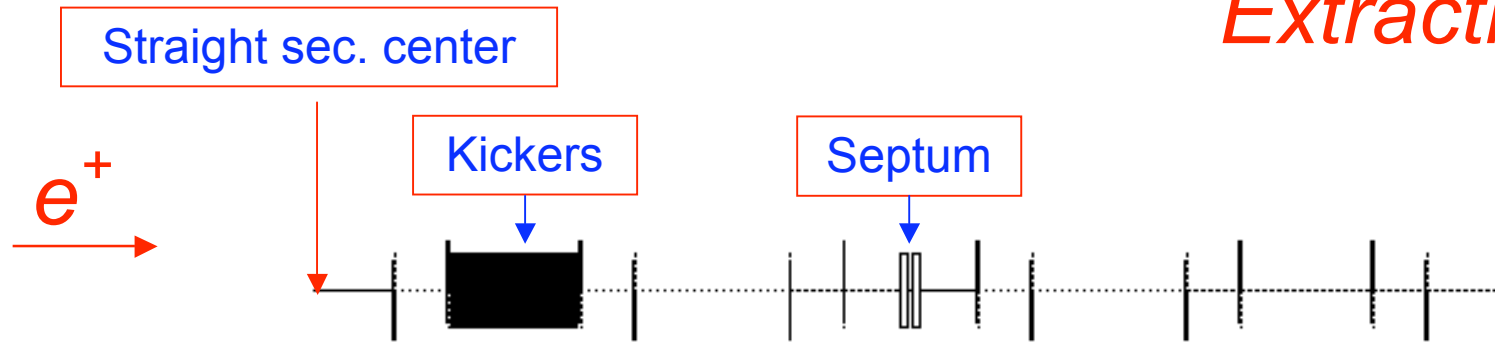


STRSECR: RF AND WIGGLERS

Injection e+



Extraction e+

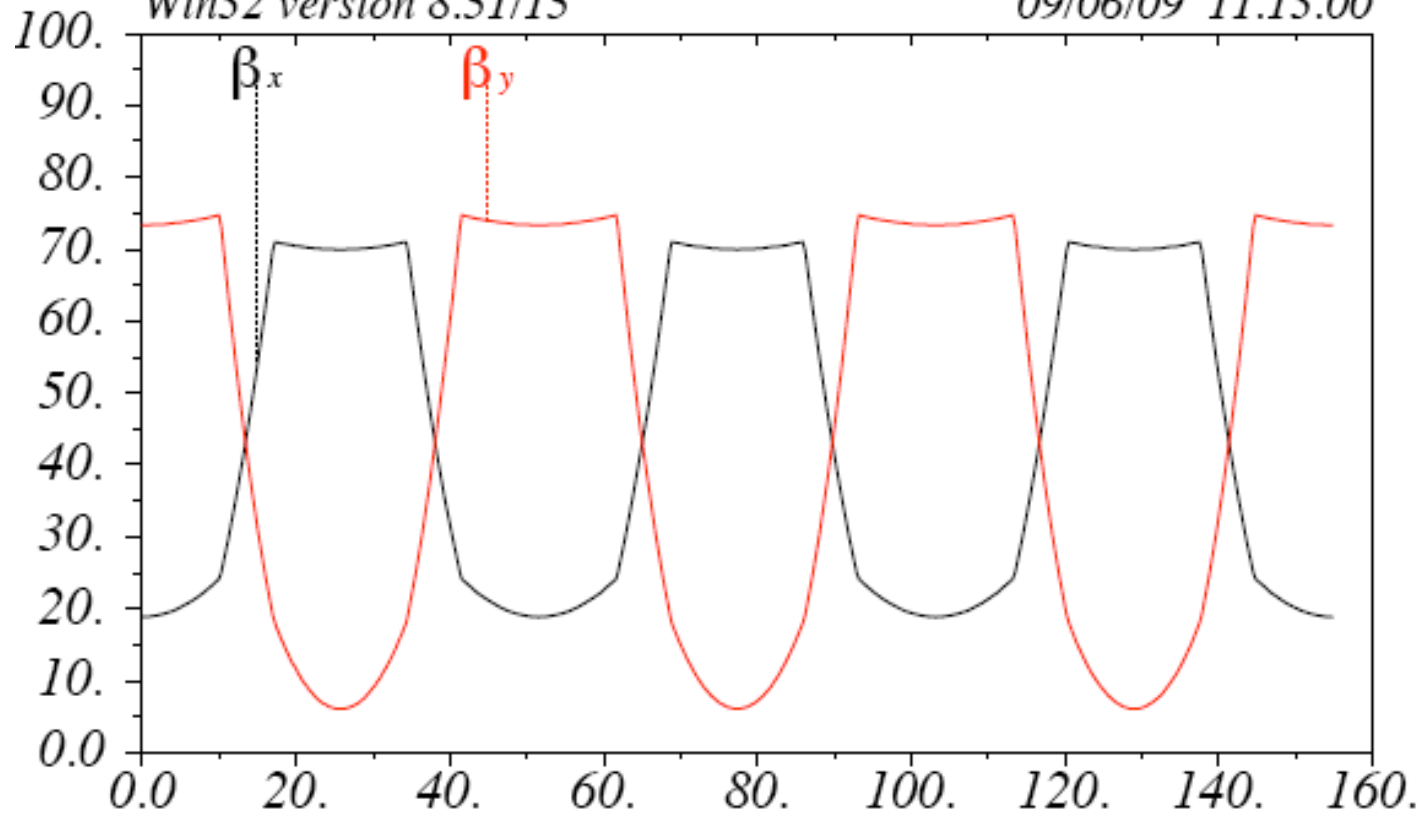


Extraction

ILC Damping Ring (DCO3): 72 deg arc cell

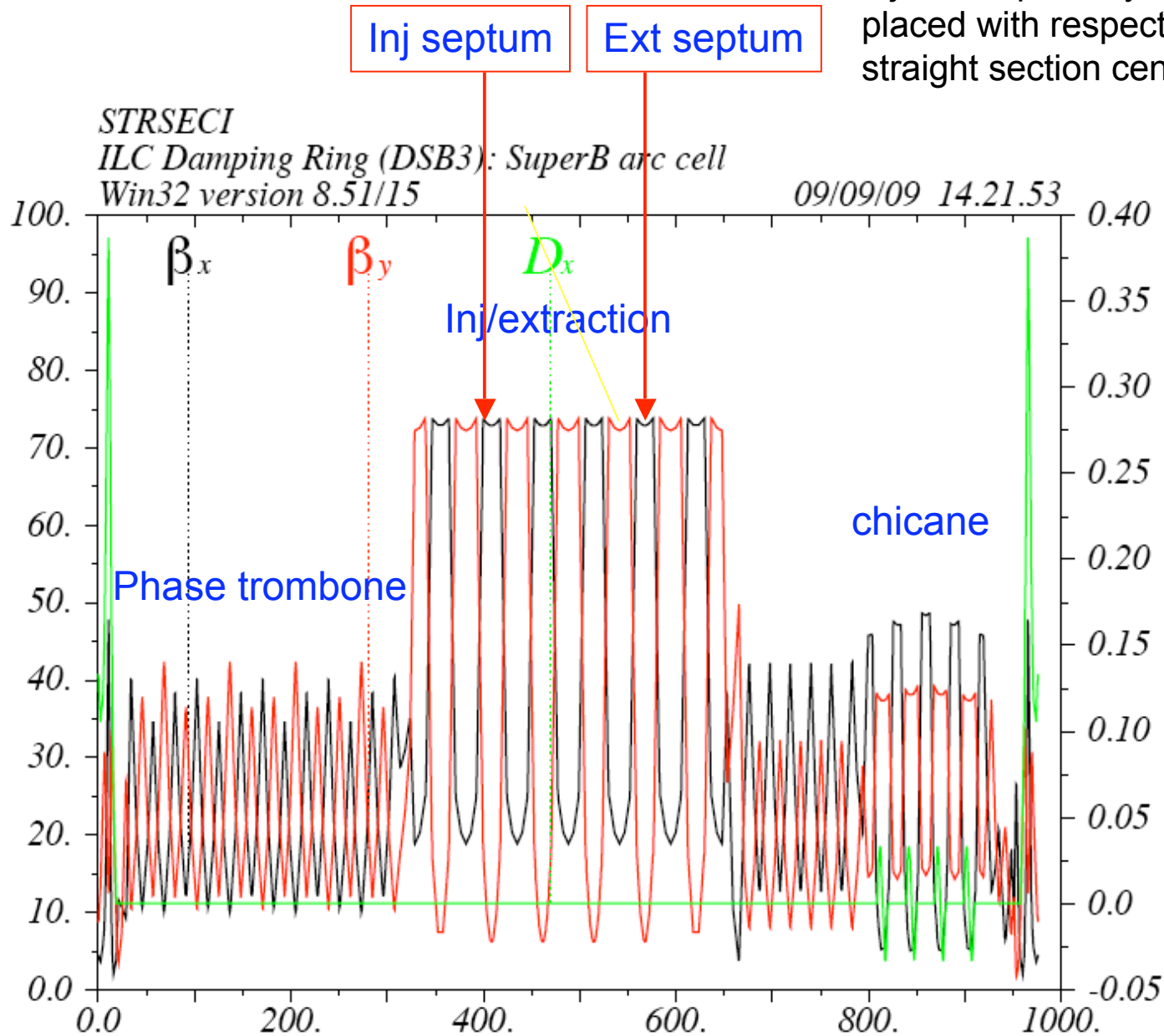
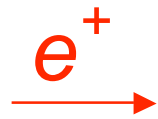
Win32 version 8.51/15

09/06/09 11.13.00



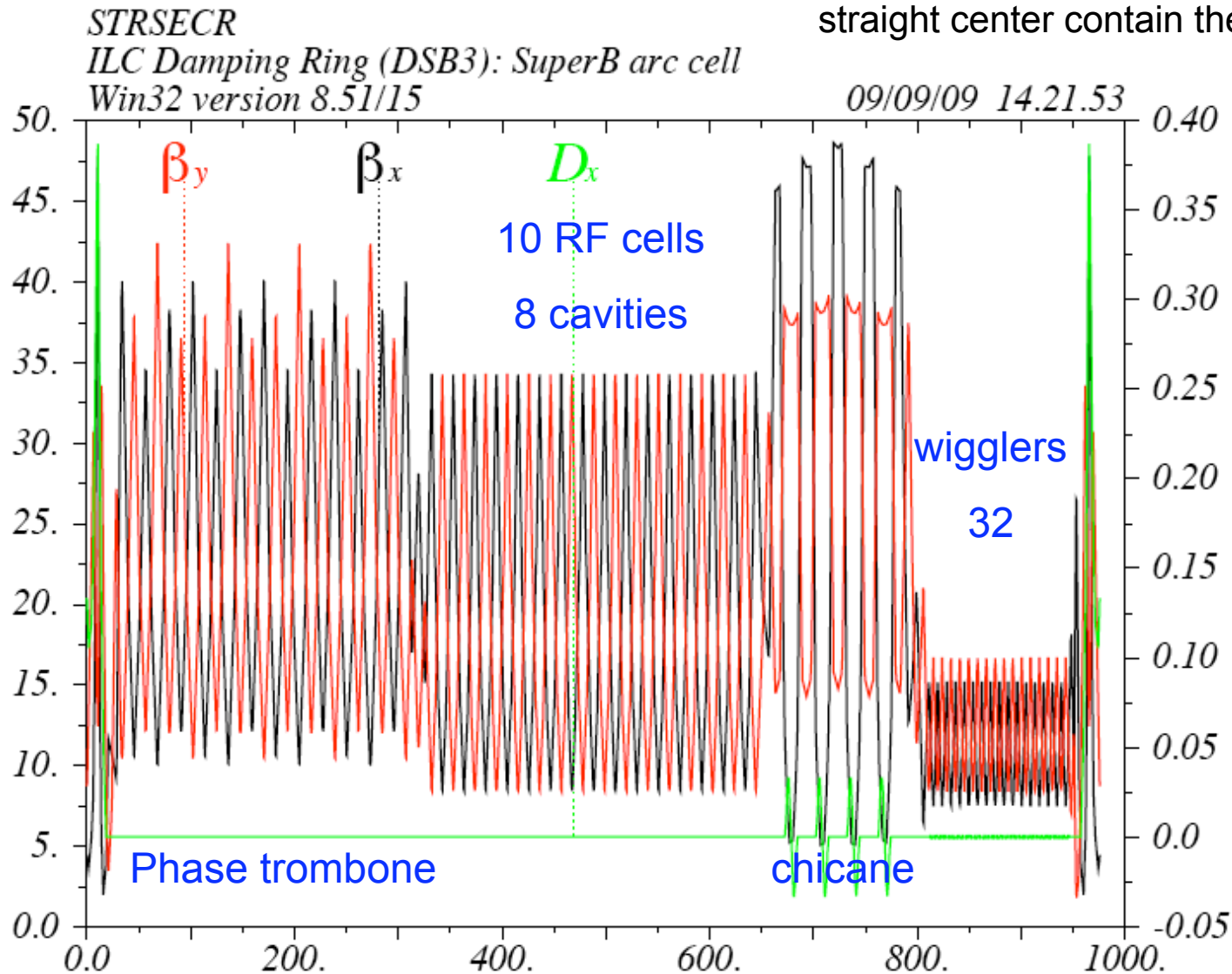
Inj/Extr straight

Inj/extr septum symmetrically placed with respect to the straight section center

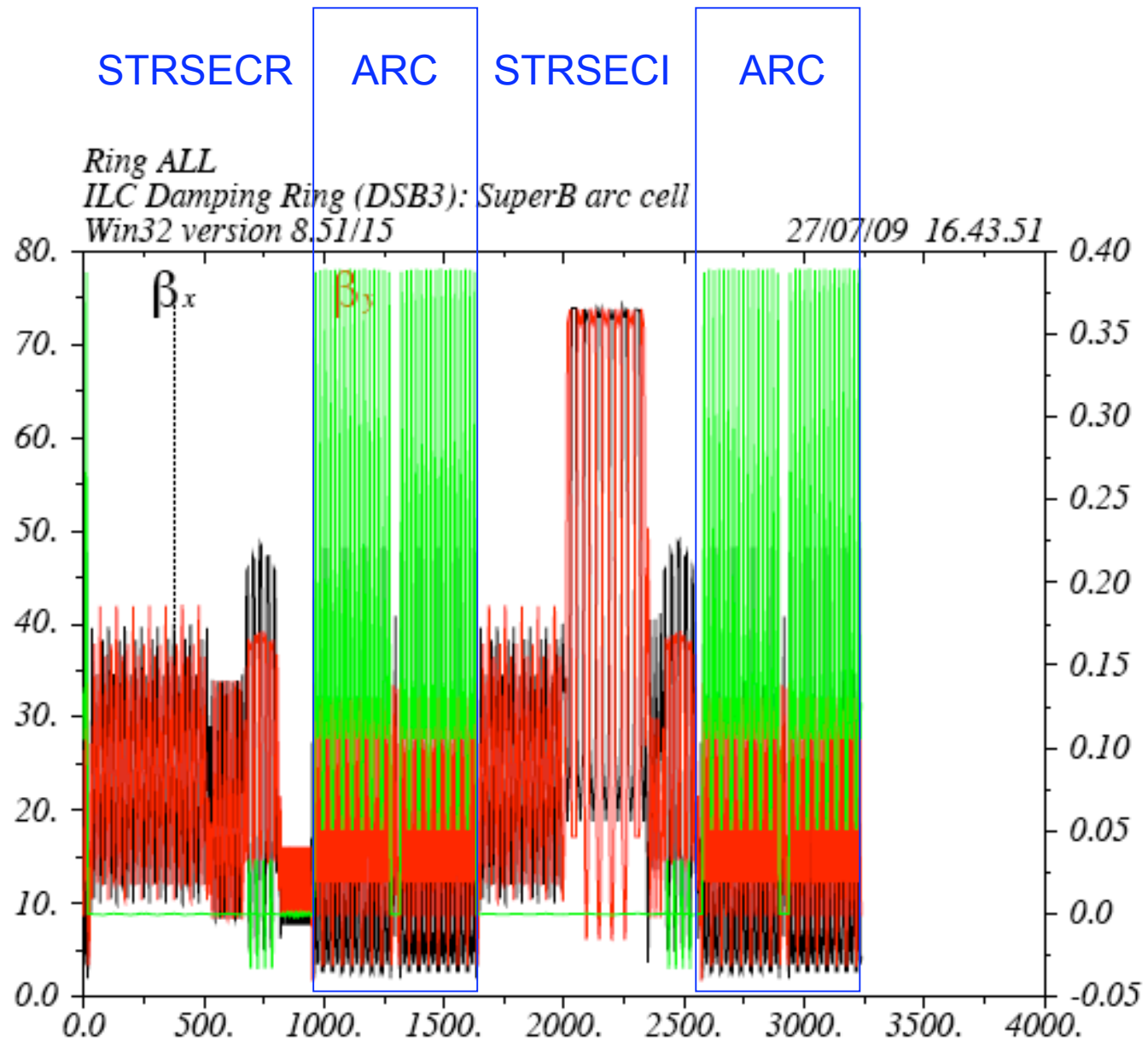


RF/wiggler straight section

Only the 2 RF cells adjacent to
straight center contain the 8 cavities



Ring





Magnet counts

	DSB3 (3.2km)	DCO4 (6.4km)
Arc dipole length	2.7 m	2.0 m
Arc dipole field (2 types)	0.26/0.36 T	0.27 T
Number of arc dipoles	128	200
Chicane dipole field	0.27 T	0.27 T
Number of 1 m dipoles (in chicanes)	48	48
Total number of quadrupoles	590	692
Quadrupole length	0.6 - 0.3 m	0.3 m
Maximum quadrupole gradient	7.5 T/m	12.0 T/m
Total number of sextupoles	192	92
Maximum sextupole gradient	145 T/m ²	215 T/m ²

Number of magnets is comparable

Half cable length

Wigglers

	SB2009	DCO4
Wiggler peak field	1.6 T	1.6 T
Wiggler period	0.4 m	0.4 m
Number of wigglers	32	88
Wiggler unit length	2.45 m	2.45 m
Wiggler total length	78.4	215.6



DR Parameters

	RDR	SB2009
	DCO2	DSB3
Energy (GeV)	5	5
Circumference (m)	6476	3238
Bunch number	2610 - 5265	2610 - 1305
N particles/bunch	2x10e10	2x10e10
Damping time tx (ms)	21	24
Emittance ex (nm)	0.48	0.53
Emittance ey (pm)	2	2
Momentum compaction	1.7x10 ⁻⁴	1.3x10 ⁻⁴
Energy loss/turn (MeV)	10.3	4.4
Energy spread	0,0013	0,0012
Bunch length (mm)	6	6
RF Voltage (MV)	21	7,5
RF frequency (MHz)	650	650
B wiggler (T)	1,6	1,6
Lwig total	216	78
Number of wigglers	88	32

1/2 circumference

<1/2 RF cavities

~1/3 wigglers