

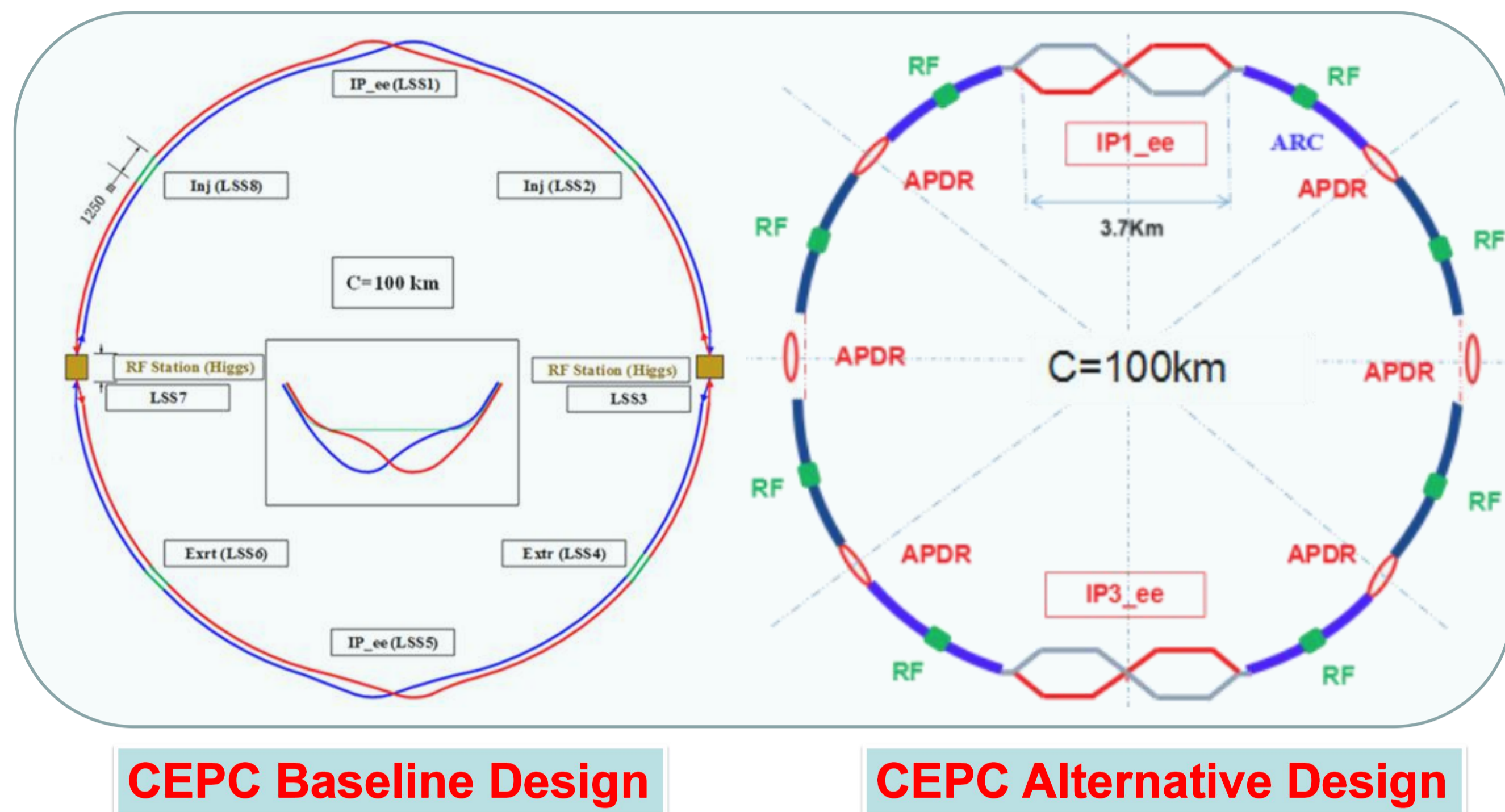
# CEPC Design Status of CDR\*

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## 1. CEPC TWO OPTIONS TOWARDS CDR



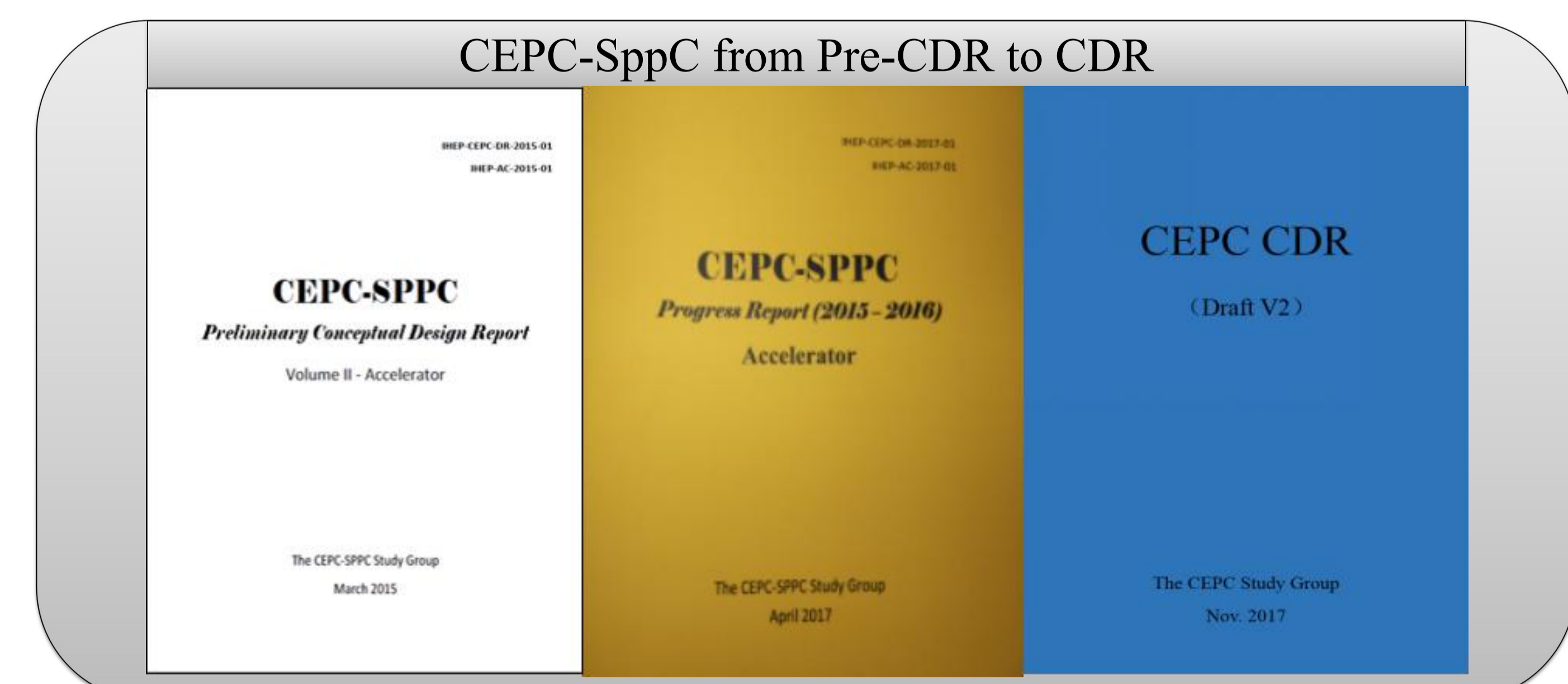
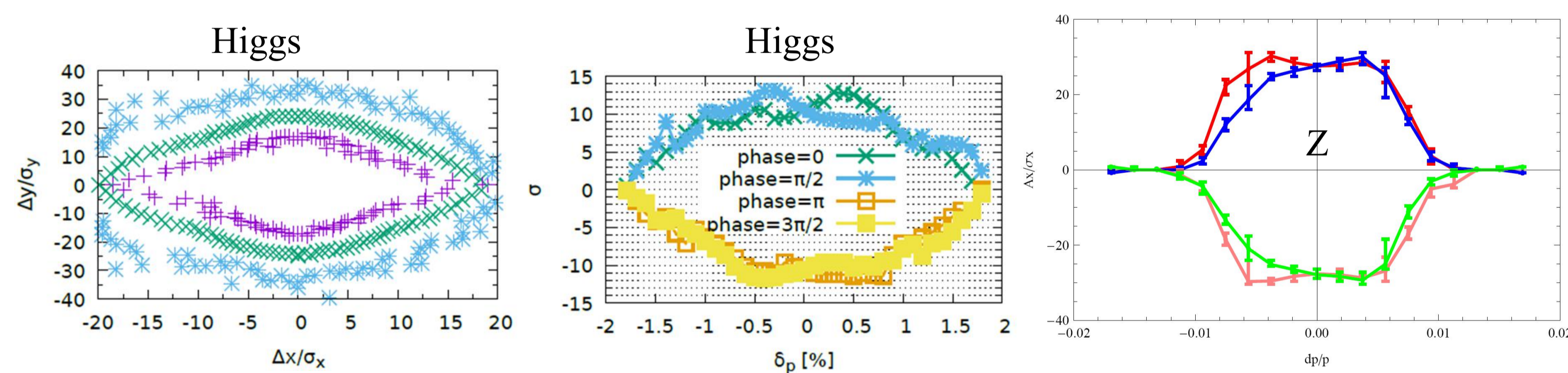
CEPC Baseline Design

CEPC Alternative Design

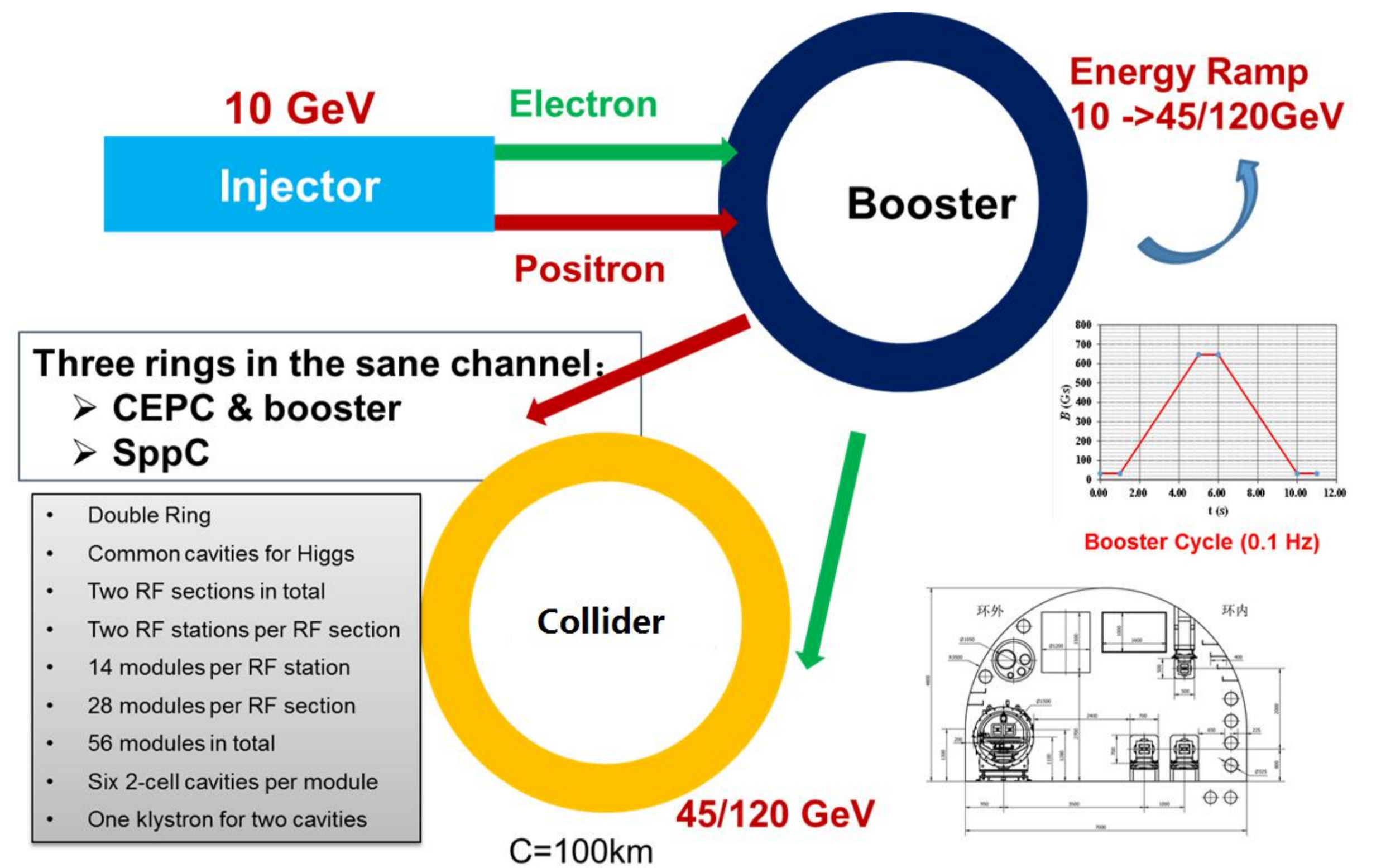
## 2. CEPC PARAMETER CHOICE FOR CDR

	Higgs	W	Z (3T)	Z (2T)
Number of IPs			2	
Beam energy (GeV)	120	80		45.5
Circumference (km)			100	
Synchrotron radiation loss/turn (GeV)	1.73	0.34		0.036
Crossing angle at IP (mrad)			16.5 × 2	
Piwnski angle	2.58	7.0		23.8
Number of particles/bunch $N_p$ ( $10^{10}$ )	15.0	12.0		8.0
Bunch number (bunch spacing)	242 (0.68 μs)	1524 (0.21 μs)		12000 (25 ns + 10% gap)
Beam current (mA)	17.4	87.9		461.0
Synchrotron radiation power /beam (MW)	30	30		16.5
Bending radius (km)			10.7	
Momentum compact ( $10^{-5}$ )			1.11	
$\beta$ function at IP $\beta_x^*/\beta_y^*$ (m)	0.36/0.0015	0.36/0.0015	0.2/0.0015	0.2/0.001
Emittance $\epsilon_x/\epsilon_y$ (nm)	1.21/0.0031	0.54/0.0016	0.18/0.004	0.18/0.0016
Beam size at IP $\sigma_x/\sigma_y$ (μm)	20.9/0.068	13.9/0.049	6.0/0.078	6.0/0.04
Beam-beam parameters $\xi_x/\xi_y$	0.031/0.109	0.013/0.106	0.0041/0.056	0.0041/0.072
RF voltage $V_{RF}$ (GV)	2.17	0.47		0.10
RF frequency $f_{RF}$ (MHz) (harmonic)			650 (216816)	
Natural bunch length $\sigma_z$ (mm)	2.72	2.98		2.42
Bunch length $\sigma_z$ (mm)	3.26	5.9		8.5
HOM power/cavity (2 cell) (kw)	0.54	0.75		1.94
Natural energy spread (%)	0.1	0.066		0.038
Energy acceptance requirement (%)	1.35	0.4		0.23
Energy acceptance by RF (%)	2.06	1.47		1.7
Photon number due to beamstrahlung	0.29	0.35		0.55
Lifetime_simulation (min)	100			
Lifetime (hour)	0.67	1.4	4.0	2.1
F (hour glass)	0.89	0.94		0.99
Luminosity/IP $L$ ( $10^{34} \text{cm}^{-2}\text{s}^{-1}$ )	2.93	10.1	16.6	32.1

## 4. DYNAMIC APERTURE OF COLLIDER RING



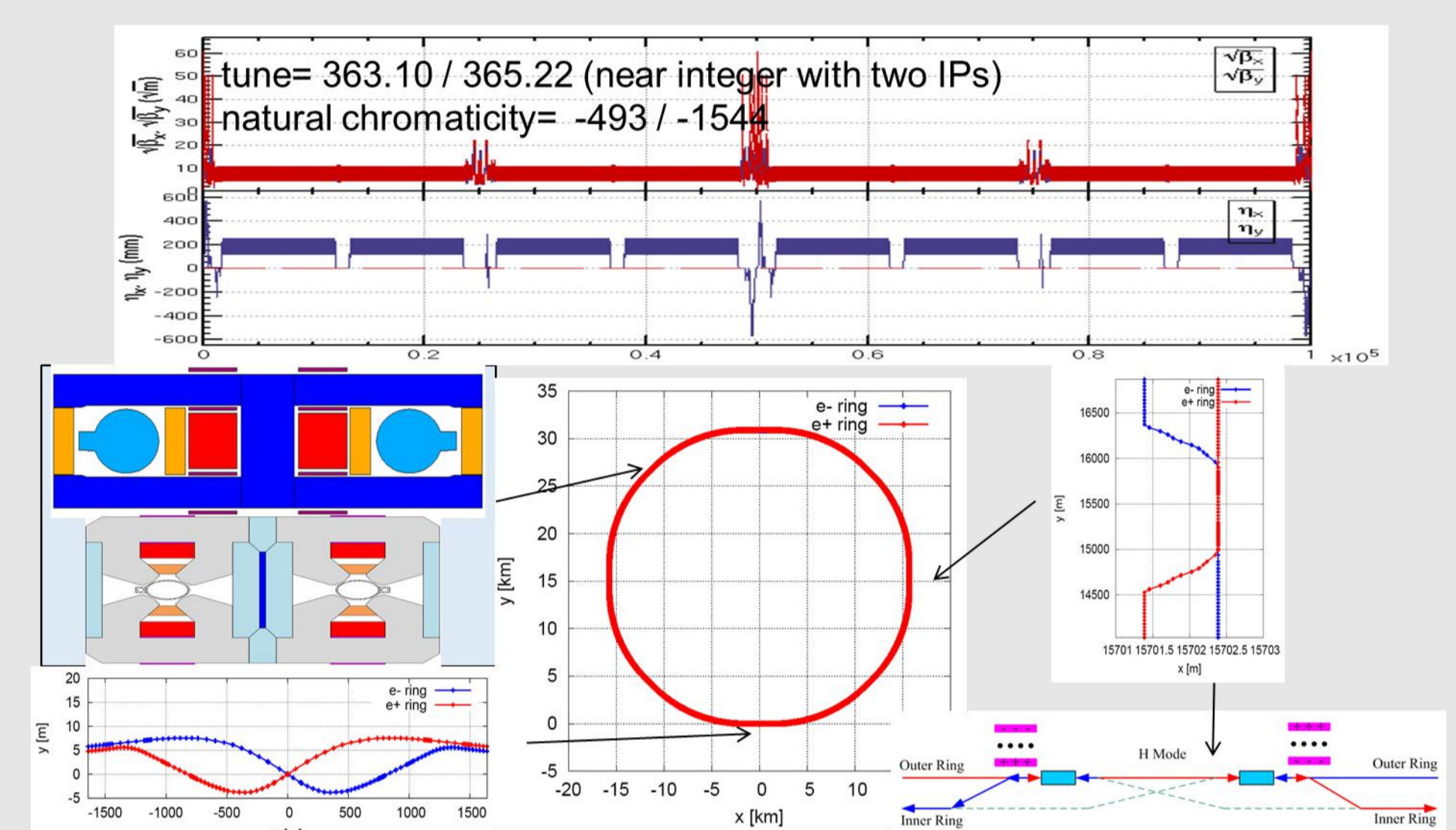
## 3. CEPC ACCELERATOR CHAIN



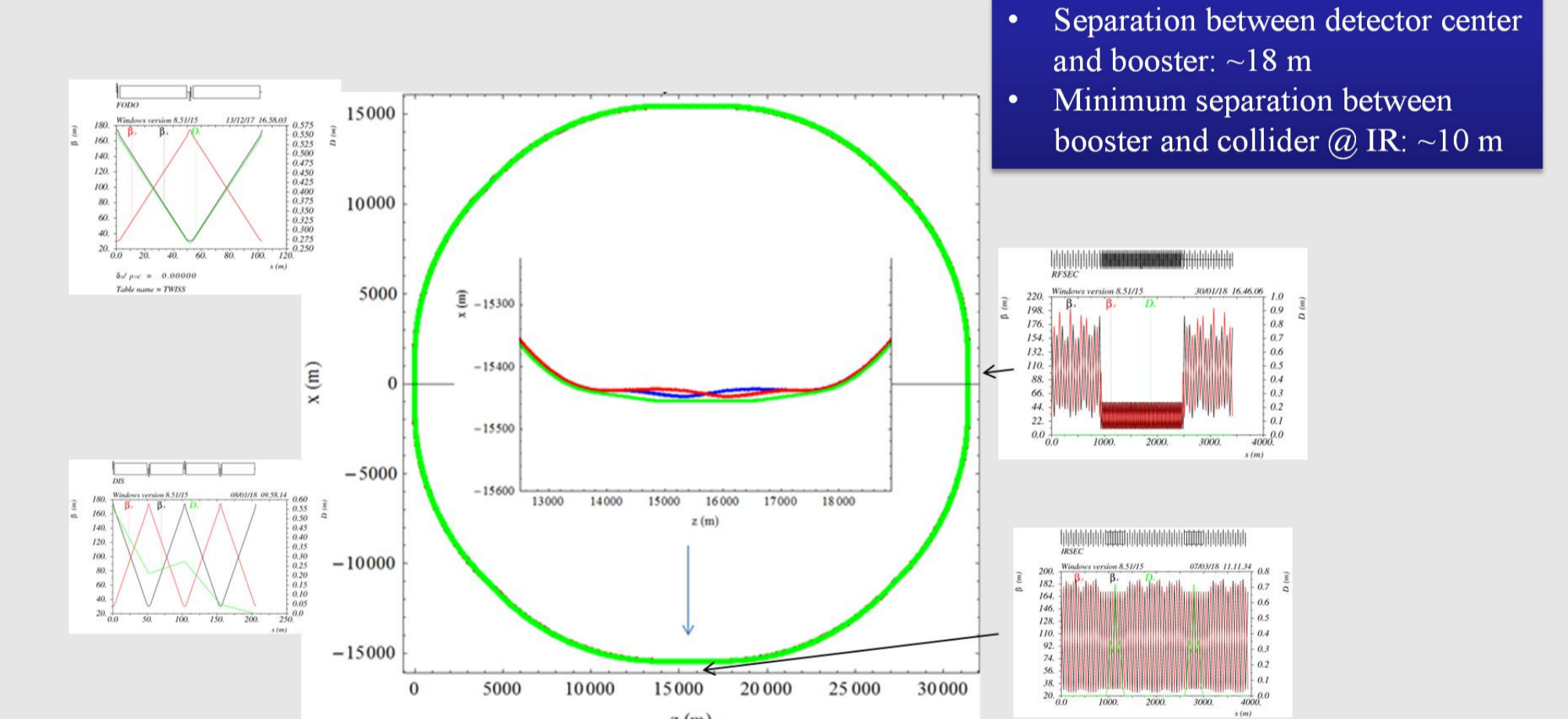
Three rings in the same channel:  
 > CEPC & booster  
 > SppC

- Double Ring
- Common cavities for Higgs
- Two RF sections in total
- Two RF stations per RF section
- 14 modules per RF station
- 28 modules per RF section
- 56 modules in total
- Six 2-cell cavities per module
- One klystron for two cavities

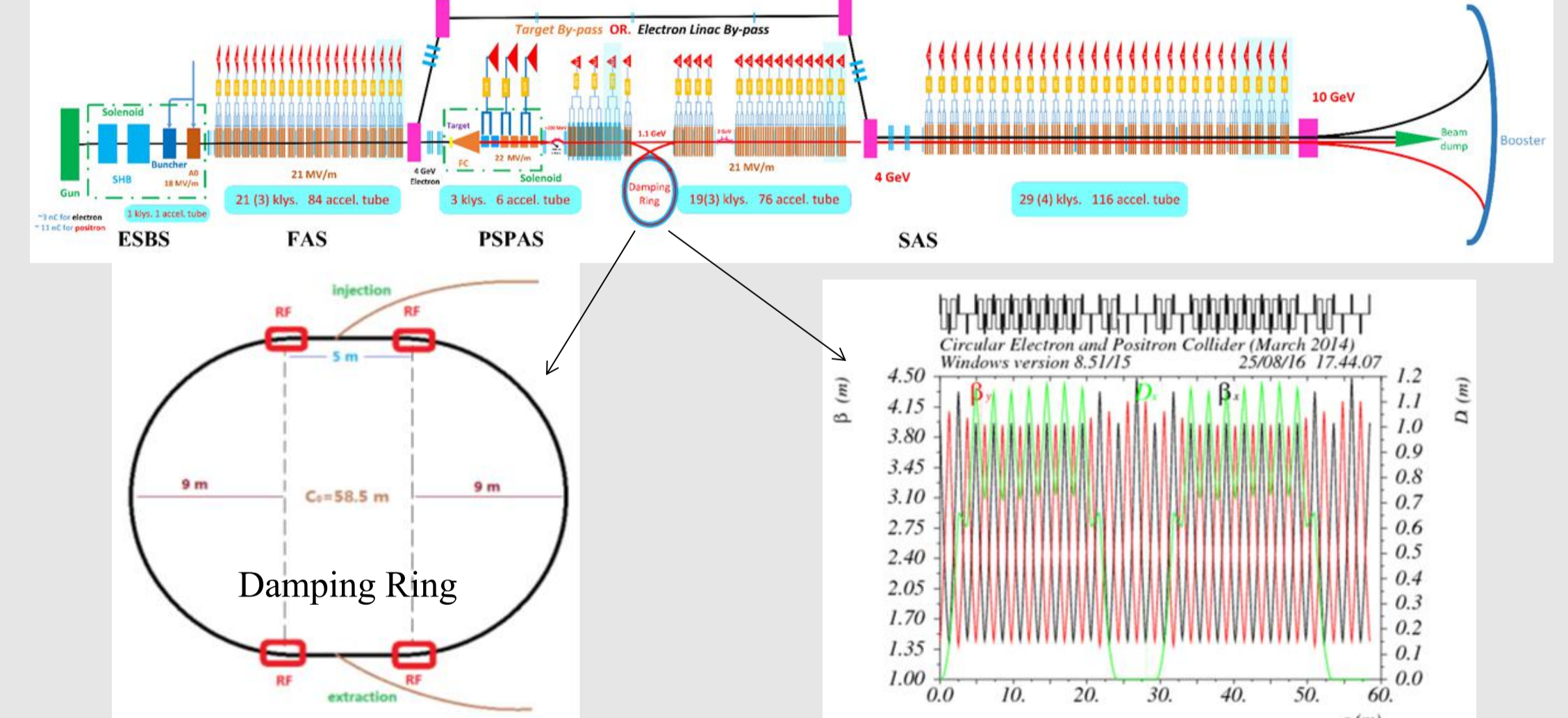
### > Collider ring optics



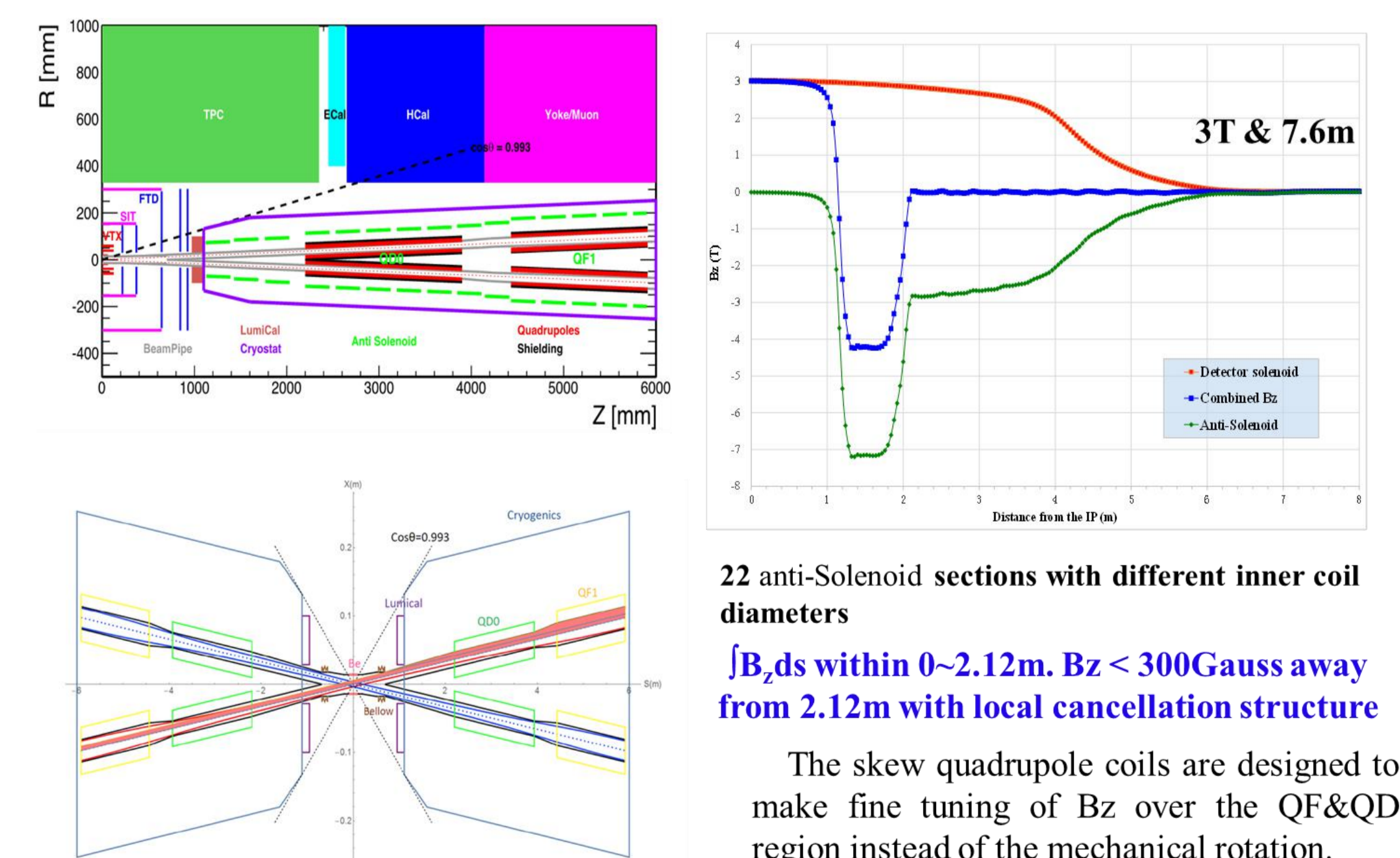
### > Booster geometry and optics



### > Linac



## 5. CEPC MDI DESIGN



22 anti-solenoid sections with different inner coil diameters  
 $\beta_z$  ds within 0~2.12m.  $B_z < 300$  Gauss away from 2.12m with local cancellation structure  
 The skew quadrupole coils are designed to make fine tuning of  $B_z$  over the QF&QD region instead of the mechanical rotation.

CEPC Higgs Energy AC Power: 305MW

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