Booster to Ion Ring Transfer Line

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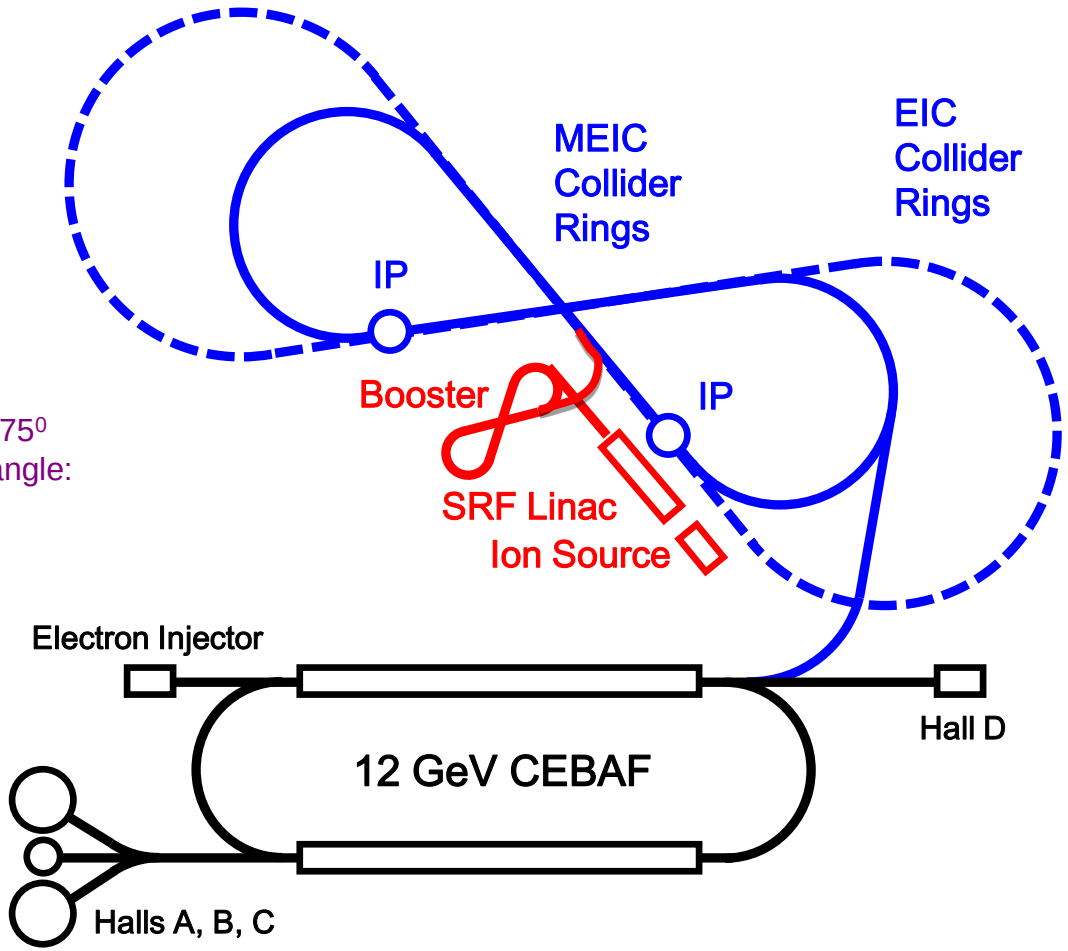
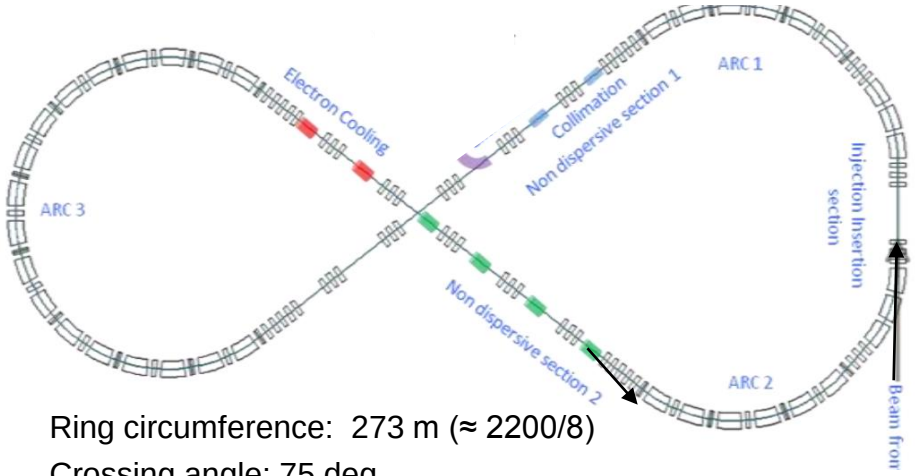
Layout

Booster crossing angle: 75^0
Transfer Line net bend angle:
$90^0 + ½\ 75^0 = \mathbf{127.5^0}$



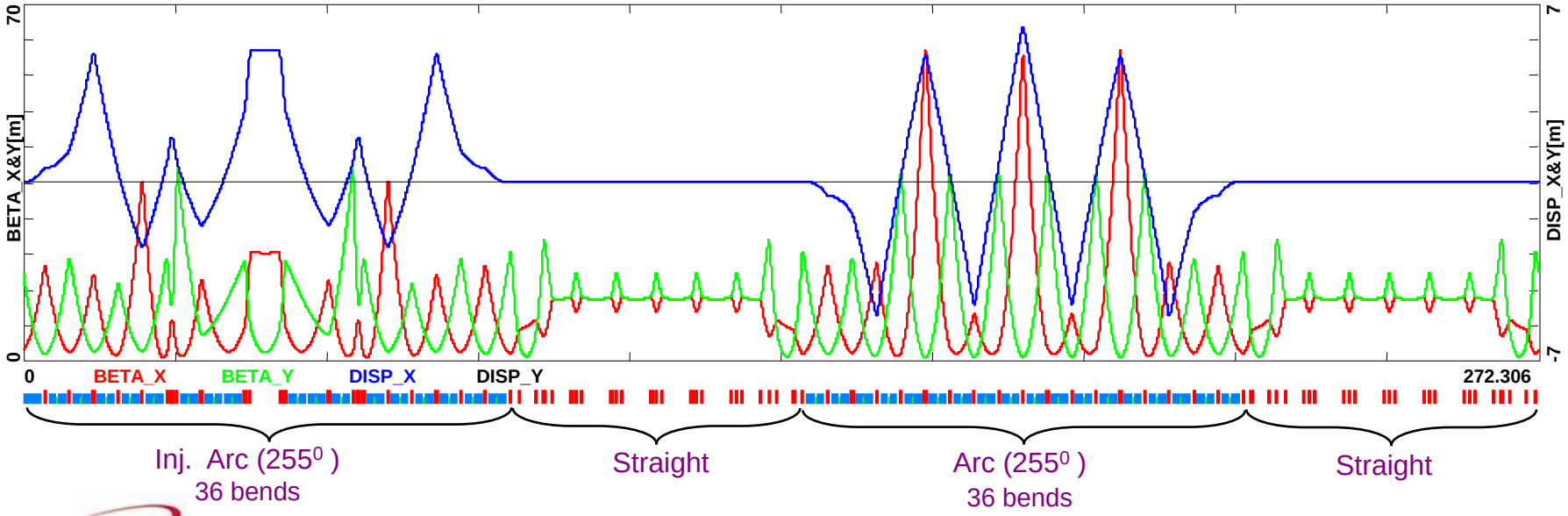
Booster (8 GeV, $\gamma_t = 10$)

E_{kin} = 285 MeV – 8 GeV



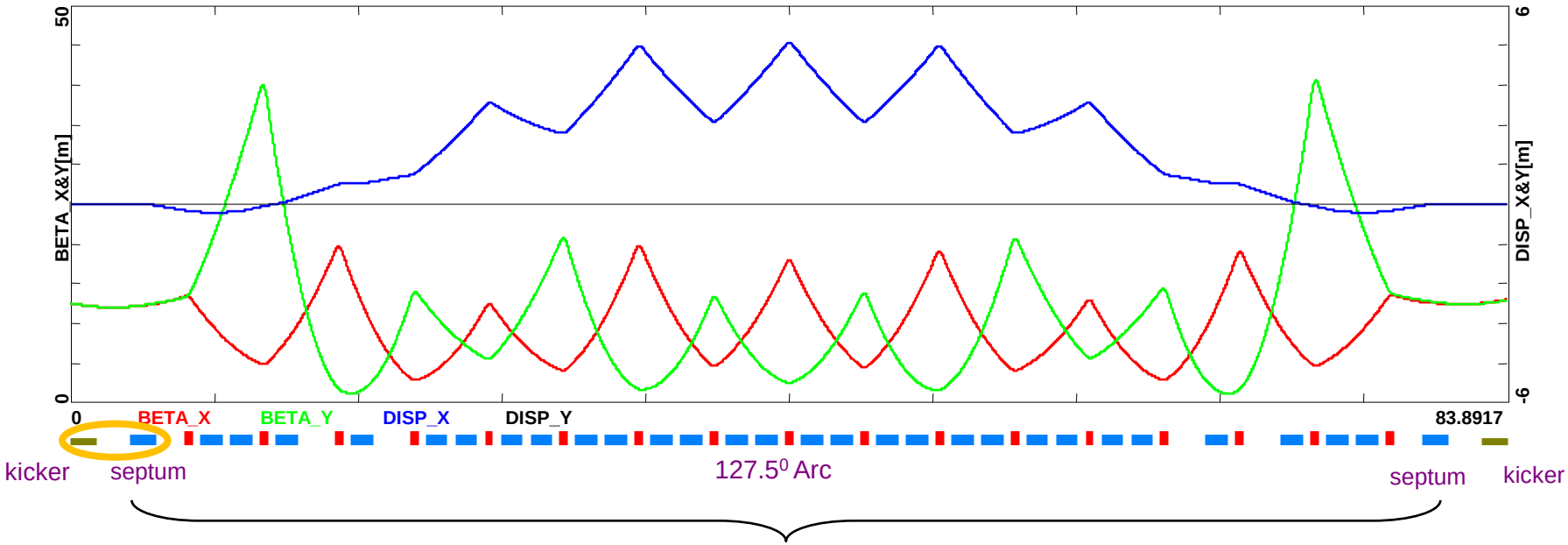
Ring circumference: 273 m (≈ 2200/8)

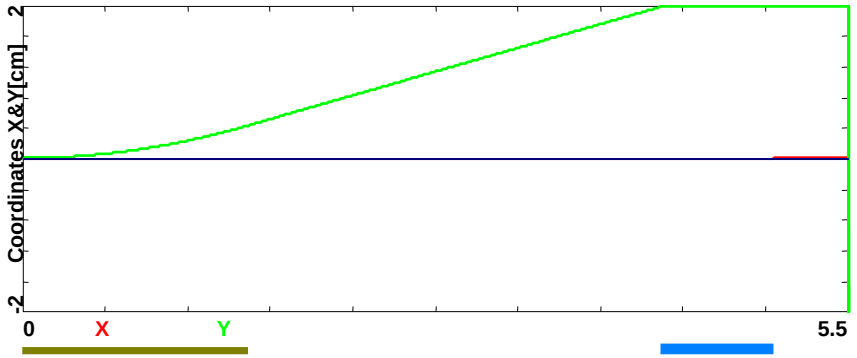
Crossing angle: 75 deg.



Horizontal Extraction: Kicker + Septum

Lattice based on FODO (90^0)

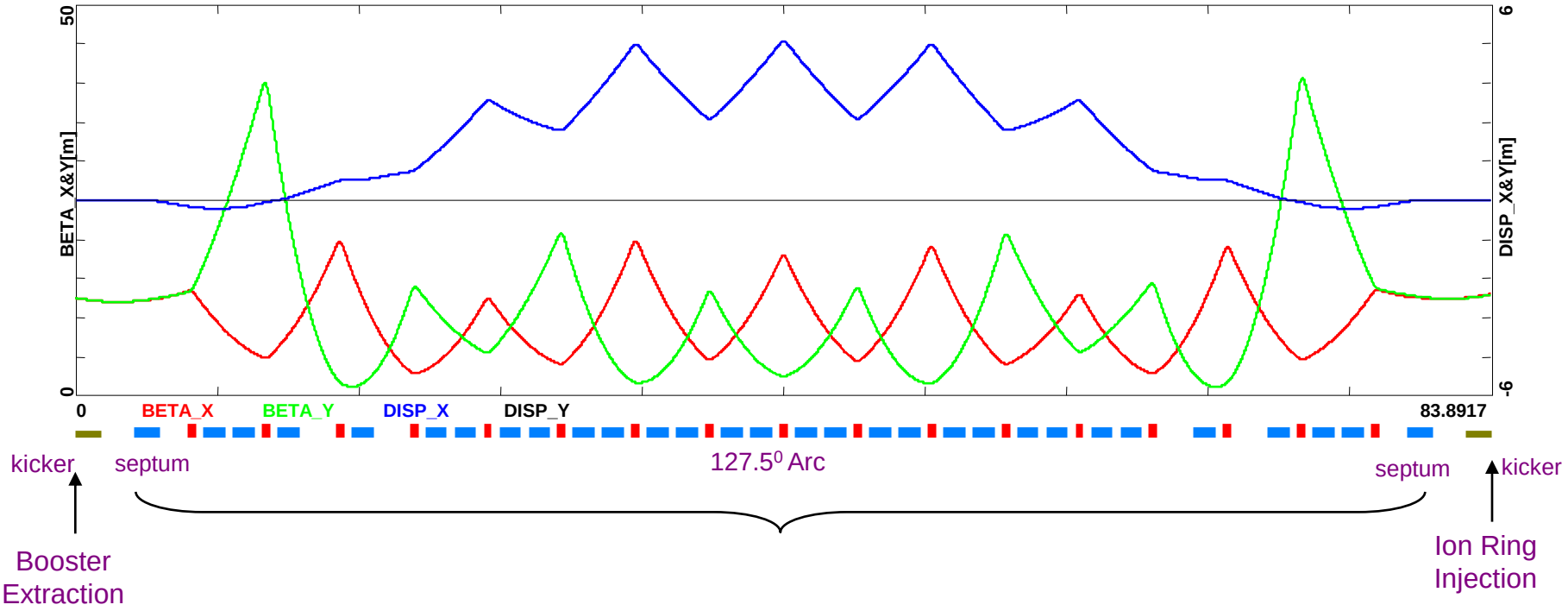




Kicker (2):	L[cm]	B[kG]	Def. Ang [mrad]
	120	1.5	5
	Rise time [ns]	Flat Top [ns]	Fall time [ns]
	300	300	300

Horizontal Extraction: Transfer Line

Lattice based on FODO (90^0)



Septa (2):

L_b = 150 cm

B = 1.5 Tesla

bend ang. = -4.9 deg.

Arc Bends (28):

L_b = 120 cm

B = 1.89 Tesla

bend ang. = 4.9 deg.

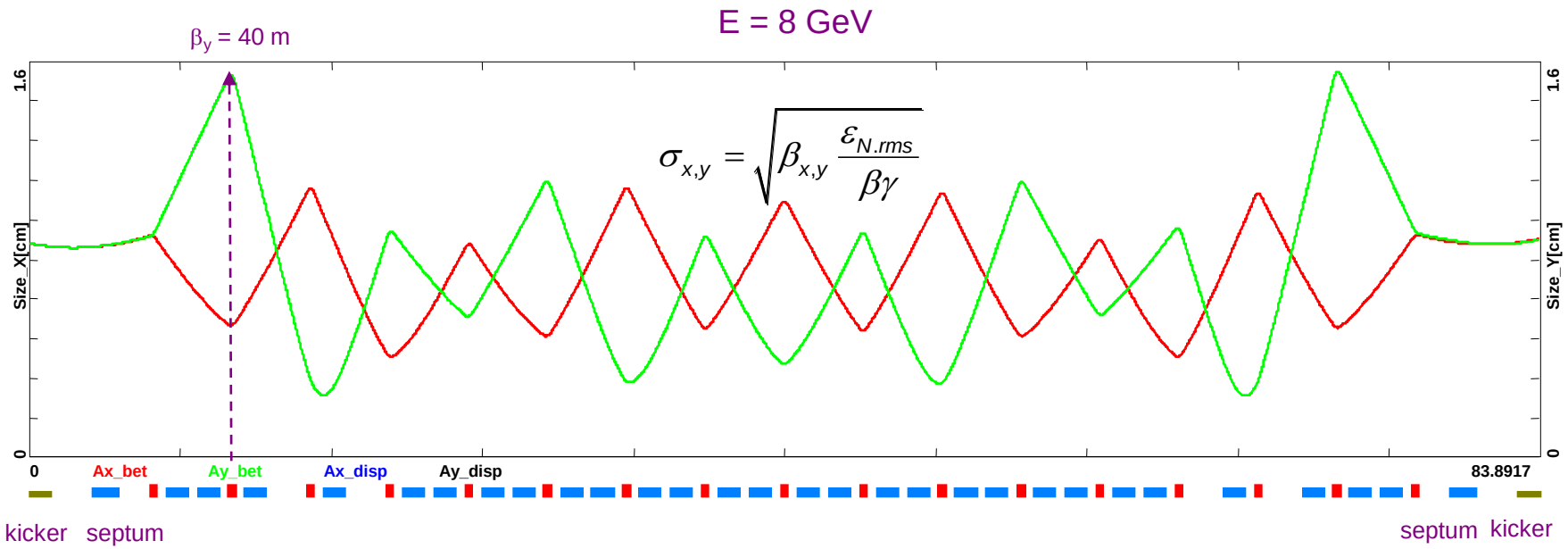
sagitta = 1.3 cm

Arc Quadrs (17):

L_q = 40 cm

G = 10-25 Tesla/m

Beam Envelopes at 6σ – Magnet Apertures



β_y = 40 m
$\beta\gamma$ = 8.47
ε_{N_rms} = 1.41 mm mrad

→ σ_y = 2.7 mm

Bore radius: 16 mm
Quad grad: 25 T/m

→ Pole tip field: 0.4 T

Summary

- Booster to Ion Ring Transfer Line Design (8 GeV)
- Horizontal Extraction: Kicker (vert) + Septum
  - Kicker parameters scaled from AGS extraction
    - Long Rise/Flat/Fall time (~300 nsec)
    - 5 m rad kick: 1.2 meter kicker at 1.5 kGauss
- 127.5^0 Arc - Horizontal Achromat (including reversed septa)
  - Geometric dispersion suppression at the ends
  - Good tunability (9 independent quads to match Twiss)
- Moderate beam sizes, Magnet Apertures