

Update on booster vacuum system, operation mode and polarisation time estimate in the DR

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183rd FCC-ee Optics Design Meeting & 54th FCCIS WP2.2 Meeting

booster proposal based on FCC-ee “booster day”

<https://indico.cern.ch/event/1378927/>

vacuum system

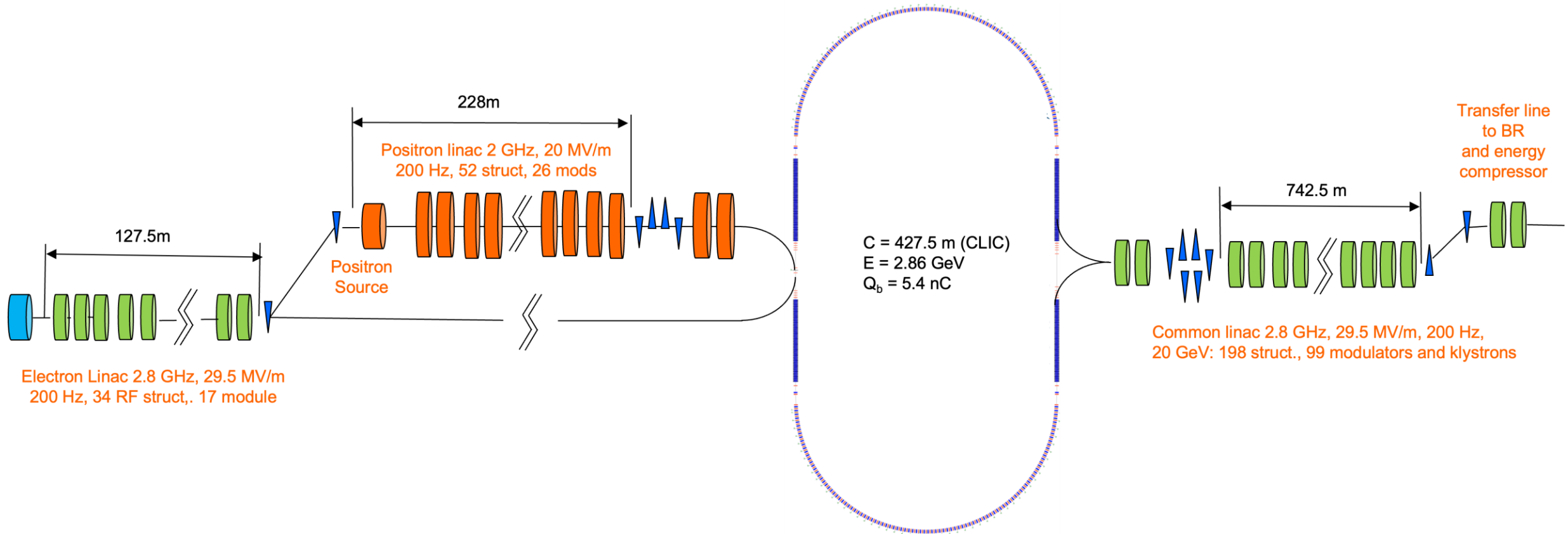
- no NEG
- no bake-out
- Cu chamber with thickness
1-1.5 mm OK (L. Von Freeden),
- inner radius 30 mm (L. Von Freeden)

bunches/cycle	11,200	1,120
pressure tolerance [nTorr]	~ 1	~ 30
injection time [s]	28	2.8
ramp up & down [s]	0.7	0.7
no. cycles	1	10
full injection [s]	~ 29	~ 35

can we achieve 30 nTorr w/o NEG & w/o in-situ bakeout?

maximum beam current ~10-15 mA

proposed alternative injector layout



from MTR

R. Zennaro, P. Craievich et al.

pre-polarisation in damping ring?

this may save 1-2 hours each time when filling from scratch after an abort

polarisation time

$$\frac{1}{\tau_p} \approx F \frac{\gamma^5 L_+}{\rho_+^3} \quad \text{with} \quad F = \left(\frac{5\sqrt{3}}{8} \right) \frac{r_e \hbar}{m_e C}$$

E. Gianfelice, PRAB 19, 101005 (2016)

consider

$E=2.86$ GeV, $C=400$ m, $\rho_+ \sim 2$ m (4.8 T), $L_+ \sim 5$ m

$\rightarrow 1/\tau_p \sim 4$ minutes