Transverse resistive impedance of LHC collimators versus impedance of cold beam screen in the arcs

$$\frac{Z_\perp^{\rm coll}}{Z_\perp^{\rm arc}} \sim \frac{(L^{\rm coll}/L^{\rm arc}) \times \sqrt{\rho^{\rm coll}/\rho^{\rm arc}}}{(a^{\rm coll}/a^{\rm arc})^3} \sim$$

$$\sim \frac{(20\,{\rm m}/20\,{\rm km}) \times \sqrt{{\rm RRR} \sim 100}}{(1.8\,{\rm mm}/18\,{\rm mm})^3} \sim$$

$$\sim \frac{10^{-3} \times 10}{10^{-3}} \sim 10!$$

$$a^{\rm coll} \sim n\sqrt{\beta\,\epsilon} \sim \sqrt{\beta}$$

$$\tau^{-1}_{\rm resist-wall} \propto < \beta\, Z_\perp^{\rm coll} > \sim \frac{1}{\sqrt{\beta}}$$

Parameter	Units	25 ns spacing	75 ns spacing	nominal
number of bunches	k_b	2520	940	2808
protons per bunch	N_b $[10^{11}]$	0.275	0.9	1.1
norm. tr. emittance	ε_n $[\mu\mathrm{m}]$	1.0	3.0	3.75
long. emittance	ε_L [eV s]	2.5	2.5	2.5
peak RF voltage	V_RF $[MV]$	16.0	16.0	16.0
r.m.s. bunch length	σ_s [cm]	7.55	7.55	7.55
r.m.s. energy spread	σ_E $[10^{-4}]$	1.13	1.13	1.13
IBS growth time	τ_x^IBS [h]	23	80	111
beta at IP	β^* [m]	0.75	1.2	0.5
full crossing angle	θ_c $[\mu\mathrm{rad}]$	140	200	300
luminosity lifetime	τ_lumi [h]	15	21	15
peak luminosity	L $[10^{34}\ \mathrm{cm}^{-2}\ \mathrm{s}^{-1}]$	0.15	0.13	1.0

Possible scenarios with 25 ns and 75 ns bunch spacing for an early LHC luminosity run with integrated luminosity of $10\,\mathrm{fb}^{-1}$ in about 200 days, assuming an average physics run time $T_\mathrm{run} = 14\,\mathrm{h}$ and $T_\mathrm{turnaround} = 10\,\mathrm{h}$.