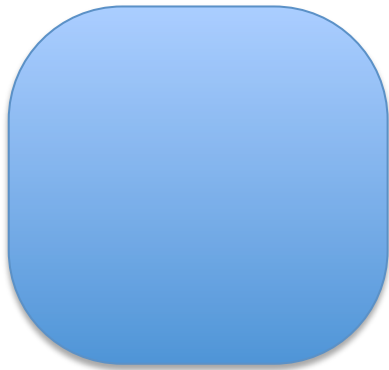


AP issues@SPring-8

A short beam lifetime by electron-electron scattering at the target stored current is one of most serious issues at DLSR.



For off-momentum particles, a ring symmetry becomes low due to 4-fold symmetric chromatic properties.



Small energy acceptance

AP issues@SPring-8

$$E = 6 \text{ GeV}$$

$$\varepsilon_y/\varepsilon_x = 0.10$$

$$\alpha = 3.00e-5$$

$$\sigma_\delta = 0.0899 \%$$

$$V_{RF} = 10 \text{ MV}$$

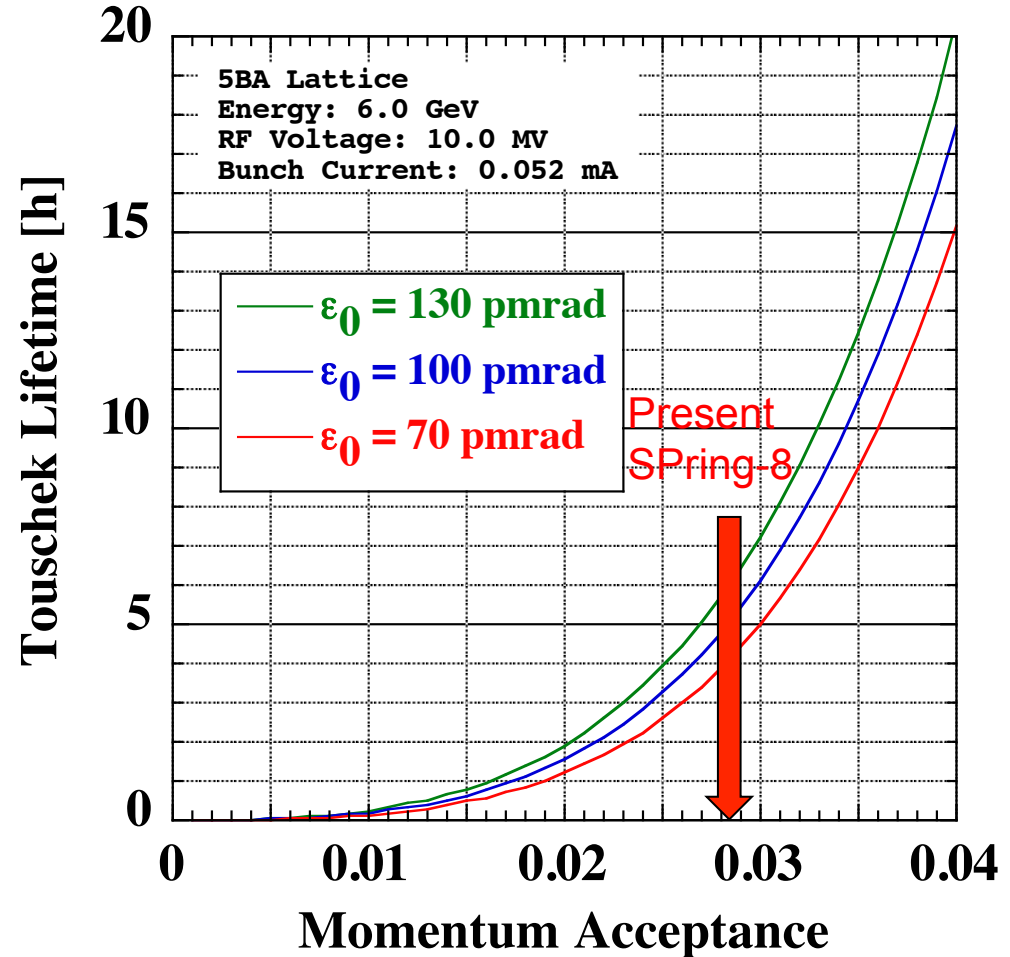
$$U_0 = 2.893 \text{ MeV/turn (w/o ID)}$$

$$q = 3.456$$

$$\sigma_s = 4.768 \text{ ps}$$

$$I_b = 0.052 \text{ mA}$$

(Multi-Bunch Filling, 100mA)



AP issues@SPring-8

Emittance degradation by electron-electron scattering (IBS) at the target stored current is also a critical issues at DLSR.

Even at 6-GeV beam energy, emittance degradation due to IBS is not negligibly small

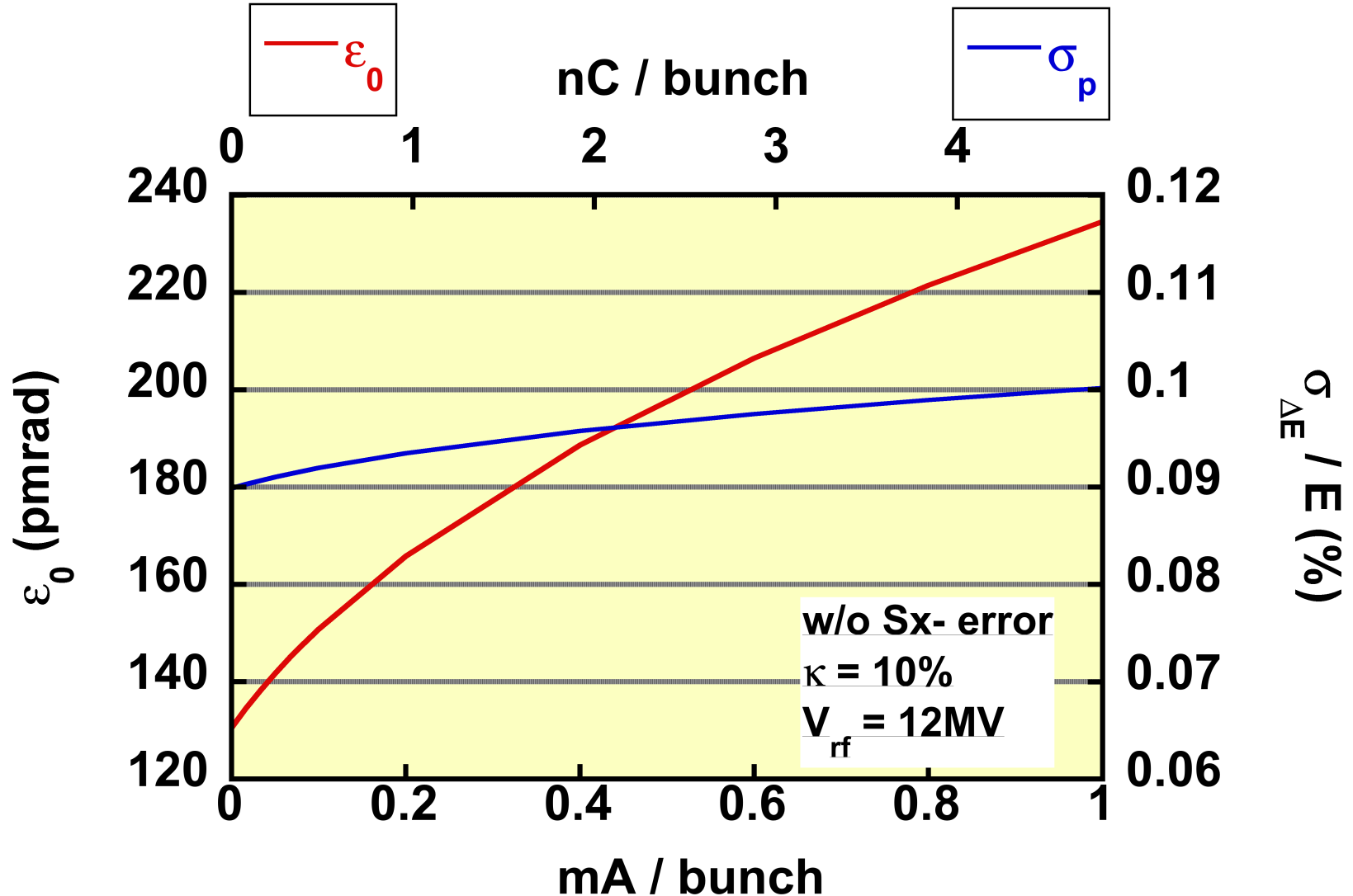


Severe limitation on a beam filling pattern

Peak current reduction is beneficial for preservation of natural emittance

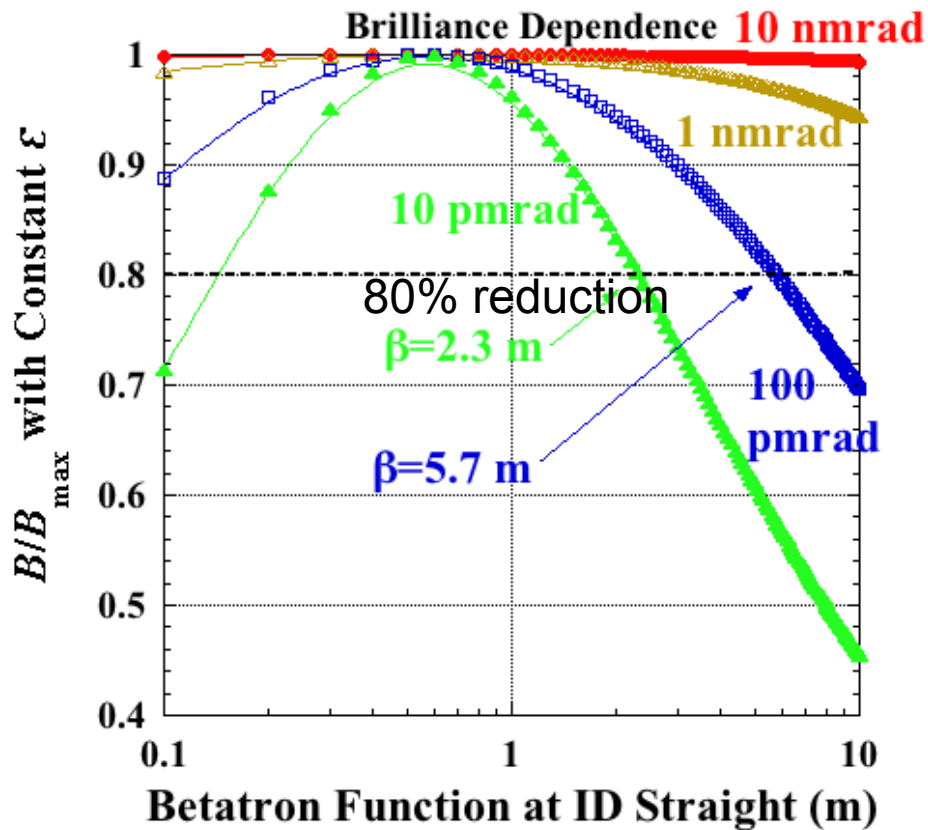
AP issues@SPring-8

100 mA@SPring-8 = ~500 nC/ring

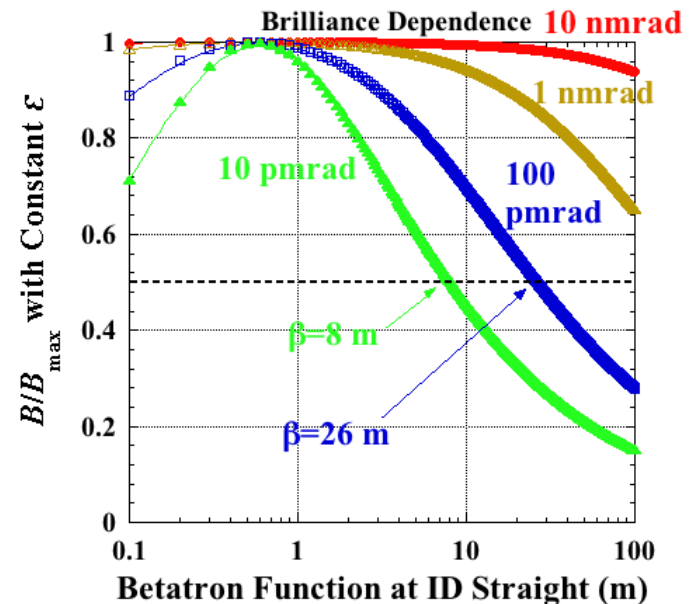


AP issues@SPring-8

Objective parameter for lattice design is not natural emittance but brilliance, which makes both beta values at ID straights critically important in the optics design.



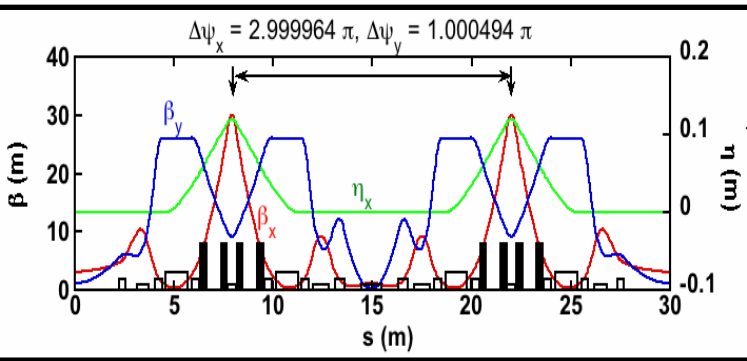
Undulator length = 3.6 m
Period length = 18 mm
Number of periods = 200
 $\lambda_{1st} = 10$ keV @ 6 GeV



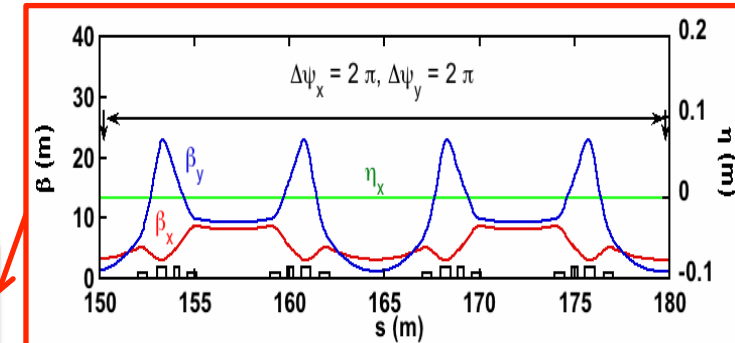
AP issues@SPring-8

Special injection cell with a high horizontal beta is required for stable beam injection.

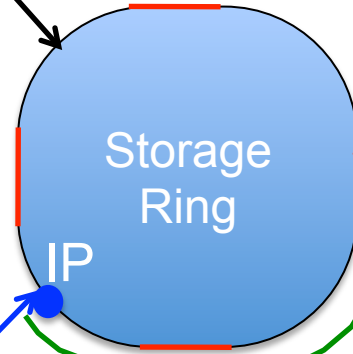
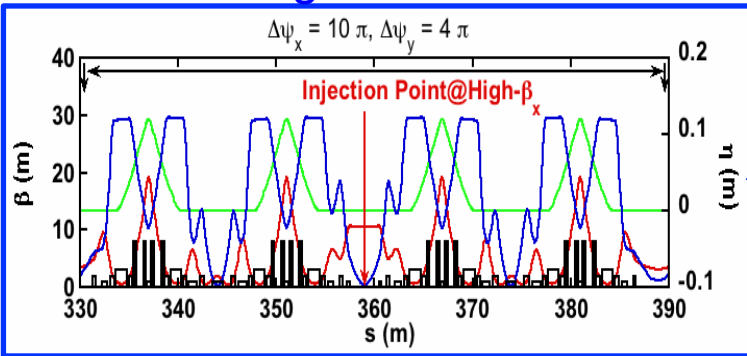
Unit Cell



Long Straight Cell (LSS)



Matching Cells with IP



High-beta

A-zone

