

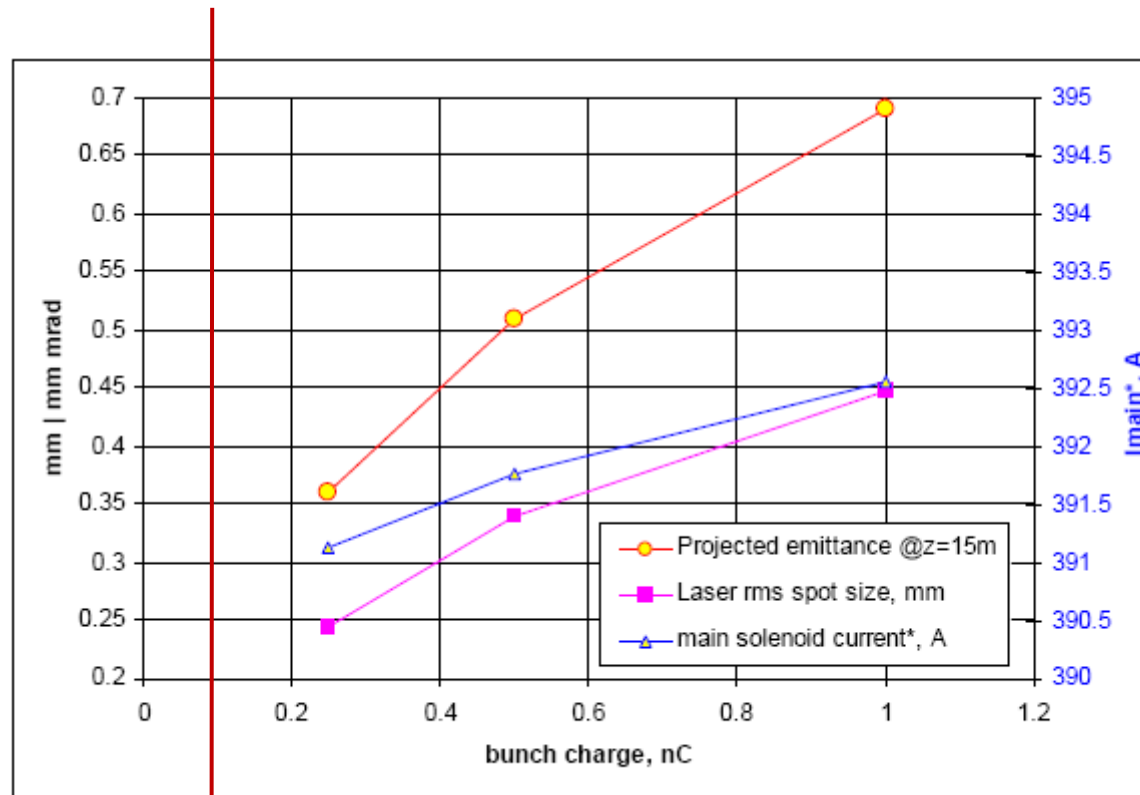
Low Charge Scenarios

Intro

- 1 nC will not be by mere chance the optimal charge to operate the XFEL or FLASH in the 'linear compression' mode (with 3rd harmonic rf system)
- Consider cases where 5 kA is enough
- Higher charges cause stronger self-fields in the injector
 - Higher emittance
 - Emittance optimum at even longer initial bunch lengths
- Longer final bunch length
- Less overall compression => rf tolerances looser

=> Look at lower charges

A Start for the XFEL (Michael Krasilnikov)



BPM and diag. limit

Lower charges

- Weaker self-fields in injector
 - Lower emittance
 - Emittance optimum at shorter initial bunch lengths
- Shorter final bunch length (~ 10 fs at 0.2 nC ?)
- Stronger overall compression \Rightarrow rf tolerances tighter

Next

- Injector: Need 0.25 nC and 0.5 nC optimization for FLASH
- S2E
 - 0.25 nC and 0.5 nC for XFEL
 - 0.25 nC and 0.5 nC for FLASH with 3rd harmonic rf

OQs

- Ways to go to even lower charges
 - How to get around the instrumentation limits (different charges in train?)
 - Can we trade something (like emittance) to regain manageable rf tolerances?
- Charge knobs for the injector possible?
- ...