Setting up ELEGANT lattice for S2E simulations

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Hamburg, 17.12.2021

Getting ready

- ELEGANT is one of the appropriate tools for studying such effects as CSR and LSC;
- Install ELEGANT on JUWELS (Jülich Wizard for European Leadership Science);
- Get files with design optics from Johann. Stay close to design optics to have solid reference for optics;
- To get familiar with the lattice $\rightarrow$ sirepo - web-based GUI for simulation codes.

Getting ready: sirepo

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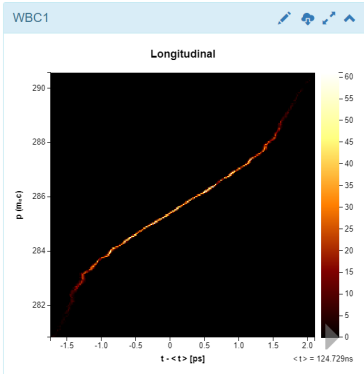
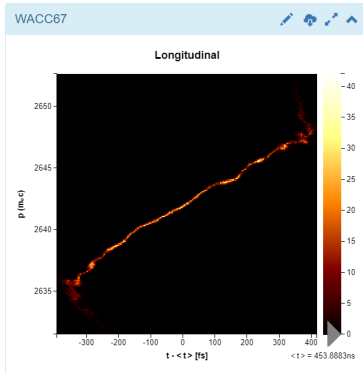
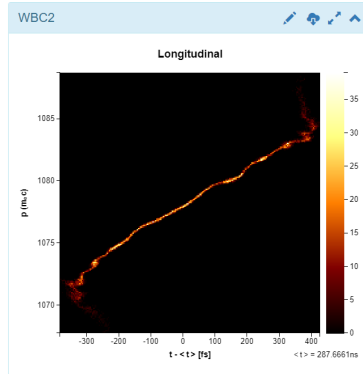
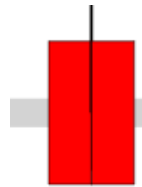




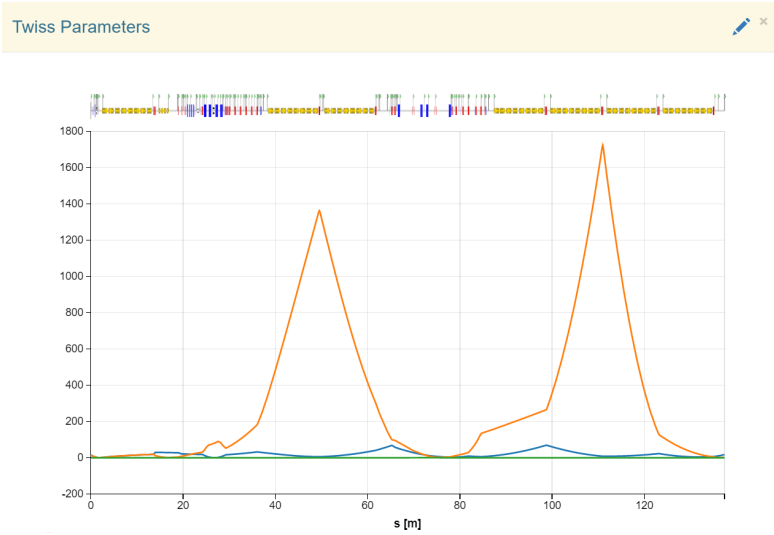


First experience

- Error: ACC23ZS defined twice;
- Warning: N_ KICKS for CSRCSBEND is deprecated, use N_ SLICES;
- Warning: element has negative length;
- Each magnet is represented by a doublet, better replaced by a single one;



WIGGLER problem



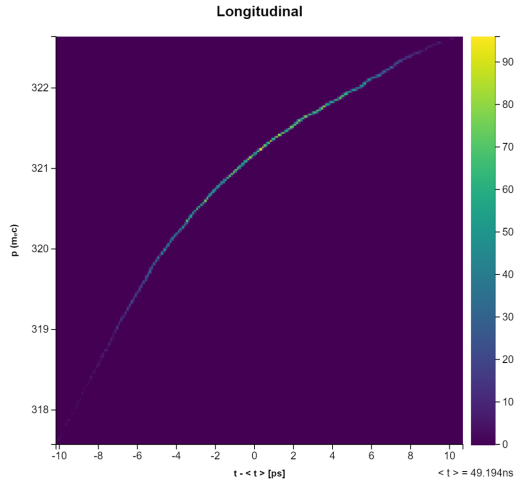
Replacing Wiggler with LSRMDLTR helps a bit

Reaching compression settings

ACC1 Volt=19907579
Phase=84.5°

pCentral = 164 MeV

bunchLength = 3.95ps(1.2mm)

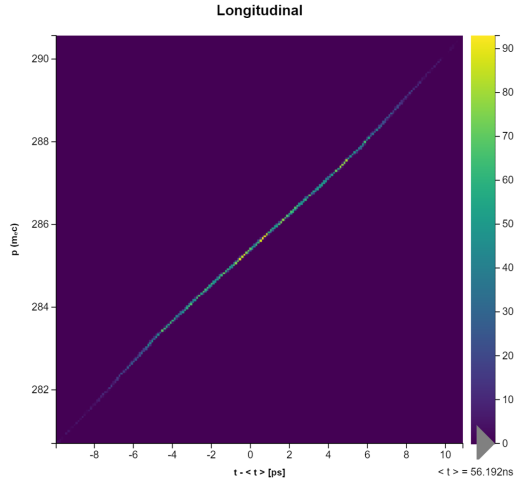


Reaching compression settings

ACC39 Volt=-4710000
Phase=105°

pCentral = 146 MeV

bunchLength = 3.9ps(1.2mm)



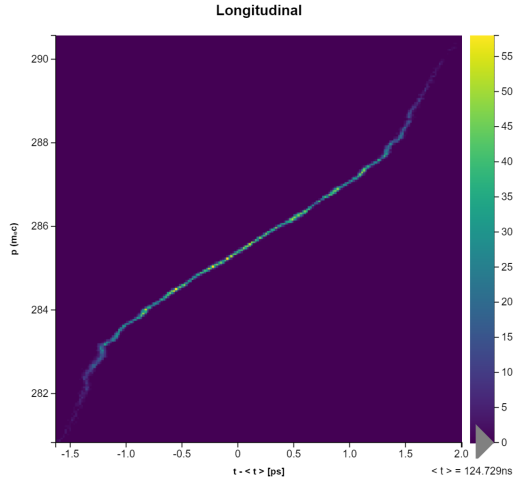
Reaching compression settings

BC1 R56=147mm

pCentral = 146 MeV

bunchLength = 891fs(267µm)

compressionFactor = 4.44

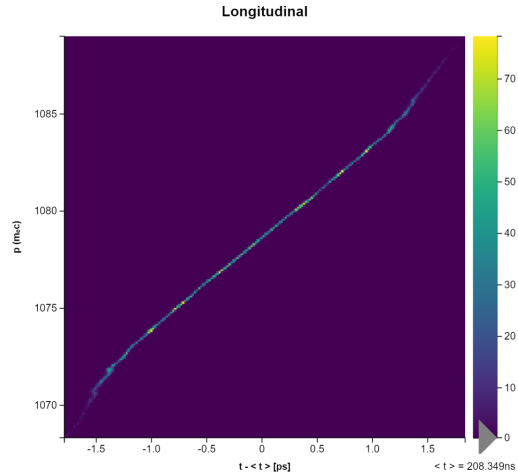


Reaching compression settings

ACC23 Volt=27935044
Phase=65°

pCentral = 551 MeV

bunchLength = 892fs(267µm)



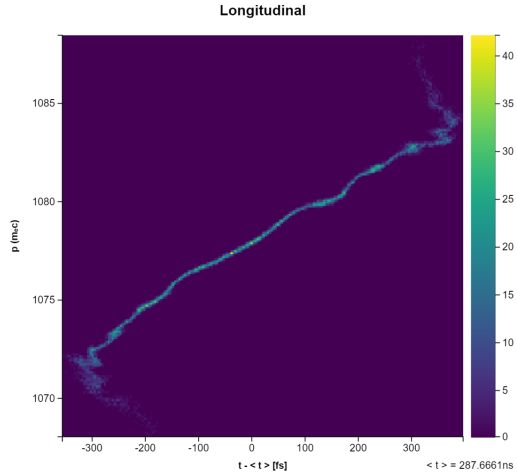
Reaching compression settings

BC2 R56=48mm

pCentral = 549.4 MeV

bunchLength = 237fs(71µm)

compressionFactor = 3.77

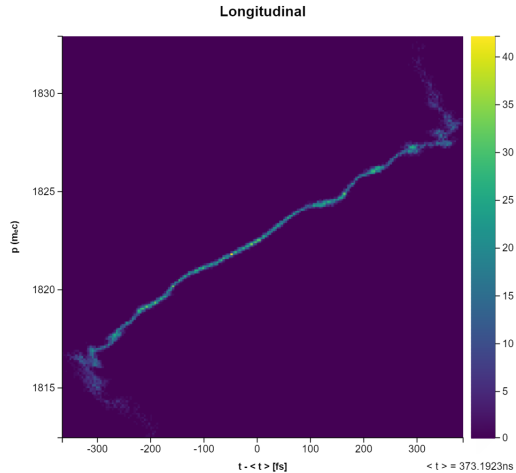


Reaching compression settings

ACC45 Volt=23775000
Phase=90°

pCentral = 931 MeV

bunchLength = 234fs(70.2µm)

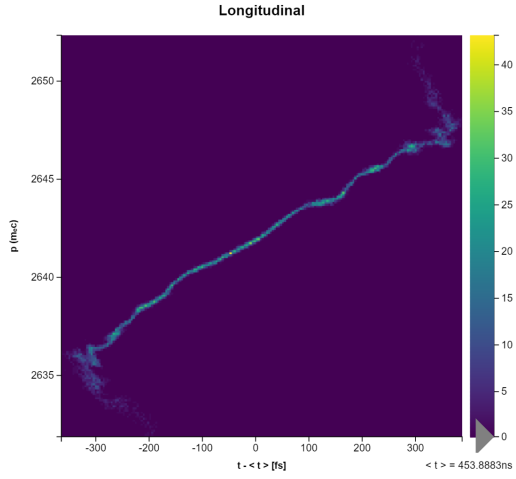


Reaching compression settings

ACC67 Volt=26170000
Phase=90°

pCentral = 1350 MeV

bunchLength = 234fs(70.3µm)



Outlook

- working point for the laser heater;
- addition of seeding section;
- interface with GENESIS for FEL simulation (check existing tools);
- replacing ideal initial bunch with a more realistic one (quasi-3D from SelaV and optics or Impact-Z);

Thank you!

Contact

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