

## CSR instability in EEHG simulation

Echo-Enabled Harmonic Generation (EEHG) is an external seeding technique for Free Electron Lasers (FEL). The technique implies complex transformations of the electron beam phase space. The transformations include laser-induced energy modulations and subsequent shearing of the modulations with dispersive chicanes. The goal of the transformations is to have the electron beam pre-bunched at a high harmonic of the seed laser. FEL seeded with such pre-bunched beam allows coherent emission at down to few nm wavelength. The design of EEHG requires one of the chicanes to be quite strong. Unfortunately, strong chicanes can induce or enhance detrimental collective effects. One of the effects - Coherent Synchrotron Radiation (CSR) - is known to be able to disturb the fine phase space manipulations required for EEHG. Here, we use particle-tracking code `elegant` to estimate CSR influence on performance of EEHG. With simulations we show that CSR in the strong chicane induces energy modulation along the electron beam, which causes notable changes in the bunching spectrum.

### Summary

**Primary authors:** SAMOILENKO, Dmitrii (MPY (Beschleunigerphysik)); NIKNEJADI, Pardis (MPY (Beschleunigerphysik)); Mr PANNEK, Fabian (DESY); PARASKAKI, Georgia (FS-FLASH (FLASH)); SCHAPER, Lucas (DESY)

**Presenter:** SAMOILENKO, Dmitrii (MPY (Beschleunigerphysik))

**Session Classification:** Session Beam Dynamics