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Ansto



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Low Emittance Electron Beams for Free Electron Lasers

Free Electron Laser (FEL) facilities are capable of producing a peak brightness 10 orders of magnitude above 3rd generation light sources, with 10^{11} to 10^{13} photons per pulse. With ultra-fast pulse durations of 100 fs down to <10 fs, these FELs are capable of imaging structures at the molecular and atomic size level and investigating dynamical processes over timescales that take place on the order of femtoseconds.

In order to achieve the high current values required for FEL lasing, strong bunch compression is required, which often results in double-horned current profile structures. These current spikes are responsible for large Coherent Synchrotron Radiation (CSR) production and the consequence is significant transverse projected emittance growth. The Linac Coherent Light Source (LCLS) has reported improved FEL performance from collimating the head and tail current spikes. In this paper we present a technique of CSR-suppression which involves including higher order magnets within the bunch compressors, to ultimately produce higher brightness photon beams.

Keywords or phrases (comma separated)

FEL, Free Electron Laser, Accelerator Physics, Coherent Synchrotron Radiation, CSR

Are you a student?

Yes

Do you wish to take part in the Student Poster Slam?

Yes

Are you an ECR? (<5 yrs since PhD/Masters)

No

What is your gender?

Female

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Track Classification: Technique Development