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Optimization of ELSA electron beam transport for its inverse Compton scattering X-ray source

Sunday, May 19, 2024 2:00 PM (4 hours)

ELSA LINC (ELSA Linac INverse Compton Source) at CEA DAM DIF is an Inverse Compton Scattering X-ray source in the 5-40 keV range, through interaction between 10-30 MeV electrons with a Nd:YAG laser. The source was upgraded to increase the X-ray flux produced in the 5-40 keV range. The new experimental setup and imaging systems have been modified for compatibility with fundamental emission at 1064 nm and for better mechanical stability. The upgrade also includes installation of a new RF linearizing cavity before magnetic compression, to improve bunch compression. Experimental optimization of the beam transport has been achieved, relying on recent detailed simulation work. Results taking advantage of this optimization are presented: achieved bunch duration, emittance, dimension at interaction point, for several electron energies and several bunch charges between 50 pC up to 1 nC. Comparisons with simulations provide an insight about major contributions to emittance growth. Achievable X-ray flux through Inverse Compton Scattering and applications are discussed.

Footnotes

Funding Agency

Paper preparation format

Word

Region represented

Europe

Author: PIRES, Abel (Commissariat à l'Énergie Atomique et aux Energies Alternatives)

Presenter: PIRES, Abel (Commissariat à l'Énergie Atomique et aux Energies Alternatives)

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