

Challenges of Linac Driven Light Sources

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Abstract

The use of linacs allows novel light sources to be conceived by not being limited by equilibrium dynamics or IBS effects. These new sources can be single pass or recirculated (with or without energy recovery) or linac augmented storage rings. They allow tuneable polarised radiation of unprecedented brilliance, short pulse lengths that may reach the atto-second scale and full coherence. Both SC and NC machines are being proposed, designed and constructed. Photon output characteristics range from incoherent synchrotron radiation to SASE to seeded HGHG. The proposed beams can be low to high average current and pulse time structures range from CW to highly variable with mutual exclusion amongst different forms of operation. The multiple challenges of these machines reside not only in the requirement of beams of extremely high quality (energy, emittance, energy-spread and temporal stability) for the brightest, shortest wavelength sources but also in the demanding technologies and control of beam-machine interactions for the high current energy recovery ones. The paper gives an overview of these broad challenges and of the directions taken to reach the objectives of a user facility.

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