

PROGRESS TOWARDS COMPACT PRE-BUNCHED FEL REALIZATION

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The motivation for developing linac-based THz source is coming from the growing interest to THz radiation. High gradient photo-cathode RF gun and few tens of femtosecond laser system are used to generate a pre-bunched electron beam. We have proposed two approaches to produce the intense radiation beams in the range of 0.1-5 THz based on Coherent Smith-Purcell Radiation (CSPR) and Coherent Undulator Radiation (CUR) in “super-radiant” regime on 8 MeV and 30 MeV electron beam at KEK LUCX accelerator, respectively. CSPR is generated when a charged particle moves in the vicinity of a periodical pattern or grating. The grating type and period can be chosen to make quasi-monochromatic CSPR spectrum. When radiation wavelength is comparable to or longer than the bunch length it becomes coherent and even more it enters a “super-radiant” regime if micro-bunch spacing became comparable with radiation wavelength and comparable to the grating period. Similar radiation enhancement can be obtained when micro-bunch period coincided with undulator period. In this report the status of experiment, comb electron beam generation, CSPR and CUR achievable characteristics will be discussed.

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