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Study on optimization of FEL generation in HX and SX lines for two-bunch operation

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PAL-XFEL comprises two lines: Hard X-ray (HX) line for 2.5-15 keV FEL and Soft X-ray (SX) line for 0.25˜1.1 keV FEL. Both lines share accelerator sections L1, L2, L3A, and two Bunch Compressors (BCs). The electron bunch is accelerated to 2.8 GeV and compressed to a peak current of 400-500A using accelerators and two BCs, then it is directed into either the HX or SX line at the branch line. Since the optimal RF phase settings for the two lines are different in the shared sections, we perform simultaneous operation by adjusting the LLRF settings of shared accelerator sections on a pulse-by-pulse basis. We are preparing for simultaneous operation using the two-bunch operation method to fully utilize the repetition rate for both lines. This method involves injecting two GUN lasers with a 25 ns delay into a single pulse, generating two bunches per pulse, and sending them simultaneously to the HX and SX lines. For two-bunch operation, the device settings of shared sections must be identical, we have re-optimized the HXFEL and SXFEL to have identical device settings for the shared sections. In this paper, we present the detailed optimization process and the final optimized parameters.

Footnotes

Paper preparation format

Word

Region represented

Asia

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