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Optimization of undulator tapering for the laser heater shaped electron bunch at PAL-XFEL

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The pulse duration of the X-ray free-electron laser (XFEL) relies on the pulse duration of the electron bunch. The energy distribution of the electron bunch can be manipulated by using the laser heater in the purpose of generating attosecond pulse duration electron bunch current profile. Therefore, the resultant electron bunch current profile after the bunch compressor chicanes is programmable by the laser parameters. To obtain further bunch compression with the high current electron bunch profile, we investigate the hard X-ray beamline setup for the longitudinal space charge (LSC) field effect desired at the magnetic dogleg where is right before the hard X-ray undulator section. The hard X-ray undulator tapering is optimized for the linear energy chirp of the ultra-short electron bunch.

Footnotes

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