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High level software for operating an EEHG FEL

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Reliable operation of a seeded Free Electron Laser requires the simultaneous control of several electron-beam, laser and accelerator parameters. With EEHG the complexity increases due to the second seed laser and the strong dependence of EEHG bunching to seeding parameters. With the recent upgrade of the FEL-1 line, FERMI is the first FEL facility to be operated in EEHG mode for users. This required a major work for developing software tools that could be used to easily set the FEL at the desired wavelength. We report here on the recent software developments at FERMI for the operations of the new FEL-1.

An important prerequisite for EEHG is to determine both the electron beam energy spread and seed laser induced energy modulation. This is done by using HGHG time dependent bunching equations to match experimental parameters scans. With these data, optimal EEHG settings of the machine parameters are then calculated to reach the desired FEL wavelength. The requested parameters are then sent to interface tools that accurately control laser, undulator, chicane and electron beam.

Footnotes

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