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A HIGH GAIN HARMONIC GENERATION FREE ELECTRON LASER DRIVEN BY A COMPACT LASER PLASMA BEAMLINE

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Laser-wake field accelerators (LWFAs) are potential candidates to produce intense relativistic electron beams to drive compact free electron lasers (FELs) in VUV and X-ray regions. The High-Field Physics and Ultrafast Technology Laboratory at National Central University (NCU) is actively developing a compact LWFA-based high gain harmonic generation (HGHG) FEL aim at coherent extreme ultraviolet (EUV) radiation. However, the high divergence and excessive energy spread of the LWFA electron beam increase the difficulties in both beam transportation and radiation power gain. Here we present a start-to-end simulation to study the feasibility of a compact beamline based on the experimental data of the NCU LWFA group with electron energy of 250MeV. Numerical results indicate that a 4th harmonic radiation gain at 66.5nm wavelength can be obtained with excessive energy spread. Giving a strongly monochromatic beam with a few percent bandwidth or smaller within a shorter saturation length compare to the SASE results.

Footnotes

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