



Contribution ID: 27 Contribution code: TUP22

Type: Contributed Poster

A Novel Method for Generating High-Repetition-Rate and Fully Coherent EUV Free-Electron Laser

Tuesday, 23 August 2022 17:40 (20 minutes)

High-brightness extreme ultraviolet (EUV) light source is strongly required for high-resolution photoelectron spectroscopy, imaging experiments, and EUV lithography. In this work, the self-modulation technique is introduced into seeded FELs, such as high-gain harmonic generation (HGHG), to significantly reduce the requirement of the seed laser power by enhancing coherent energy modulation. Numerical simulations demonstrated that the modified HGHG configuration with the self-modulation technique could generate high-repetition-rate, fully coherent, stable, and kilowatt-scale EUV pulses at a more compact linac-based light source.

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