Contribution ID: **72** Contribution code: **TUBC04** Type: **Contributed Oral Presentation**

High-repetition-rate seeded free-electron laser enhanced by self-modulation

Tuesday 20 August 2024 12:30 (20 minutes)

High-repetition-rate and fully coherent soft X-ray free-electron lasers (FELs) are crucial for time-resolved spectroscopic experiments. However, it is difficult to operate seeded FELs at a high repetition rate due to the limitations of present state-of-the-art laser systems. We have proposed and carried out a series of experimental studies on self-modulation based seeded FELs at the Shanghai Soft X-ray Free Electron Laser (SXFEL) facility to significantly relax the requirements for seed lasers. Our findings demonstrate that this new method not only decreases seed laser requirements but could also largely enhance the harmonic up-conversion efficiency, paving the way for the realization of high-repetition-rate, fully coherent soft X-ray FELs. In this presentation, we will summarize our progress* in self-modulation based seeded FELs, including harmonic self-modulation and ultrashort ultrahigh harmonic pulse generation.

Footnotes

- H. Yang et al., Self-enhanced coherent harmonic amplification in seeded free-electron lasers, Fundamental Research, 2024. ** H. Yang et al., High-repetition-rate seeded free-electron laser enhanced by self-modulation, Adv. Photonics Nexus, 2023. *** J. Yan et al., First observation of laser–beam interaction in a dipole magnet, Adv. Photonics, 2021. **** J. Yan et al., Self-amplification of coherent energy modulation in seeded free-electron lasers, Phys. Rev. Lett., 2021.

Funding Agency

Primary authors: YANG, Hanxiang (Shanghai Institute of Applied Physics); YAN, Jiawei (European XFEL GmbH); DENG, Haixiao (Shanghai Institute of Applied Physics)

Presenter: YANG, Hanxiang (Shanghai Institute of Applied Physics)

Session Classification: Seeded FEL

Track Classification: Seeded FEL