

A significant step towards robust table-top XUV-FEL

Tuesday 27 August 2024 16:00 (2 hours)

Our recent experiments achieved EUV range undulator radiation amplification based on the stable electron beam obtained from laser wakefield accelerator (LWFA). The experiments were conducted on the LWFA platform in RIKEN Spring-8 center supported by ImPACT and JST MIRAI project. By optimizing the driving laser system and gas target, the reproducibility of the acceleration process has been significantly improved. The electron beam with central energy of 380 MeV can be steadily generated with an energy spread less than 1% and a pointing instability less than 0.5 mrad in RMS. The typical electron beams with an average charge of 15 pC were focused by three permanent magnetic quadrupoles and four electromagnetic quadrupoles to the undulators located 6.5 meters downstream to the target. The amplified undulator radiation centered at 45 nm has been detected and the maximum gain of the radiation power is approximately 14-fold. Such the demonstration is not only the first time in Japan but also one of the world leading results. Based on our current achievements, we anticipate a navigable road from EUV to X-ray wavelengths.

Footnotes

Funding Agency

Primary author: JIN, Zhan (Osaka University)

Co-authors: GU, Yan-Jun (Osaka University); HUANG, Kai (National Institutes for Quantum Science and Technology); NAKANII, Nobuhiko (National Institutes for Quantum Science and Technology); SATO, Shingo (Osaka University); LEI, Zhenzhe (Osaka University); KANDO, Masaki (National Institutes for Quantum Science and Technology); HOSOKAI, Tomonao (Osaka University)

Presenter: JIN, Zhan (Osaka University)

Session Classification: Tuesday Poster Session

Track Classification: MC1: Beam Dynamics, Extreme Beams, Sources and Beam-Related Technologies; MC1.4 Plasma and wakefield acceleration