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Optimization of the longitudinal phase space of the electron beam for generating attosecond soft X-ray pulses at PAL-XFEL

Monday 2 June 2025 16:00 (2 hours)

At the Pohang Accelerator Laboratory X-ray Free-Electron Laser (PAL-XFEL), a scheme for generating attosecond XFEL pulses in the soft X-ray undulator line is under development using the Enhanced Self-Amplified Spontaneous Emission (E-SASE) method with an external laser pulse. To account for the slippage effect in the soft X-ray region, a mid-wavelength infrared (IR) laser pulse will be employed in the E-SASE section to create a sufficiently wide current spike. Following the E-SASE section, an additional wiggler will be used to introduce a strong energy chirp within the current spike via longitudinal space charge effects. This approach enables lasing exclusively within the current spike when applying strong reverse tapering in the undulator line, effectively suppressing background radiation. In this presentation, the optimization of the longitudinal phase space of the electron beam will be discussed by exploring the condition of the E-SASE section and wiggler for the attosecond soft X-ray pulses generation at PAL-XFEL.

Footnotes

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