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Terawatt hard X-ray pulses using a single current spike and self-seeded FEL

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The terawatt-scale free electron lasers (FELs) are of great interest for the possibility to allow X-ray single molecular imaging experiments and nonlinear x-ray science. At Pohang Accelerator Laboratory X-ray Free Electron Laser (PAL-XFEL), for the second hard undulator plan (HX2) the enhanced Self-Amplified Spontaneous Emission (E-SASE) scheme with an external laser pulse will be installed to generate a single high peak current spike which can be used to generate the terawatt-scale XFEL or attosecond XFEL. The current profile of the single spike is manipulated by controlling the external laser wavelength and the modulator, and the bending angle in the magnetic chicane. At the entrance of the undulator, the e-beam has a peak current of a few tens of KA and a pulse duration of less than 10 fs. The self-seeded FEL scheme is utilized to effectively enhance XFEL energy using the undulator tapering method. In this presentation, we will introduce the terawatt-scale XFEL using ESASE and the self-seeded FEL scheme.

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Footnotes

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Yes

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