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## Observation of coherent edge radiation for electron-bunch length monitoring during free-electron laser oscillations at KU-FEL

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It has been reported that cavity-type free-electron laser (FEL) oscillations cause shape distortion in an electron bunch depending on a detuning length of an optical cavity [1]. We have studied the FEL-induced bunch distortion by observing coherent edge radiation (CER) generated at an FEL facility of Kyoto University, which has the highest extraction efficiency of an FEL oscillation [2]. We have already found that an electron bunch interacting with the cavity-type FEL elongated when the detuning length of an optical cavity was positive [3]. To extract higher-power CER from the optical cavity without interfering with FEL oscillations, we updated a system that separates the CER beam from the FEL beam in the optical cavity. Using the new system, it is expected to measure the temporal evolution of the electron bunch shape in the FEL macropulse. In the presentation, we will report on the CER separation system and the latest results of the CER measurements.

### Footnotes

- [1] N. Sei et al., *Sci. Rep.* 11, (2021) 3433.
- [2] H. Zen et. al., *Phys. Rev. Accel. Beams* 23, (2020) 070701.
- [3] N. Sei et al., *Phys. Scr.* 98, (2023) 025510.

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