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Study on pre-bunched free electron Laser in the terahertz wavelength range

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We have been studying about a pre-bunched FEL in the THz region. In the pre-bunched FEL, the electron bunches being compressed shorter than the oscillation laser wavelength, it is expected that we can generate short-pulse THz laser pulses with high peak intensity. A broadband spectrum and high-intensity characteristics, which cannot be realized by conventional FEL, are expected. The pre-bunched FEL experiments were conducted using the THz-CUR at Kyoto University Free Electron Laser (KU-FEL) consists of an existing electron rf gun (ECC-RF-Gun), which can produce short electron bunches adequate for pre-bunched FEL, and a 10-period undulator. We installed an optical cavity and performed beam tests at the lasing frequency of 0.2 to 0.4 THz. As the results of beam test, we observed the coherent stacking of coherent THz pulses inside the cavity, however, FEL oscillation has not been achieved yet. We will report on our pre-bunched FEL project, experimental setup, beam test results and future prospects.

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