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Current Status of Beam Operation at Compact ERL toward Free-Electron Laser with CW Mode

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The compact ERL has been built as a test machine of energy recovery linac (ERL) at KEK in 2013. It has been succeeded to operate with 1 mA beam current with energy recovery mode in 2016. Recently, two undulators have been integrated into it to produce an infrared free-electron laser (FEL) light and the light amplification has been successfully observed with a burst mode and without energy recovery mode in 2020.

So far, the beam operation for high beam current at the compact ERL has been performed with machine parameters for a low-charged electron beam. However, to achieve continuous-wave (CW) FEL, it is necessary to have a high-charged beam with high-repetition rate and the energy recovery mode but without beam loss. After the observation of FEL light amplification in 2020, high-charged beam operation has been established with energy recovery mode but still with some losses. In this presentation, the causes of the measured beam losses and the countermeasures will be discussed, as well as prospects for CW-FEL at the compact ERL.

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Footnotes

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Yes

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