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Development of high-power RF components for an X-band transverse deflector system at SACLA

Wednesday 4 June 2025 16:00 (2 hours)

We have been developing an X-band transverse deflector system (XB-TDS) with sub-fs time resolution, which will be installed after the undulator sections at SACLA. A sub-fs XFEL pulse is desirable for user experiments such as the measurements of structural disordering in an XFEL interaction with a matter, as the degree of damage depends on the pulse duration. The demand for a shorter and shorter XFEL pulse is increasing. The SACLA's XFEL pulse duration is 6 fs at FWHM. In order to achieve a shorter XFEL pulse duration and to satisfy users'needs, a diagnostic system of the longitudinal bunch distribution is essential. We adopt an X-band frequency to efficiently deflect an 8 GeV electron beam. We feed 20 MW to the pulse compressor, and the peak power is increased to around 100 MW, which is divided into four cavities, generating HEM11 horizontal mode. We utilize a dipole magnet before the beam dump to measure the energy-time distribution.The current status is to manufacture high-power RF components such as deflector cavity, pulse compressor, and dummy load. In this presentation, we will show the design, manufacturing method, and commissioning status of these components.

Footnotes

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