Contribution ID: **1129** Contribution code: **WEPB020** Type: **Poster Presentation**

Highly stable pulse operation of 476 MHz solid-state amplifiers with a precision of 0.01 degrees at SACLA

Wednesday 4 June 2025 16:00 (2 hours)

We have introduced new 476MHz solid-state pulsed amplifiers to the X-ray Free Electron Laser facility, SACLA. The 476 MHz booster cavity requires high stability and reliability with a 100 kW power for 50 us pulse width. Previously, an Inductive Output Tube (IOT) was employed for this purpose. However, due to the reduced operational range caused by aging of IOT components and increasing difficulties in obtaining maintenance parts, a transition to solid-state amplifiers has been undertaken. The modular configuration of solid-state amplifiers with a combiner allows continuous operation even in the event of module failures and facilitates easy repairs. Additionally, their design eliminates the need for high voltage, as required by IOTs, which is expected to improve fault tolerance. This poster presents the operational status of the solid-state amplifiers, along with evaluation results of pulse-by-pulse stability with a precision of 0.01% for the amplitude and 0.01 degrees for the phase, respectively.

Footnotes

Paper preparation format

LaTeX

Region represented

Asia

Funding Agency

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Session Classification: Wednesday Poster Session

Track Classification: MC7: Accelerator Technology and Sustainability: MC7.T08 RF Power Sources