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Development status of laser arrival time measurement at SXFEL

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X-ray Free Electron Lasers (XFELs) are transformative across multiple disciplines, offering high power and tunable wavelengths. Facilities like FLASH, LCLS, and SwissFEL, including China's SXFEL and SHINE, provide ultra-bright femtosecond X-ray pulses. Their operation hinges on the precise synchronization of RF and laser sources, typically using femtosecond lasers as the master clock generator.

Environmental factors such as temperature, pressure, and vibrations induce timing jitter, impacting the laser chain and experimental outcomes. Laser Arrival-time Measurement (LAM) technology precisely tracks and compensates for these variations, ensuring stability and accuracy. LAM's precision is vital for XFEL performance enhancement and future facility development.

The paper reviews the current state of LAM technology at SXFEL, analyzes the impact of environmental factors on stability, and looks forward to future developments, emphasizing the importance of LAM technology in advancing XFEL facility performance and scientific research.

Footnotes

Funding Agency

Paper preparation format

Region represented

Asia

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