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Synchronization of Peking University THz FEL

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Peking University plans to conduct experimental research on a THz FEL (Terahertz Free Electron Laser) amplifier using a DC-SRF (Superconducting Radio Frequency) electron gun. The DC-SRF electron gun, which is capable of generating high-quality electron beams with high repetition rates and low emittance, is suitable for use in large scientific facilities such as FELs and ERLs. The experimental setup of the THz FEL amplifier mainly includes a 1.3GHz DC-SRF electron gun, a 2.856GHz RF (Radio Frequency) deflection cavity, a 2.4 GHz cavity-based Beam Arrival Monitor (BAM), a 1.3 GHz 2×9 Cell superconducting accelerator module, as well as photocathode drive laser systems and THz seed light systems. The two laser systems have repetition rates of 81.25 MHz and 100 MHz, respectively. Since the operating frequencies of the components on the THz FEL amplifier device are not identical and some frequencies do not have a multiple relationship, clock generation schemes based on PLL (Phase-Locked Loop) or mixers cannot fully meet the experimental requirements. Therefore, we have employed DDS (Direct Digital Synthesis) to generate the key frequencies. Additionally, to ensure the normal operation of the BAM, signal detection and processing of the BAM signals have been implemented based on the KC705 and FMC150 platforms.

Footnotes

Funding Agency

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Yes

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