Contribution ID: **25** Type: **Oral**

Femtosecond Synchronization System for Free Electron Laser

Wednesday, 30 October 2024 15:15 (25 minutes)

Free electron laser has the characteristics of extremely high peak brightness, ultra-short pulse and high coherence, providing unprecedented research opportunity for physics, chemistry, biomedicine, materials science and energy science.
Large-scale free electron laser and its time-resolved pump-probe experiment requires femtosecond-level synchronization. Optical and RF synchronization technologies play important roles for large facilities.
The tasks of the femtosecond synchronization system: To produce a clock reference source with femtosecond level accuracy; 10 fs-level synchronize several hundred clients for Laser, LLRF, Diagnostic, and Timing system with different requirements (optical/RF reference, frequency, power, accuracy, etc.). Femtosecond synchronization system is the core system to ensure the free electron laser facility can work and run stable for a long time.
We built two systems for Dalian Coherent Light Source (DCLS) and Dalian Advanced Light Source (DALS). Both of them are optical system and work well.
Shenzhen Superconducting Soft-X-ray Free Electron Laser (S^3FEL) is a high repetition rate soft-X-ray superconducting free-electron laser facility that consists of a 2.5 GeV CW superconducting linear accelerator and three initial undulator lines, which aims at generating X-Rays between 40 eV and 1 keV at rates up to 1MHz. An optical and RF combined synchronization system is under designing.

Primary authors: CHEN, Zhichao (Dalian Institute of Chemical Physics); WU, Guorong (Dalian Institute of Chemical Physics); ZHANG, Weiqing (Dalian Institute of Chemical Physics); YANG, Xueming (Dalian Institute of Chemical Physics)

Presenter: CHEN, Zhichao (Dalian Institute of Chemical Physics)

Session Classification: Synchronization

Track Classification: Synchronization