

1. Accelerator

In 2021, the COVID-19 pandemic had little impact on accelerator operations compared with the previous year. The accelerators, SPring-8 and SACLA had been operated as scheduled and provided stable and reliable user operations with the same operational statistic as usual years.

The SACLA linac had been successfully operated as a high-performance XFEL electron driver and as a stable beam injector to the current SPring-8 storage ring throughout the whole year. No serious problems related to operational reliability, stability, or isolated bunch purity degradation occurred over the operations. This success led to the shutdown of the old injector system and its dedicated high-voltage substation in the summer of 2021. Furthermore, this is also a considerable advancement towards upgrading the SPring-8 storage ring with a small beam emittance of less than 100 pm.rad because injection beams from the SACLA linac are spatially sharp enough for injecting the beam into the upgraded ring. It should be emphasized that this advanced operation, in which one linear accelerator is time-shared pulse by pulse for completely different applications with different electron beam characteristics, is the first of its kind in the world.

The efficiency and transparency of SACLA accelerator tuning are still insufficient for stable, high-performance, and reliable multi-beamline XFEL operations with stable top-up beam injections to the ring. Continuous efforts have been made to improve the above performance. To optimize optics matching conditions independently in BL2, BL3, and XSBT, seven pulsed quadrupole magnets were installed at a C-band main accelerator section. In

FY2022, the pulsed quadrupole magnet system composed of 21 magnets in total will be completed for more high-performance XFEL operations.

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