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Low-Emittance Beam Injection from SACLA to SPring-8

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The SACLA linear accelerator has been successfully used as a full-energy injector of the SPring-8 storage ring since 2020. In order to perform the beam injection in parallel with XFEL operation, three accelerators are virtually constructed in a control system. Thus the electron beam parameters, such as the beam energy, are independently tuned for the beam injection and the two XFEL beamlines. By shutting down dedicated old injector accelerators, the electricity consumption has been reduced by roughly 20-30 % and its maintenance cost is no more necessary. SACLA will also provide the electron beam for the future SPring-8-II, which requires low-emittance beams for injection due to its small beam aperture. In this presentation, we summarize the beam injection scheme developed at SACLA including observed emittance increase at a beam transport caused by quantum excitation of synchrotron radiation, a synchronization system between the two accelerators, and a purification method of the electron bunch in the storage ring.

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