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SPring-8 and SACLA Plans for the Future

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SPring-8, a 3rd-generation synchrotron radiation facility in Japan currently operates at 2.4 nm.rad electron beam emittance, is planning to upgrade to operate below 100 pm.rad by changing the present Chasman-Green lattice to 5 bend achromat lattice, with keeping positions of all the straight sections as they are. The upgrade, combined with the development of X-ray focusing optics down to nm focal spot size, helps revealing local properties of heterogeneous materials in a non-destructive manner, while the most of the present applications observe the averaged properties of the samples which are assumed to be homogeneous. The upgrade will hopefully be completed within 10 years. SACLA (SPring-8 Angstrom Compact LAsEr), an X-ray free electron laser adjacent to SPring-8, is the world's second SASE X-ray source following to LCLS (Linac Coherent Light Source) at the SLAC National Accelerator Laboratory. New undulator technology permits us to downsize the facility length to be 700 m which is 1/3 of LCLS and 2/9 of Euro XFEL. We have constructed a tight focusing system for the XFEL beam to obtain 50 nm focal spot diameter. The power density of the focused XFEL reached 10^{20} W/cm². We are currently designing 7 nm focusing system to get the high power density of 10^{22} W/cm². We are seeking for the ways to further downsize the facility length. Our temporary goal at the moment is to build 100 m long hard X-ray FEL facility in middle 2030s. R&Ds for the mini-pole undulators and higher energy gradient linear accelerator are starting soon.