# Project XFEL

Late in the 20th century, theoreticians discovered that a free electron laser (FEL) based on the self-amplified spontaneous emission (SASE) scheme has exceptional ability to produce ultrabrilliant, coherent radiation in a short wavelength region, including extreme ultraviolet (EUV), soft X-rays, and even hard X-rays. With great enthusiasm, the construction of X-ray FEL (XFEL) facilities was started in 21st century at Stanford Linear Accelerator Center (SLAC) in the US, Deutsches Elektronen-Synchrotron (DESY) in Germany, and SPring-8 in Japan. From the very beginning, the SPring-8 XFEL project claimed the importance of "compactness" in order to realize widespread distributions of XFEL machines for developing diverse fields of photon science.

This unique concept is based on the combination of Japan's original technologies: short-period invacuum undulators, high-gradient C-band linacs, and an ultralow-emittance thermionic electron gun. To verify the concept, the SPring-8 Compact SASE Source test accelerator (SCSS) was constructed in 2005. After many trials and developments, the SCSS finally achieved a stable saturation of the lasing power at a wavelength region of 50 to 61 nanometers in 2007. Succeedingly, the SCSS started to deliver the intense EUV radiation to users from May, 2008. The stable, robust operations to be achieved have been highly appreciated by a number of researchers, and provided great expectations for performance of the 8-GeV XFEL machine, which will start user operation in 2011.

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SPRING-8 COMPACT SASE SOURCE PROJECT
SCSS