



Layout of XFEL Facility

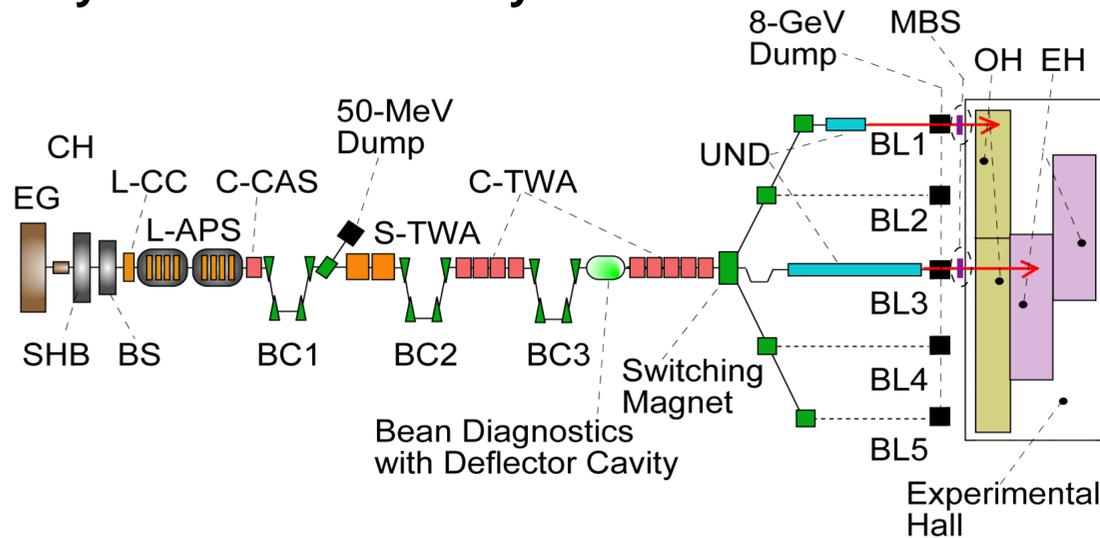


Figure 1: Schematic configuration of SACLA. EG, 500-kV electron gun; CH, chopper with collimator; SHB, 238-MHz sub-harmonic-buncher; BS, 476-MHz booster; L-APS, L-band alternating periodic structure (APS) typed standing-wave cavity; S(C)-TWA, S(C)-band travelling-wave acceleration tube; BC: bunch compressor; UND, undulator; BL, beam line; MBS, main beam shutter; OH, optical hutch; EH, experimental hutch.

Table 1 Main Design Parameters

Parameter	Target Value
Beam energy (GeV)	4~8
Bunch compression ratio	> 3000
Peak current (kA)	3~4
Repetition rate (Hz)	Max. 60
Normalized slice emittance (π mmrad)	< 1
Shortest SASE laser wavelength (Angstrom)	0.6
Laser power (GW)	20~30
K-value setting range	1.1~2.2
Undulator period length (mm)	18
Number of undulator periods	277
Number of undulator segments	18

User operation started in 7 March 2012

X-ray Free Electron Laser (XFEL), which is named **SACLA** (**S**Pring-8 **A**ngstrom **C**ompact free-electron **L**aser), was constructed as one of Japanese five key technologies of national importance and its construction was completed in FY2010. Via the one years system tuning, official user experiments started in March 2012.

Achieved Results

- Laser power amplification at wavelengths from **1.6 to 0.63 Angstroms**
- Pulse Energy **sub-mJ/pulse** @ $\lambda \geq 1\text{\AA}$
- Maximum laser power **>10 GW**
- Intensity fluctuation **10~20%**
- Laser being reproducible
 - w/o beam FB keeping the peak current
 - at ~25% of peak intensity

Fig.2: Spatial Profile of SASE Monochromatized

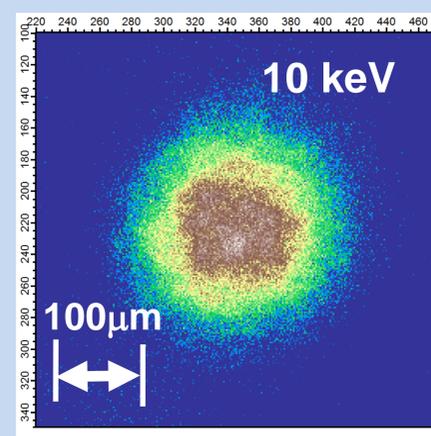


Fig.3: Progress on Shortening Laser Wavelength

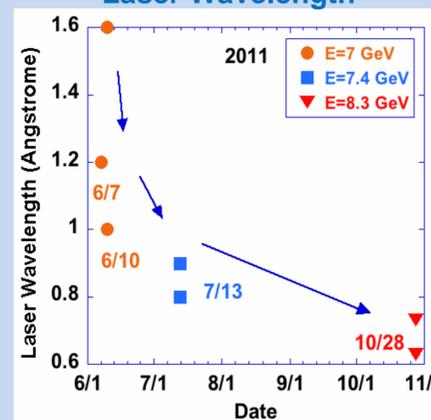


Fig.4: Laser Spectrum (K=1.8)

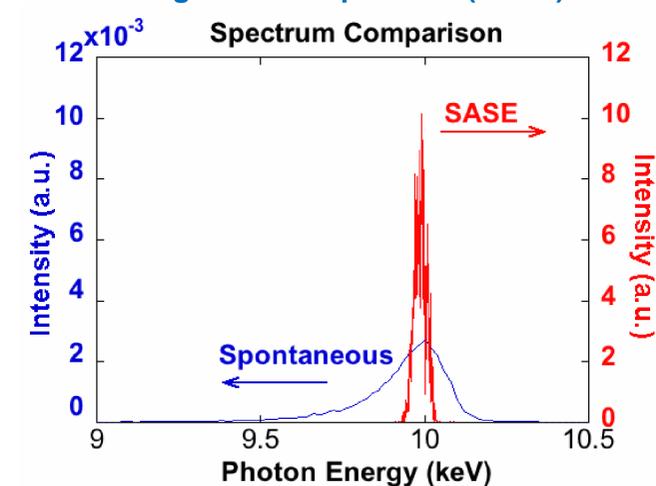


Fig.5: Laser Stability
2011/11/11 20:22~21:22

