

Breakout session B2:

Nanofocusing XFEL: 100 nm- and 10 nm-focusing capabilities at SACLA

Organizers: K. Yamauchi (Osaka Univ.) and J. Yamada (SACLA)

Facility report

100-200 nm focusing (100exa) system

- └ Grating-based automated optimization of 100nm-focused XFEL wavefront have been deployed.
- └ 2~10 min auto-refocusing is available by users themselves.
- └ The wavefront was consistent with the knife-edge scan.
- └ SACLA staffs recommends to use the auto-tuning system for convenient & efficient experiments.

Sub-10 nm focusing system

- └ Grating-based wavefront measurement & ptychography indicated 7x7 nm focus
- └ The stability of the focus condition was sufficiently high (>10 h).
- └ In solid sample case, 2- μ m depth-of-focus is sufficient for practical use.
- └ SACLA widely welcomes applications using the unique and novel sub10-nm beam

Comments form participants

- Relationship between wavefronts and source condition?
 - Feedback to accelerator tuning
 - Improvement of the XFEL 'phase profile' (not only the intensity)
- Need for the guarantee of the 10^{22} W/cm² intensity
 - Experimental plans will greatly depend on the intensity
 - In the worst case, users will give up
- 'Clean' (monochromatic & short-pulse) nanofocused XFEL
 - SASE is too chaotic & complex to determine the nonlinear cross-section
- Capability for changing photon energy
 - >> Answer) technically possible (R&D is required)
- Sample monitoring system with 10nm resolution? (e.g. EM)
- Availability of test beamtime for the sub-10nm system?
 - >> Answer) Coupling with YamauchiG-related experiments is realistic.
- Future perspectives for the higher intensity?
 - Continually updating the world record.