Summary notes
Photon-A: Optics & Diagnostics

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Presentations & topic

X-ray optics

- European XFEL (H. Sinn)
- SACLA (M. Yabashi)
- LCLS (B. Schlotter)
- SwissFEL (U. Flechsig)

X-ray diagnostics

- PAL-XFEL (In Tae Eom, Soon Nam Kwon)
- SACLA (Shigeki Owada)
- European XFEL (U. Bösenberg, P. Vagovic)
- SwissFEL (P. Beaud)
- LCLS (Yiping Feng)

Coverage of topics

Optics	Mirrors	Monochro.	Nano-optics	Split&delay	!
LCLS	X		X		Cooled M.; Nano-X
SACLA		X		X	SDO, HBT
PAL-XFEL	X	X			
SwissFEL	X	X			
European XFEL	X				Metrology

Diagnostics	Time & laser	Intensity	Spectrum	Other	
LCLS	X	X		Transparency	
SACLA	X		X		t_o meas.
PAL-XFEL	X	X			Laser, GMD
SwissFEL	X				LAM, mult.
European XFEL			X	Wavefront	

Some observations (optics)

Mirrors

– Seems largely settled; metrology ?; next: cooling

– KB systems → alignment ?

– Wavefront sensor techniques still not mature

Split & delay optics

– Wavefront splitting seems to have an edge over Int. splitting

– Characterization of split beams requires more experience

Nano-structured optics

– (C*) gratings used in several places; more complex devices ?

Some observations (diagnostics)

Timing, synchronization, lasers
- 20-50 fs regime safely achieved
- Both transmittence and streaking CC methods established
- Time-zero measurement and improvement of sync. on-going

Spectrum diagnostics
- Si specs have become standard; new: use of diamond

Intensity
- GMD design at PAL-XFEL
- Low effort power meters

Wavefront
- Still under implementation as reg. diagnostics

Topics for collaboration

- Mirror metrology (off-line, at wavelength, wavefront sensing)
- Highest intensities in non-collinear geometry (non-linear reg.)
- Special applications using nano-structured optics
- In-situ cleaning of mirrors
- …

Summary

Overall developments have been successful and similar schemes are used at the different facilities.

→ Overall happiness with situation

→ Optics area has still some need for collaborations

Are there other, more relevant topics we should have brought here and discussed ?

- Detectors, THz, … ?
- What about pushing time resolution to single or sub-fs ?
- Do we need (new) 2-x-ray-pulse diagnostics schemes ?
- High average power issues ?
- …