Joint Session B:
Summary Reports and Collaboration results

Report on collaboration topics
from 7th hard X-ray FEL collaboration meeting

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Conclusions

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Many thanks to

Rafael Abela, Nicole Hiller, Luc Patthey, Sven Reiche
for providing on short notice input to the following listing

Color code:

black text: from Rafael (last year) ongoing stuff
red text: from Rafael (last year) new topics suggested during 7th collab.meeting
blue text: updates what is happening/has happened

additional input and corrections welcome!

Photon Diagnostics

This field has a lot of overlap, many opportunities for collaboration

- Focus characterization (real-time) for sub-micron beams is still missing, very inefficient
- Done: Beamtime for Time arrival monitor with 2 colors (SACLA and PSI)
- Combination diagnostics are good ways of correlating information (Cookie-box, time-tool)
- Diagnostics are lacking for tender X-ray regime – this primarily requires testing and time, not new methods

Suggestion: Satellite Workshop at Photon Diagnostics conference (every two years)
? Would allow for more lengthy discussions and plans

Proposed new collaborations:
SLAC/PSI/SACLA: tender X-ray diagnostics, testing materials, communicating results

Continuing collaborations:
Everyone: Absolute Intensity Campaign

Optics

Multiple ongoing collaborations which will continue:

- XFEL beam damage to optics

Done: Grazing incidence mirror damage and reflexion measurement on coated mirrors (B4C/Mo/SiO, B4C/SiO) (PSI-SACLA)

- X-ray Split and Delay

Proposed new collaborations:

SLAC/SACLA/PSI: Better understanding of mirror degradation issues

- Joint effort for optical commissioning at SwissFEL/Eu-XFEL. What about PAL-XFEL?
- Joint effort for Delta-Tau control system for DCM by SwissFEL and PAL-XFEL

Optics

Continuing collaborations:

Everyone: Damage campaign

Open-ended collaborations:

- Wavefront propagation software (**XFEL.EU**)
- Proposal from PSI: Portable set-up based on grating interferometry available for wave front measurement (PSI)
- SOS (Software for Optical Simulations) workshop (2016), fellow-up in San Diego 2017
- Calypso +: Metrology of optics and wave front measurement (PSI, EuXFEL, Diamond, ALBA, ESRF, HZB,…

Experimental Instruments

Primary goal would be better communication between facilities to allow for simple exchange of information. There is no current reliable way of exchanging information (conference, workshop).

Continuing collaborations:

- X-ray split-and-delay (**Everyone**)

Proposed new collaborations:

SLAC/PSI/XFEL: Robot software control

SACLA/NNN: Crystal quality control (PCVM treatment)

Open-ended collaborations:

- Start-to-end simulations (**XFEL.EU**)

Laser systems and timing

Extensive experience with these topics at SLAC. Laser/X-ray diagnostics provide feedback on both XFEL beam and laser.

Proposed collaboration topics:

SLAC/NNN: 200 nm bandwidth, 10 fs pulse generation

PSI/NNN: near-IR and mid-IR generation, single cycle

Narrowband THz generation (tunable)

Single-shot diagnostics beyond 1 micron

Improving OPA stability

Detectors

Detector programs are well established and communication is good between facilities (conferences, workshops, interchange of detectors between facilities)

Done: first test of Jungfrau (1M) detector at LCLS

Proposed new collaborations:

SLAC/PSI/SACLA/XFEL.EU: EMP effects on detectors

SACLA/NNN: Tools for parallax

efficient way to measure monochromatic flat-field illumination

dectector calibration

1. "Simple" X-ray pulse energy detectors (commercial laser powermeter) at different locations in the beamlines (Fritz, LCLS)

2. Optical light detectors "beyond Si" (200-266nm), Erny/PSI

Data acquisition and analysis

General consensus on using python-based tools to provide user analysis toolkits.
But hardware solutions, software back-ends vary from facility to facility.

Continuing collaborations:
XFEL.EU/PSI/DESY: PaNData policy

Proposed new collaborations:
Data analysis (no discussion in session due to site visit)
Offsite remote data access: present state:NX, ssh
Python library sharing
→ is there a collaboration possibility to push web based analysis interface (server implementation, remote access, permission/user group control)

Accelerator issues

Starting phase of the new facilities and the planed “dark period” at LCLS should be used to transfer knowledge.

- Exchange of personnel

Continuing collaborations:

- Commissioning issues
  Exchange of personnel for commissioning PSI-DESY, DESY-PAL …
- Diagnostics (Screen, Electron Density Monitor at SLAC)
  PAL/SLAC BPMs
  Nicole Hillers talk in Accelerator A
- X-band Deflector
  DESY/CERN/PSI collaboration

Proposed new collaborations:

- Modulator developments, very fruitful discussion yesterday in Accelerator B session
- Better understanding and control of longitudinal and transverse phase space
  PSI/SLAC: Two bunch with non linear dechirper
- Optimization of undulator and FEL schemes
  PSI/SLAC: Fresh Bunch technique with tilted beam

- Optimization of procedures to set up the accelerator.
  - Injector Emittance Optimization PSI/ SLAC
  - Ocelot DESY/SLAC

Electron Diagnostics Collaborations with PSI Involvement

Nicole Hiller's talk in Accelerator A

- Beam Position Monitors (DESY, PSI)
- Wire Scanners (PSI, FERMI)
- Bunch Compression Monitors (PSI, DESY)
- Fluorescence Screens (PSI, SLAC, PAL)
- Plasma-based diagnostic for characterizing high-field ultra-short FEL electron bunches (PSI, SLAC)
- Transverse Deflectors (CERN, DESY, PSI)
- Mini-Workshop Series on Longitudinal Diagnostics

Summary

after all, a lot of collaboration evolves on many topics!

and, despite of Jerry's worries,

this meeting is not the only but an import enabler of these collaborations