

LCLS UEC Meeting Minutes: 2021-04-30

Present: E. Biasin, A. Gleason, M. Cammarata, Y. Cao, G. Doumy, T. Gorkhover, J. Kern, M. Khalil, M. Mitrano, B. Ofori-Okai, R. Sension, P. Sun, H. Wen, G. J. Williams, L. Conradson, C. Knotts, M. Dunne

Absent: A. Marinelli, E. McBride, C. Rajendran, D. Rolles, E. Snell

Guest: Diling Zhu

Update from Mike:

- Call for Scientific Campaign in Condensed Phase Chemistry recently went out.
 - 2 Step process (first submission of LOI, if LOI is approved then submission of full proposal). Users are encouraged to contact Mike Dunne, Bob Schoenlein, and beamline scientists for deep discussion for developing campaign proposals.
- HXR finished installing systems for self-seeding. This is compatible with the vertical polarization of the new HXR undulator
 - Will be available for run 19
- HXRs have been producing ~ 0.5 mJ scale energies in the 18-25 keV range, and 1 to 2.5 mJ in the 8-15 keV range
- New cryo chamber (20 Kelvin) for X-ray diffraction fielded successfully at XPP
- L2SI progress
 - TMO successfully fielded LAMP, cVMI, and Magnetic bottle. Next to field is a prototype of the "MRCOFFEE" cookie-box time-of-flight system for full pulse characterization.
 - Optics for endstation 2.2 have been received
 - qRIXS spectrometer making good fabrication progress. Will be received in summertime
- Detectors update
 - Decision on the initial 5 kHz detector for soft-X-ray deployment in the qRIXS instrument for REXS and XPCS applications will be made this month
 - Developing new sensors to work at harder X-rays (>18 keV)
 - New ePIX detector for TXI instrument engineering mock up for initial 5 kHz operation in a forward-scattering imaging chamber. This will have a shingled tile geometry, and will be later updated to a system operating at 25 keV.
 - Initial tests of the electronics for a MHz 'rare-event' pixel imaging detector successful (SparkPix-ED)
- **Question:** For the non-planar detector, is the gap variable? Can the curvature be changed?
 - Gap can be changed, curvature is fixed. More details can be obtained from Mark McKelvey.
- **Question:** Is there any information on when users can come on site?
 - Users can come to their beamtime now as long as travel is permitted by their local institution and local government. There is still a SLAC site occupancy limit (~50%), and limitations on occupancy of any given area (eg. controls rooms and hutches). Users should discuss with their experiment Point of Contact (POC) as far in advance as possible to arrange access. Can do work with others after testing negative ~5 days after arrival.
 - SLAC is not asking if people are vaccinated, so protocols operate assuming people are not vaccinated yet. Could change, dependent on DOE and Stanford guidance.

Rosanne: SAC update

- Topical areas: Review of LCLS Chemical Sciences; Update on Scientific Campaigns; Progress with TMO; Instrument plans for LCLS-II and LCLS-II-HE; Accelerator and Photon Science R&D; MEC-Upgrade.
- Future meetings: updates on ChemRIXS and qRIXS

- **Question:** Guidelines for campaigns are fairly vague. Is there more guidance given to applicants?
 - Yes, users are encouraged to talk to staff for planning campaign proposals. POC Bob Schoenlein. Previous awarded campaigns on average: 6 beamtimes in 3 years, 5 to 15 institutions.

Elisa: Users Meeting

- Program is mostly finalized. Reaching out to session chairs to organize speakers.
- Quick discussion about choosing plenary speaker -- wanting to ensure fair and unbiased selection. Plan is to contact the plenary speakers accordingly to the preferences expressed through the UEC vote.

Diling: Slides from SAC meeting on Photon Science R&D.

- Focusing on optical laser systems, new experimental methods, beam delivery, and sample environment and delivery
- New high repetition rate OPCPA (Optical parametric chirped pulse amplifier) system
 - Target parameters: 100 kHz, 800 nm, 1 mJ
- Developing first production system. Will initially produce 100 kHz with 0.3 mJ, and 30 kHz with 1 mJ
 - Aimed at demonstrating a very robust system
- New laser lab in development in Arillaga science center
- Trying to improve timing diagnostics using a fiber-based technology. Goal is to get to <10 fs RMS stability in the timing jitter
- More developments to split-and-delay to produce X-ray pulse pairs XPCS applications
- Sample delivery using lithographically developed jets have demonstrated lots of progress. Working on new jets that will produce droplets on demand to avoid wasting samples.
 - Will get customized drop-on-demand jets to MFX as a starting point.
 - Hoping to further develop 120 Hz drop-on-demand in in a few years
- Developing PAX: using x-ray to electron conversion and then energy resolving the electron energy, which has much higher energy resolution.
- Also using polycapillary spectrometer to improve spectroscopy throughout
- **Question:** For droplets on demand, how small are the droplets? Does it depend on the solvent?
 - Between 30 and 80 um
 - Looking at sample parameter ranges. Trying water, but also looking at solvents for crystallography and solution
- **Question:** For the PAX, is the resolution limited by the lifetime of the auger electrons in the converter?
 - Auger electron lifetime does have an effect, but this may be managed by choosing working near the emission edge.
- **Question:** Is there any mechanism for users to use the OPCPA system to pre-characterize the samples and how they behave under high average power excitation?
 - New lab space in Arillaga science center might be available for testing.
 - Users' office will work with users who were successful with the PRP to gain pre-beam access to either the system in B040 or the Arrillaga Science Center, dependent on need.
- **Question:** How much faster will PAX be for spectroscopy be, depending on the conversion efficiency
 - Aiming to get two orders of magnitude increase
- **Question:** For the low-temperature cryostat, what are the available range of angles for diffraction