

LCLS UEC Meeting September 2nd 2022

Present: E. Biasin, G. Doumy, J. Kern, M. Khalil, A. Marinelli, M. Mitrano, R. Sension, P. Sun, M. Trigo, G. George, C. Knotts, P. Jones, M. Dunne, C. Rajendran, T. Gorkhover

Absent: Y. Cao, E. McBride, D. Oberthur, B. Ofori-Okai, D. Rolles, G. J. Williams, L. Conradson

Mikes updates:

Run 21:

- Run 21 scheduled has been published online, with start date on October 27th: https://lcls.slac.stanford.edu/sites/default/files/LCLS_Run21_Schedule-v1.pdf
- User shift allocation (PRP): 6% M&I, 27% Chemistry/AMO, 20% Biosciences, 29% Materials, 18% MEC
- Acceptance rate is 20%, below average. Main reason is the complexity due to LCLS II commissioning. However, in order to schedule a number of experiments comparable to previous runs, we have decided to extend the Run to June 2022.
- Short winter shut down, followed by a maintenance / recertification shutdown (no operations) from mid February to mid March. For the rest of the time the hard x-ray instruments are operational.
- Early science for TMO and ChemRIXS is planned from mid-March, but schedule is not published yet. The User Meeting will inform our plans.
- Run 22 call will be in January. This means a careful projection of LCLS II capabilities (since Early Science will happen later).

LCLS II:

- The LCLS-II gun has been tested at its operating point of 100 MeV
- The cryomodules are stable at 2K, and have been through a successful initial RF test. Fast cool down (which will lead to operation mode) will be tried in October, with beam expected by mid-November. Current predictions are for first XFEL light by the end of January.
- The first instruments to use LCLS-II will be TMO (first interaction point, using the Magnetic Bottle Spectrometer), and ChemRIXS. Following that will be qRIXS and TMO-DREAM, and subsequently TXI and user-supplied endstations (SurfSpec and k-Microscope).
- Recent progress with DREAM at the second interaction point of the TMO hutch includes an initial test of the second set of KB mirrors, which will be used to focus the beam down to 300 nm to provide highest molecular resolution.
- High laser power system (OPCPA) has been tested in the NEH. Operating at 33 kHz, 38 W, 800 nm. Bandwidth supports <20 fs pulse duration. The key task now is the synchronization with LCLS-II, and optimization of advanced modes beyond the fundamental and harmonics.
- qRIXS is now installed and beginning its pre-beam check-out. Over the longer term, a large area pixelated detector will be installed to a second arm (parallel to the arm of the

current spectrometer) to be able to capture speckle patterns for XPCS-type measurements.

Site access:

- SLAC is now in a green county, and most access restrictions have been relaxed. Details are at <https://vue.slac.stanford.edu/covid-19>.

Discussion:

- Question: When is the schedule for Early Science on TMO and ChemRIXS using LCLS-II going to be published? How is the wider User Community engaged?
The experiments for Early Science have been selected. The effective schedule and mode of operation is still under discussion. Crucial will be the discussions at the User Meeting Early Science workshops with the participating teams. The strategy is to allow for flexibility and adaptability, as we have learned from previous commissioning. Also, we need to allow sufficient time to ramp up the beam: half of the time should be for accelerator, half for instrument. We are seeking advice for PRP, SAC, and UO on how to best split the time.
Comment: It is important that clear guidelines about the participation to Early Science are communicated to the UO.
- Question: Many new instruments are being commissioned (chemRIXS, TMO, qRIXS, TXI, momentum microscope, surface science, etc.). Will there be enough time for all?
Some of the commissioning can happen parasitically. Priority remains on TMO-IP1 and chemRIXS for the initial phase, then qRIXS. Allocation of time and effort will be to maximize the scientific readiness of the first endstations, with work on the subsequent systems being scheduled in a manner that does not unduly impact the first phase.
Comment: For comparison, at XFEL 6 experiments were allocated out of 29 proposals.
- Questions: Are there going to be new science campaigns?
Not in the near future. We have 8 campaigns running at the moment. We will seek the SAC's advice to understand if more campaigns can lead to higher success, even though the participation is smaller.
- Comment: It is essential to debrief the UO of the achievement of the Early Science, and to be flexible wrt the soft x-ray proposals for Run 22: allow for instance change in experimental plan after there are realistic expectations of LCLS-II performance, as long as there are no conflicts with other user experiments. It may be useful to split the PRP: first PRP in mid-April for hard x-ray experiments, second PRP after the Early Science.
- Questions: Are there enough resources to run 2 accelerators?
It is indeed a challenge. DOE is committed to rebaseline 2024 funding. It is important to show support for LCLS-II.