

Scientific Opportunities for Ultrafast Hard X-rays at High Repetition Rate: An Energy Upgrade of LCLS-II

September 26-27, 2016
SLAC National Accelerator Laboratory
Menlo Park, CA

Workshop Charge

- ❑ Identify most important science opportunities (transformational, grand challenge level) that can uniquely be addressed using capabilities of LCLS-II-HE (high rep rate hard X-rays, initially up to 12.8 keV, and in the future beyond 20 keV)
 - Near-term science consistent with initial LCLS-II-HE capabilities and augmented LCLS hard X-ray instrumentation
 - Future science consistent with projected LCLS-II-HE capabilities and advanced instrumentation
 - Succinct statement of why this science is transformational
 - *What are important outstanding questions in your field?*
 - *Why have they not been answered (what is impeding progress, why now, why LCLS-II)?*
 - *What is the potential broader impact if we can answer these questions (why are they important)?*
- ❑ Identify relevant experimental approach(es) and key requirements or capabilities – particularly for advanced approaches that are not well developed.
 - Computational approaches, beamline optics, endstation(s), detectors, lasers, sample injectors, etc.
 - Photon flux, pulse duration, rep rate, photon energy etc.
- ❑ Compare experimental approach to current state-of-the art & assess alternative approaches
 - Can the experimental approach leverage existing instrumentation/expertise?
Where are the gaps, or what R&D is required?
 - Can the science be done with other existing sources?
(e.g. diffraction-limited synchrotrons, cryo-EM, table-top HHG, etc.)