



Contribution ID: 23

Type: **Invited**

Single-pulse multi-frame x-ray imaging with a crystal-based x-ray split-and-delay line

Thursday, 16 March 2023 10:55 (30 minutes)

We developed an x-ray optics solution, called x-ray tomographic-delay-line (XTEL), for studying pico- to nanosecond dynamics of mesoscale materials processes at existing x-ray light sources. This optic lays the groundwork for taking snapshot movies of materials processes with selectable delay times, as well as single-pulse 3D images of materials by recording multiple views simultaneously from different angles. The XTEL has been designed to match the time resolution required to probe materials processes in the pico-second to nanosecond range, which is not accessible at existing or soon emerging x-ray light source facilities. It will operate between 5 to 20 keV initially to match LCLS, LCLS-II, the European XFEL, and DCS. In future experiments, the XTEL will enable single-pulse tomographic imaging as well as multi-frame movies created from a single x-ray pulse that enables the user to capture dynamic processes.

We will describe the instrument design choices and initial results from LCLS Run 20 beamtime for a single probe beam. The conceptual design for multiple-probe beams, to be used with the upgraded LCLS MEC facility, will be described.

This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344. Document release number LLNL-ABS-833457

Primary authors: BURCKLEN, Catherine (Lawrence Livermore National Laboratory); VENNARI, Cara (Lawrence Livermore National Laboratory); MCGUIRE, Christopher (Lawrence Livermore National Laboratory); PARDINI, Tom (Lawrence Livermore National Laboratory); HAU-RIEGE, Stefan (Lawrence Livermore National Laboratory); KOZIOZIEMSKI, Bernard (Lawrence Livermore National Laboratory)

Presenter: BURCKLEN, Catherine (Lawrence Livermore National Laboratory)

Session Classification: Imaging

Track Classification: Imaging