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The LCLS-II: High Repetition Rate Free Electron Laser driven by a Superconducting CW Linac

Thursday 29 August 2024 08:30 (45 minutes)

A major upgrade to the Linac Coherent Light Source (LCLS) Free Electron Laser facility has recently been completed. The LCLS-II project delivered a 4 GeV superconducting CW linac, capable of supplying pulses at up to 1 MHz rates in a continuous stream, marking the culmination of a 10-year, $1 billion project.

This beam is used to drive a pair of undulators capable of delivering FEL pulses from 250 eV to 5000 eV, with pulse durations down to the sub-femtosecond level.

A suite of instruments has been built to make use of the new beam, including TMO (time-resolved atomic, molecular and optical science instrument), ChemRIXS (liquid-phase chemical sciences using Resonant Inelastic X-ray Scattering), qRIXS (materials science using time- and momentum (q)- resolved RIXS), and TXI (a dual-beam tender X-ray instrument).

This talk will provide an overview of the current status of the LCLS facility with these new developments, including data from the commissioning and early science programs at the level of 8 to 32 kHz.

The talk will also describe the next phase of upgrades that are currently underway, including the extension to 8 GeV via the LCLS-II-HE Project.

Finally, the talk will offer a perspective on future plans for a next-generation facility known as LCLS-X, and commentary on the anticipated directions for FEL science.

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