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## CXFEL labs

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The Compact X-ray Free-Electron Laser Labs (CXFEL Labs) encompass facility infrastructure that supports the operation of two beamlines, the Compact X-ray Light Source (CXLS) beamline (6-10 keV, <500 fs X-ray pulses @ 1 kHz), and the Compact X-ray Free-Electron Laser (CXFEL) beamline (0.25-2.5 keV, <10 fs X-ray pulses @ 1 kHz). We present an overview of the science instrumentation and its requirements for CXLS and CXFEL and how these physics requirements translate to engineering specifications that drive the facility design. The facility design includes many interdependent systems including: network; on-lab and off-lab data processing and storage; fast and slow controls; air and water systems; health and safety systems; power distribution; vibration isolation; electron, laser, and x-ray beam transport, for example. We articulate specific challenges associated with beam transport where sub-10-fs timing requirements exist across multiple rooms, and network requirements for large data flow from 1 kHz source in a compact footprint with reasonable cost. We conclude with an overview of implementation status for the CXLS and CXFEL beamlines.

### Footnotes

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