Macromolecular Femtosecond Crystallography (MFX)

MFX - A new macromolecular beamline at LCLS
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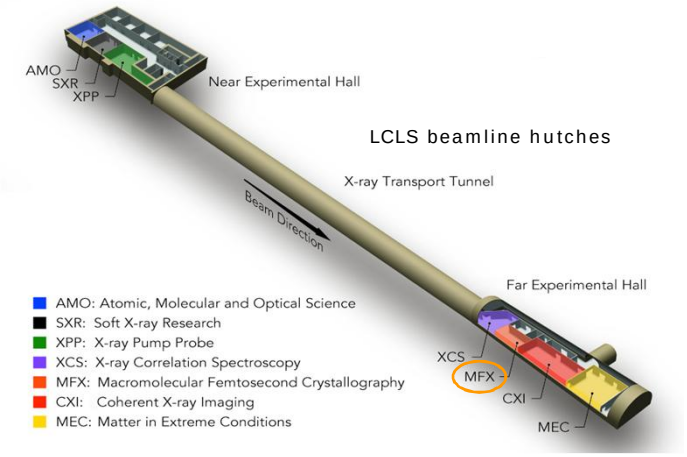
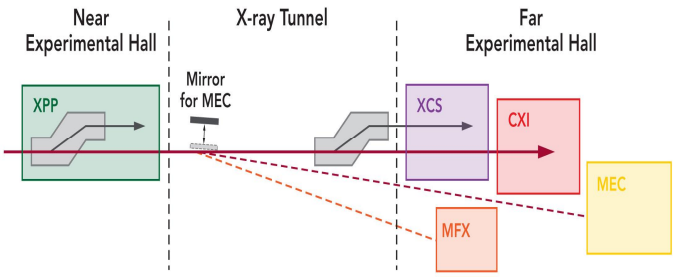
Motivation for a new beamline at LCLS:
Biology experiments require pink beam in the Hard Xray regime.
The existing and combined, CXI and XPP beamlines at LCLS cover >55% of the LCLS proposals, all sciences included. About half of these are biology proposals.
Schedule constraints mean structural biology beam time had plateaued and the gap between biology beam time and demand has been increasing steadily.

MFX is a new beamline at LCLS optimized and dedicated to atmospheric pressure structural biology.
MFX was created to allow more access to beam time and benefit from the LCLS multiplexing capabilities.
First light came on January 12 2016, 21 months after initial funding. First user experiment took place in July 2016. End station is still in construction phase.



LCLS beamline hutches

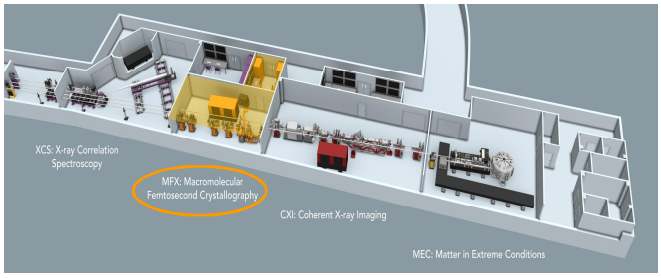
LCLS Instruments and Beam Multiplexing with the New Hutch 4.5

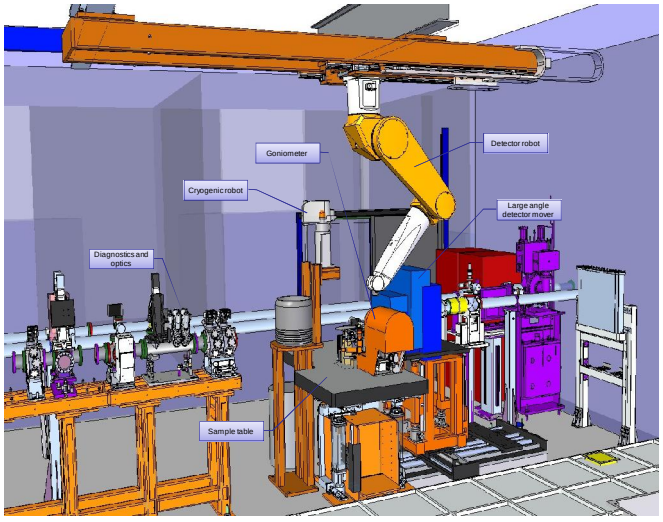


MFX First Light

- MFX will be optimized for atmospheric pressure structural biology, with a flexible system capable of rapid fixed target sample scanning
- MFX will allow more access to beamtime and benefit from LCLS multiplexing capabilities
- First light came on January 12 2016, 21 months after initial funding

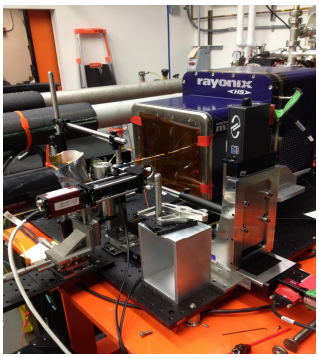
LCLS Far Experimental Hall Hutches with MFX

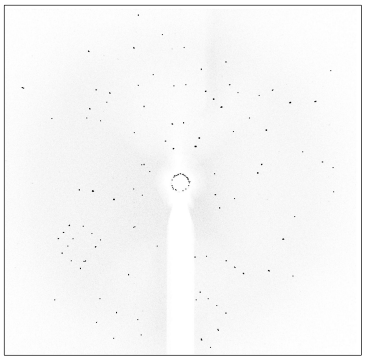




MFX First Diffraction Data

- First diffraction data was collected on March 22 2016
- A viscous jet in air was used to deliver crystals to the beam
- Existing shared LCLS Rayonix detector was used
- Data was collected while multiplexing with XPP beamline, highlighting the key advantage of MFX for increasing access to beamtime





MFX will be an ideal instrument for studying structure and dynamics at room temperature in many fields including biology.

- Diffraction patterns from 22,488 crystals were collected during a short 6 hour run
- Average hit rate of 32%, peaking above 70%
- The MFX instrument will be optimized for atmospheric pressure structural biology ideally suited for large viscous jets.