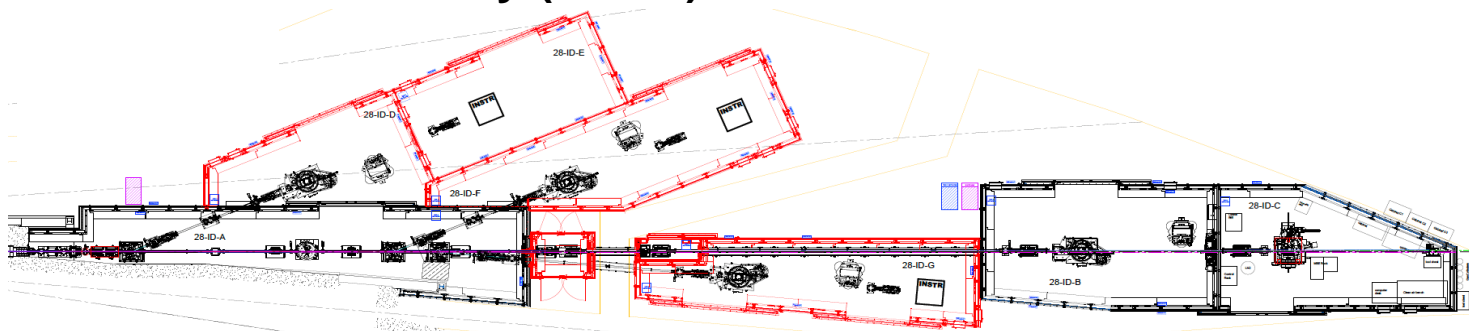


UPGRADING THE ADVANCED PHOTON SOURCE

Revolutionizing *in situ* science with the Coherent High-Energy X-ray (CHEX) feature beamline



Schematic of the CHEX beamline at 28-ID at the Advanced Photon Source. CHEX will include eight experiment stations on 4 branchlines, one with a tunable energy range of 5-60 keV and three selectable energy branches. This will allow multiple instruments to operate simultaneously.

The Coherent High-Energy X-ray sector (CHEX) is considered one of the feature beamlines under construction as part of the Advanced Photon Source (APS) Upgrade. In truth, it's a suite of experiment stations, the goal of which is to advance the frontier for real-time *in situ* studies. CHEX will consist of one tunable energy branchline operating from 5-60 keV and three selectable energy branchlines operating at particular energies from 5-105 keV. CHEX will make use of revolutionary coherent diffraction imaging and photon correlation spectroscopy, making use of the extremely coherent X-ray high energy beams the upgraded APS will produce. The beamline will be optimized for coherent X-ray techniques at the higher energies needed for *in situ* studies and will uncover new insights into the synthesis and transformation of materials. Research conducted at CHEX has the potential to open new paths of discovery in a variety of fields, from additive manufacturing to energy

energy storage to catalysis to geochemical systems, and will contribute to new materials for applications such as light-emitting diodes and quantum computers. CHEX is under construction now and is expected to be available for user proposals in 2025.

CHEX Key Specifications

Photon beam energy	5-105 keV
Distance from source	Up to 70 m
X-ray spot size	down to 1 μm
Techniques	Coherent diffraction imaging and photon correlation spectroscopy



CHEX will enable experiments into new materials for quantum information systems.

Follow the APS Upgrade Project at aps.anl.gov/APS-Upgrade

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