Advancing Crystallography Research: The Latest Progress and Future Directions of NE-CAT Beamlines at the Advanced Photon Source

Ali Kaya[1], Malcolm Capel[1], Igor Kourinov[1], Anthony Lynch[1], Frank Murphy[1], David Neau[1], Kay Perry[1], Jonathan Schuermann[1], Narayanasami Sukumar[1], James Withrow[1], Steve Ealick[1]

[1]Department of Chemistry and Chemical Biology, Cornell University / NE-CAT

aik52@cornell.edu

The Northeastern Collaborative Access Team (NE-CAT) designs and operates synchrotron X-ray beamlines for solving technically challenging structural biology problems. Our state-of-the-art instrumentation and expertise provide critical resources for the national and international research community. Currently, we operate two undulator beamlines: a tunable energy beamline (24-ID-C) that can deliver X-rays from 6-22 keV, and a single-energy beamline (24-ID-E) that operates at 12.662 keV. Both beamlines are designed for remote operations and are equipped with MD2 micro diffractometers, custom-built ALS-style robotic sample automounters with dewars capable of holding up to 14 pucks, and a locally developed software suite RAPD, which provides data collection strategies, integration, scaling, and a simple automated MR/SAD. Our experienced NE-CAT team supports our users 24/7, and they can securely download their data using Globus, sftp, or a custom Python script.

The Advanced Photon Source upgrade (APS-U) is underway, and our goal is to provide a faster, more flexible, and reliable data collection experience for the structural biology community. To achieve this, we are implementing several upgrades during the APS-U period, including a new monochromator for the C-beamline, MD3 micro diffractometers, a custom-built sample automounter with a 30-puck capacity, a more flexible design for the remote user interface with fully automated data collection, and RAPDv2, a faster and redesigned data processing software suite. Additionally, we are increasing our capabilities for room-temperature data collection experiments.