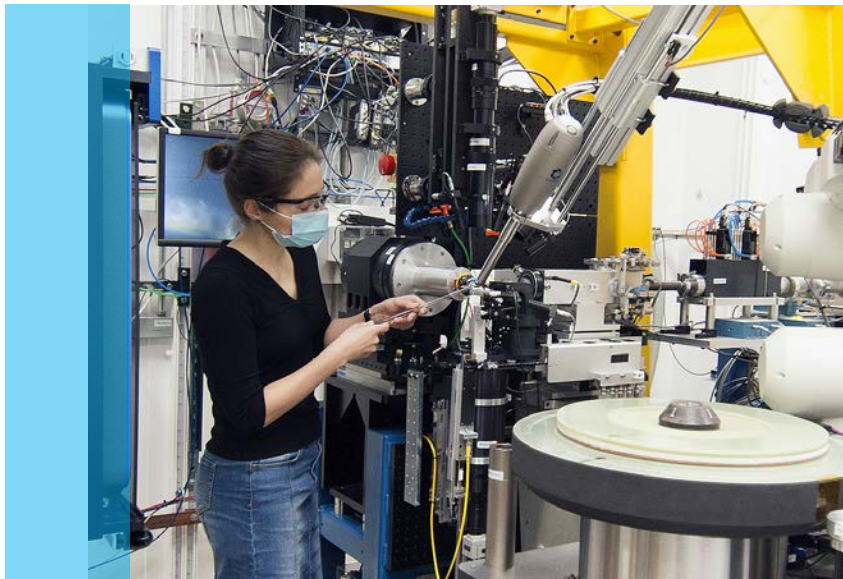


FIGHTING COVID-19 WITH THE ADVANCED PHOTON SOURCE



From the outset of the COVID-19 pandemic, researchers using the U.S. Department of Energy's Advanced Photon Source (APS) at Argonne National Laboratory have been studying the SARS-CoV-2 virus and COVID-19 disease.

As of late 2021, scientists using ultra-bright x-rays from the APS have published more than 50 papers on these topics, with more on the way (scan the QR code below for a list of COVID-19-related publications and highlights). Here are a few examples of recent discoveries.

Karolina Michalska, a structural biologist at the Structural Biology Center, in the 19-ID research station.

- A study at an SBC-XSD x-ray beamline at the APS provided structural details of how the drug masitinib (which has undergone clinical trials but has not yet received approval to treat humans) works. Because the drug may be effective against many types of coronaviruses and picornaviruses due to the way it inhibits replication, it may be effective against COVID-19 variants.

- Researchers using the GM/CA-XSD x-ray facility at the APS determined protein structures that will help develop small-molecule drugs designed to stop the spread of COVID-19 by inhibiting a critical enzyme's ability to set viral replication in motion.

- Using an NE-CAT beamline at the APS to study the naturally occurring human antibodies created in response to SARS-CoV-2 helped researchers discover how different antibodies bind to the SARS-CoV-2 virus, and identified clues to ways of optimizing antibodies so that they are more effective at targeting the virus, on the way to developing new therapies that can prevent and treat COVID-19 infections.

- Researchers using the IMCA-CAT x-ray facility at the APS solved the structure of a particularly promising variant of a SARS-CoV-1 protease inhibitor and demonstrated that it displayed potent anti-viral inhibition of SARS-CoV-2, which led to the development of a phosphate that entered clinical trials as a potential treatment for COVID-19.

- Research based on x-ray data collected at an LS-CAT x-ray beamline at the APS provided important insights into how dexamethasone, a drug used to treat COVID-19 patients, is transported within the body and the factors that may determine whether it helps or harms these vulnerable patients.

Groups operating macromolecular x-ray crystallography facilities at the APS: BioCARS, the Industrial Macromolecular Crystallography Association Collaborative Access Team (IMCA-CAT), the Life Sciences CAT (LS-CAT), the Lilly Research Laboratories CAT, the National Institute of General Medical Sciences and National Cancer Institute (GM/CA-XSD), the Northeastern CAT (NE-CAT), the Southeast Regional CAT, and the Structural Biology Center (SBC-XSD).

This research used resources of the Advanced Photon Source, a U.S. Department of Energy (DOE) Office of Science User Facility operated for the DOE Office of Science by Argonne National Laboratory under Contract No. DE-AC02-06CH11357

Media inquiries: bschlesinger@anl.gov
APS information: fenner@anl.gov
APS web site: www.aps.anl.gov/

