

Facility Facts & Figures

The National Synchrotron Light Source (NSLS) is a national user research facility funded by the U.S. Department of Energy's Office of Basic Energy Science. The NSLS operates two electron storage rings: an X-Ray ring (2.8 GeV, 300 mA) and a Vacuum UltraViolet (VUV) ring (800 meV, 1.0 A) which provide intense light spanning the electromagnetic spectrum from the infrared through x-rays. The properties of this light, and the specially designed experimental stations, called beamlines, allow scientists in many fields of research to perform experiments not otherwise possible at their own laboratories.

Over 2500 scientists representing more than 400 institutions, over 50 of them corporations, come to Brookhaven National Laboratory annually to conduct research at the NSLS. The facility operates 7 days a week, 24 hours a day, throughout the year, except during periods of maintenance and studies.

As a national user facility, the NSLS does not charge for its beamtime, providing that the research results are published in the open literature. Proprietary re-

search is conducted on a full cost recovery basis.

There are two ways to obtain beamtime at the NSLS: either as a General User or as a member of a Participating Research Team (PRT). General Users are independent investigators interested in using the NSLS for their research. Access is gained through a peer-reviewed proposal system. All operational beamlines at the NSLS reserve at least 25% of their available beamtime for General Users. PRTs are groups of researchers with related interests from one or more institutions. Membership in a PRT is open to all members of the scientific community who can contribute significantly to the program of the PRT (i.e., funding, contribution of equipment, scientific program, design and engineering, operations manpower, etc.).

The NSLS currently has 56 X-Ray and 23 VUV operational beamlines for performing a wide range of experiments. The following pages list the operational beamlines at the NSLS and their unique characteristics.

Beamline Guide

Technique	Description	Technique	Description
ARPES	UV photoelectron spectroscopy, angle-resolved	STXM	Scanning transmission x-ray microscopy
DAFS	X-ray diffraction anomalous fine structure	UPS	UV photoelectron spectroscopy
DEI	Diffraction-enhanced imaging	UV-CD	Ultraviolet circular dichroism
EXAFS	X-ray absorption spectroscopy, extended fine structure	WAXD	Wide-angle x-ray diffraction
HARMST	High aspect ratio microsystems technology	WAXS	Wide-angle x-ray scattering
IRMS	Infrared microspectroscopy	XAS	X-ray absorption spectroscopy
MAD	Multi-wavelength anomalous dispersion	XMCD	X-ray magnetic circular dichroism
NEXAFS	X-ray absorption spectroscopy, near edge x-ray absorption	XPS	X-ray photoelectron spectroscopy
SAXS	Small angle x-ray scattering	XRD	X-ray diffraction
SPARPES	UV photoelectron spectroscopy, spin- and angle resolved	XSW	X-ray standing waves

Beamline	Source	Type of Research	Energy Range	Organization
U1A	Bend	NEXAFS XAS	20-1500 eV	ExxonMobil Research and Engineering Co.
U2A	Bend	IR spectroscopy IRMS High pressure research	50-4000 cm ⁻¹	Carnegie Institute of Washington
U2B	Bend	IR spectroscopy IRMS	50-4000 cm ⁻¹	Albert Einstein College of Medicine
U3C	Bend	XPS	50-1000 eV	Bechtel Nevada Lawrence Livermore National Laboratory Los Alamos National Laboratory Sandia National Laboratory
U4A	Bend	UPS	10-300 eV	Boston University Brookhaven National Laboratory North Carolina State University Rutgers University
U4B	Bend	XPS UPS XMCD X-ray fluorescence X-ray scattering, resonant X-ray scattering, magnetic	20-1200 eV	Brookhaven National Laboratory Montana State University Naval Research Laboratory Pohang Institute of Science & Technology
U4IR	Bend	Infrared spectroscopy IRMS	20-4000 cm ⁻¹	Brookhaven National Laboratory
U5UA	Insertion Device	UPS ARPES SPARPES Magnetospectroscopy	15-150 eV	Argonne National Laboratory Brookhaven National Laboratory University of Texas
U7A	Bend	XPS NEXAFS	180-1200 eV	Brookhaven National Laboratory Dow Chemical Company National Institute of Standards & Technology Rutgers University Texas A&M University University of Michigan
U7B	Bend	NEXAFS UPS XPS	15-300 eV	Brookhaven National Laboratory
U8A	Bend	ARPES NEXAFS	7-1300 eV	University of California, Riverside
U8B	Bend	NEXAFS ARPES	100-1000 eV	IBM Research Division University of California, Riverside University of Michigan
U9A	Bend	Photon-stim. desorption	White Beam	Brookhaven National Laboratory
U9B	Bend	UV-CD UV fluorescence	2.1-8.9 eV	Brookhaven National Laboratory
U10A	Bend	IR spectroscopy	30-10000 cm ⁻¹	Brookhaven National Laboratory
U10B	Bend	IRMS IR spectroscopy	50-4000 cm ⁻¹	Brookhaven National Laboratory University of Saskatchewan
U11	Bend	UV photoabsorption UPS UV photoionization	3-30 eV	Brookhaven National Laboratory

Beamline	Source	Type of Research	Energy Range	Organization
U12A	Bend	XAS	100-800 eV	Brookhaven National Laboratory Oak Ridge National Laboratory
U12IR	Bend	IR spectroscopy Far-IR spectroscopy Time-resolved spectroscopy	3-400 cm ⁻¹	Brookhaven National Laboratory SUNY Stony Brook University of Florida
U13UA	Insertion Device	White Beam	White Beam	Brookhaven National Laboratory
U13UB	Insertion Device	UPS ARPES	5-30 eV	Boston University Brookhaven National Laboratory
U14A	Bend	XPS UPS	15-300 eV	Brookhaven National Laboratory
U16B	Bend	XPS	50-1000 eV	Brookhaven National Laboratory Rutgers University University of Texas
X1A1	Insertion Device	STXM	250-500 eV	Brookhaven National Laboratory ExxonMobil Research & Engineering Co. SUNY Plattsburgh SUNY Stony Brook University of Texas
X1A2	Insertion Device	STXM	250-1000 eV	SUNY Stony Brook
X1B	Insertion Device	XAS X-ray fluorescence XPS X-ray scattering, coherent	100-1600 eV	Boston University Brookhaven National Laboratory Fritz-Haber-Institut University of Groningen
X2B	Bend	X-ray microtomography	8-35 keV	ExxonMobil Research & Engineering Co.
X3A1	Bend	XRD, single-crystal	19,31 keV	Alfred University Amoco Corporation SUNY Buffalo SUNY Stony Brook
X3A2	Bend	XRD, single-crystal Molecular crystallography XAS SAXS	6-30 keV	Alfred University Amoco Corporation SUNY Buffalo SUNY Stony Brook
X3B1	Bend	XRD, powder EXAFS XAS	6-30 keV	Alfred University Amoco Corporation SUNY Buffalo SUNY Stony Brook
X3B2	Bend	XRD, surface	6-26 keV	Alfred University Amoco Corporation SUNY Buffalo SUNY Stony Brook
X4A	Bend	MAD	3.5-20 keV	Howard Hughes Medical Institute
X4C	Bend	MAD	7-20 keV	Howard Hughes Medical Institute
X5A	Bend	Laser backscattering	140-470 MeV	Brookhaven National Laboratory Forschungszentrum Juelich (KFA) Norfolk State University Ohio University Syracuse University University of Paris

Beamline	Source	Type of Research	Energy Range	Organization
X5A (cont'd)	Bend	Laser backscattering	140-470 MeV	University of Rome II University of South Carolina University of Virginia Virginia Polytechnic Inst. & State University
X6A	Bend	MAD	5-20 keV	Brookhaven National Laboratory
X7A	Bend	XRD, powder	5-45 keV	Brookhaven National Laboratory Chevron Research & Technology Company Ohio State University SUNY Stony Brook University of Birmingham University of California, Santa Barbara University of Pennsylvania
X7B	Bend	WAXS or WAXD XRD, time-resolved XRD, single-crystal	5-21 keV	Brookhaven National Laboratory
X8A	Bend	Metrology	0.26-5.9 keV	Bechtel Nevada Lawrence Livermore National Laboratory Los Alamos National Laboratory Sandia National Laboratory
X8C	Bend	MAD	5-19 keV	Brookhaven National Laboratory Hoffmann-La Roche Los Alamos National Laboratory National Research Council of Canada University of California, Los Angeles
X9A	Bend	MAD	5-15 keV	Albert Einstein College of Medicine Rockefeller University Sloan-Kettering Institute for Cancer Research
X9B	Bend	MAD XAS EXAFS NEXAFS	5-15 keV	Albert Einstein College of Medicine National Institutes of Health
X10A	Bend	SAXS XRD, time-resolved XRD, powder WAXS or WAXD X-ray reflectivity	7-15 keV	ExxonMobil Research & Engineering Co.
X10B	Bend	XRD, powder XRD, surface WAXS or WAXD X-ray reflectivity	14.2 keV	ExxonMobil Research & Engineering Co.
X10C	Bend	XAS EXAFS NEXAFS	4-24 keV	ExxonMobil Research & Engineering Co.
X11A	Bend	XAS EXAFS NEXAFS DAFS	4.5-35 keV	Brookhaven National Laboratory Hunter College Naval Research Laboratory Naval Surface Warfare Center New Jersey Institute of Technology North Carolina State University Pacific Northwest National Laboratory Paul Scherrer Institute U.S. Environmental Protection Agency University of Connecticut

Beamline	Source	Type of Research	Energy Range	Organization
X11B	Bend	EXAFS	3.5-25 keV	Brookhaven National Laboratory Naval Research Laboratory Naval Surface Warfare Center New Jersey Institute of Technology North Carolina State University Paul Scherrer Institute U.S. Environmental Protection Agency University of Connecticut
X12A	Bend	Optics R&D	5.6-40 keV	Brookhaven National Laboratory
X12B	Bend	MAD	5-20 keV	Brookhaven National Laboratory
X12C	Bend	MAD	7.5-13.5 keV	Brookhaven National Laboratory
X13A	Insertion Device	X-ray scattering, resonant Magnetospectroscopy XMCD	250-1800 eV	Brookhaven National Laboratory
X13B	Insertion Device	X-ray microdiffraction	5-15 keV	Brookhaven National Laboratory
X14A	Bend	XRD, single-crystal	5-26 keV	Oak Ridge National Laboratory University of Tennessee
X14B	Bend	HARMST X-ray lithography	White Beam	Brookhaven National Laboratory
X15A	Bend	DEI XSW	8-45 keV	Argonne National Laboratory Brookhaven National Laboratory European Synchrotron Radiation Facility Illinois Institute of Technology North Carolina State University Northwestern University University of North Carolina
X15B	Bend	XAS EXAFS NEXAFS	1.5-15 keV	Lucent Technologies, Inc.
X16A	Bend	XRD, surface	4-12 keV	Lucent Technologies, Inc. University of Illinois, Chicago
X16B	Bend	XRD, powder XRD, surface	7.85 keV	Lucent Technologies, Inc.
X16C	Bend	XAS XRD, powder	4.5-25 keV	Lucent Technologies, Inc. University of Illinois, Chicago
X17B1	Insertion Device	XRD, powder	20-100 keV	Brookhaven National Laboratory Carnegie Institute of Washington SUNY Stony Brook
X17C	Insertion Device	XRD, powder XRD, single-crystal High pressure research	5-80 keV	Carnegie Institute of Washington Lawrence Livermore National Laboratory Naval Research Laboratory University of Chicago
X18A	Bend	WAXS or WAXD XRD, single-crystal XRD, surface XRD, powder X-ray reflectivity SAXS	4-19 keV	Brookhaven National Laboratory Pennsylvania State University Purdue University University of Maryland University of Missouri
X18B	Bend	XAS	5.6-40 keV	AlliedSignal, Inc.

Beamline	Source	Type of Research	Energy Range	Organization
X18B (cont'd)	Bend	EXAFS NEXAFS	5.6-40 keV	Brookhaven National Laboratory Chevron Research & Technology Company Dow Chemical Company General Electric Institute of Paper Science and Technology North Carolina State University PPG Industries, Inc. Rutgers University University of California, Davis University of Kentucky University of Tennessee UOP
X19A	Bend	XAS EXAFS NEXAFS	2-7.9	Brookhaven National Laboratory Chevron Research & Technology Company Dow Chemical Company General Electric Institute of Paper Science and Technology North Carolina State University Rutgers University University of California, Davis University of Kentucky University of Tennessee UOP
X19C	Bend	X-ray scattering, liquid XRD, surface X-ray reflectivity X-ray topography	6-17 keV	Army Research Laboratory Carnegie Mellon University Dartmouth College Johns Hopkins University National Aeronautical and Space Agency SUNY Stony Brook University of Chicago University of Illinois, Chicago University of Wisconsin
X20A	Bend	XRD, surface X-ray microdiffraction	6.3-12 keV	IBM Research Division University of Toronto
X20B	Bend	XRD, surface	17.4 keV	IBM Research Division University of Toronto
X20C	Bend	XRD, surface XRD, time-resolved	5-11 keV	IBM Research Division University of Toronto
X21	Insertion Device	X-ray inelastic scattering X-ray fluorescence SAXS	5.6-10	Brookhaven National Laboratory
X22A	Bend	XRD, single-crystal XRD, surface XRD, time-resolved X-ray reflectivity WAXS or WAXD X-ray scattering, surface	10,32 keV	Brookhaven National Laboratory Rutgers University University of Maryland
X22B	Bend	X-ray scattering, liquid XRD, surface	6-10 keV	Brookhaven National Laboratory Harvard University Rutgers University
X22C	Bend	XRD, single-crystal XRD, surface X-ray scattering, magnetic X-ray reflectivity	3-11 keV	Brookhaven National Laboratory Rutgers University University of Maryland

Beamline	Source	Type of Research	Energy Range	Organization
X23A2	Bend	XAS EXAFS NEXAFS DAFS XRD, powder	4.7-30 keV	Brookhaven National Laboratory
X23B	Bend	XAS EXAFS NEXAFS XRD, powder	3-10.5 keV	Naval Research Laboratory
X24A	Bend	XSW XPS X-ray fluorescence EXAFS Auger spectroscopy	1.8-5 keV	Brookhaven National Laboratory National Institute of Standards & Technology
X24C	Bend	XPS	6-1800 eV	Naval Research Laboratory
X25	Insertion Device	MAD	3-30 keV	Brookhaven National Laboratory
X26A	Bend	X-ray microprobe X-ray microdiffraction	3-30 keV	Brookhaven National Laboratory University of Chicago University of Georgia
X26C	Bend	MAD	5-20 keV	Brookhaven National Laboratory Cold Spring Harbor Laboratory SUNY Stony Brook
X27A	Bend	X-ray microtomography	8-40 keV	Brookhaven National Laboratory
X27B	Bend	HARMST	White Beam	Brookhaven National Laboratory
X27C	Bend	SAXS WAXS or WAXD XRD, time-resolved	10 keV	Basell USA, Inc. (formerly Montell) Honeywell International National Institute of Standards & Technology National Institutes of Health Naval Surface Warfare Center New Jersey Institute of Technology SUNY Stony Brook U.S. Air Force
X28C	Bend	X-ray footprinting	White Beam	Albert Einstein College of Medicine