WORKSHOP # 11 – Tuesday, May 5, 2026

Soft X-ray Nanoprobe – First Science Opportunities, Instrumentation and Practice

Organizers: Thomas Feggeler (NSLS-II), Wen Hu (NSLS-II)

Over 50 years of development, synchrotron-based X-ray microscopy has become a powerful and widely used tool for probing nanoscale structure, chemistry, and morphology across many areas of science. Scanning X-ray microscopy, in particular, enables chemically, electronically, and magnetically sensitive imaging with high spatial resolution and is now routinely implemented at synchrotron facilities worldwide using advanced optical schemes, detector technologies, and diverse sample environments, including ptychography, tomography, time-resolved measurements, and operando and cryogenic studies.

The forthcoming Soft X-ray Nanoprobe (SXN) at the NSLS-II represents a new state-of-the-art capability in soft X-ray nano-imaging and spectroscopy. Operating over an energy range of approximately 250 eV to 2500 eV with full polarization control, SXN is designed to achieve sub-10 nm spatial resolution using coherent diffractive imaging approaches, enabled by the exceptional brightness, coherence, and stability of NSLS-II. The beamline is scheduled to come online in 2026, with first external users anticipated in 2027, creating a timely opportunity to shape early science directions and user readiness.

This one-day, in-person workshop will focus on identifying high-impact first science opportunities for SXN, providing an overview of instrument capabilities and commissioning plans, and sharing practical guidance for future users. Topics will include experimental design and data acquisition strategies, multimodal and correlative measurements, advanced data analysis workflows, and emerging approaches leveraging machine learning and artificial intelligence.

We expect that the workshop will serve as a foundational step in building the initial SXN user community and supporting a successful transition from commissioning to early user operations. In addition, the workshop will address anticipated community needs arising from the Advanced Light Source dark time beginning in mid-2027 by highlighting SXN as a complementary capability. The workshop aligns directly with the missions of NSLS-II, Brookhaven National Laboratory, the DOE Office of Basic Energy Sciences and the Genesis Mission by maximizing the scientific impact of a major new user facility instrument and strengthening the soft X-ray nanoprobe user community at NSLS-II.

Start Time (ET)	Title	Speaker (Affiliation)
8:30	*Breakfast (SUSC)*	
9:00	Welcome & Strategic Context	Paul Zschack (NSLS-II)
9:15	SXN Beamline Overview and Commissioning Vision	Wen Hu (NSLS-II)
9:40	The Pixelator Instrument Control System (Keynote, Remote)	Benjamin Watts (PSI)
10:15	*Break*	
10:25	Earth and environmental science research needs, applications, and first science cases for soft X-ray nanoprobe (Remote)	Brandy Toner (University of Minnesota)
10:50	Capturing fluctuation mediated dynamics using coherent x-ray scattering in correlated oxides	Roopali Kukreja (UC Davis)
11:15	Recent and future Advances in Soft X-ray Imaging (Plenary)	David A. Shapiro (ALS)
12:00 – 1:30 pm	*Lunch Break (SUSC)*	
1:30	Making the Invisible Visible: Soft Materials in a Composite Matrix	Esther Takeuchi (BNL/Stony Brook)
1:55	Experimental Practice Case and Needs II	Brian A. Collins (Washington State University)
2:20	TBD	Xin Zhang (PNNL)
2:45	*Break*	
3:05	Application of the Bluesky data acquisition framework and the Blop optimization tool for NEXT-II ARI & SXN beamlines	Max Rakitin (NSLS-II)
3:30	SXN - Data Engineering	Yevgen Matviychuk (NSLS-II)
3:55	SXN – Data Analysis & ML / AI Opportunities	Abigail Giles (NSLS-II)
4:20	SXN Beamline Tools – First Insights	Thomas Feggeler (NSLS-II)
5:00	Panel Discussion	All participants
5:30	Closing Remarks	Thomas Feggeler (NSLS-II) Wen Hu (NSLS-II)