50th Annual Department of Chemistry and Biochemistry
Spring Undergraduate Research Symposium

Keynote Speaker

Jeff Keister, PhD

(JMU Class of 1993)

Deputy Division Director, Data Science and System Integration
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Jeff Keister is Deputy Division Director for Data Science and System Integration (DSSI) at the National Synchrotron Light Source II (NSLS-II) of Brookhaven National Laboratory (BNL). He graduated from James Madison University with a B.S. in Chemistry in 1993. During his time at JMU, Jeff performed unimolecular decomposition research with Tom DeVore, catalysis research at Clemson University, and gas-phase laser research at Georgia Tech.

After graduating from JMU, Jeff studied gas-phase ion dissociation at UNC Chapel Hill, performing experiments in the lab as well as at synchrotrons in Berkeley and Paris, before completing his Ph.D. in 1997. Afterwards, Jeff served as a National Research Council fellow for the Army Research Office, conducting research at North Carolina State University and making regular measurements of silicon surfaces and interfaces at the NSLS on Long Island, New York. Starting in 2000, Jeff worked at KLA Instruments, supporting development and application of patterned wafer inspection equipment for semiconductor manufacturing. In 2004 he returned to NSLS to run beamlines for a consortium of users requiring absolute calibration of flux measurement instrumentation for inertial confinement fusion (ICF) research. In 2009 he joined the NSLS-II project, supporting x-ray optics testing for ultrahigh resolution spectroscopy. Within NSLS-II he later took on responsibilities to lead several beamline development projects and support operating beamlines with standard detectors and other instrumentation. In 2019 Jeff took on leadership of the Engineering and Equipment (EE) group within NSLS-II's DSSI where he is responsible for defining and delivering hardware infrastructure standards supporting all beamlines at NSLS-II.

When he's not working, Jeff likes to run, make and play music, and spend time with his family.

Research: When Rubber Hits the Road

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Whereas university coursework prepares us with the principles of science, engaging in research forces us to take accountability for our own experimental variables. Since a predictable degree of control of conditions and accuracy in measurement are critical foundations of science, sound experimental design often leverages and expands upon established techniques, methods, and instruments. My career has largely been based on learning techniques and their engineering foundations, in order to improve their reliability and widen their applicability to scientific inquiry.

As early as during my first research at JMU, I recognized that many of the experiments I can do rely on proven instrumentation with wide applicability. Since then, I have also seen many career scientists find long-term success by developing or refining techniques which can be reliably used for many types of samples.

At the synchrotron, small beams of x-ray light with specific wavelength are delivered to a range of samples. Since the interaction of this light with samples can take an array of forms and provide correspondingly diverse types of information about the samples, scientists and engineers over time have developed many techniques which serve a wide variety of fields of study.

In my talk I will describe techniques I have used both in and out of the synchrotron, and I will share information about what the NSLS-II can provide to researchers in various fields as well as to students who are interested in deepening their experience with instrumentation.