# BNL Course in X-Ray Crystallography Draws Students From Around the World

*Karen McNulty Walsh*

BNL's National Synchrotron Light Source (NSLS) was extra busy last week as a group of 48 students from around the world participated in a week-long, hands-on training course. "Rapid Data Collection and Structure Solving at the NSLS: A Practical Course in Macromolecular X-Ray Diffraction Measurement" was developed by the Biology and NSLS Departments to introduce students to the best people, newest equipment, and latest techniques in the field of x-ray crystallography.

"There's probably no better experience than this for someone who's trying to learn how to use a synchrotron and how to use the software," says participant Mark Walter, an associate professor of chemistry at Oakton Community College in Des Plaines, Illinois.

Walter last did crystallography work when earning his Ph.D. at Northwestern University. Like a Rip Van Winkle who's been asleep for eight years while the field has advanced dramatically, he wanted to update his skills and possibly set up a similar hands-on learning experience for his students.

Like Walter, half the students came to the BNL course to observe and learn everything they could about x-ray crystallography. The other half came with specific projects in mind, such as solving the structure of a particular enzyme. "Half a dozen of them are leaving with a publishable result," said Bob Sweet of BNL's Biology Department, who designed and helped run the program.

The students started their week with two days of lectures and tutorials on the techniques used to prepare crystal samples, and the software and other tools needed to collect and analyze data. These talks were given by BNL scientists, including Sweet, John Skinner, Dieter Schneider, Lonny Berman, and Howard Robinson, and other experts chosen from industry, academia, and other national labs.

"We recruit people who we think are leaders in the field," says Sweet, "and they are really happy to come because they and their competitors are all together at the same time and are able to show their wares.

"There were several volunteer instructors from various industries, including Bram Schierbeek, who works for Bruker/Nonius, a Dutch and German company that makes a variety of crystallography equipment, including detectors and software.

Says Schierbeek, "We think it's a good thing to meet people who use the equipment and see what problems they are encountering so we can use this in our design of software and tell them about the good things we make."

The BNL scientists and these volunteers then served as hands-on scientific supervisors when the students moved to the NSLS beam lines to begin collecting data on their crystal samples.

Emma Jakobsson, a Ph.D. student from Uppsala University in Sweden, particularly appreciated this aspect of the program. "Usually when you are working, you don't have somebody that can take their time to help you . . . and set up the experiment in the optimal way," she said. But in this program, "there is always someone you can ask."

*Students and teachers participating in the x-ray crystallography course gather outside the National Synchrotron Light Source*

According to Sweet, the plan was for the students to run 24 experiments using six of the NSLS macromolecular crystallography beamlines for 60 hours straight. At about 9 p.m. on Tuesday, however, after just one group had begun to collect data, the synchrotron went down. It took until about 1:30 a.m. to get it up and running.

But the students took the delay in stride, working in groups of eight with their scientist advisors to plan how best to use their time. When last seen, they were huddled around beam-line computer terminals, clustered in conversation, and getting on with their work.

"It's really nice to be able to concentrate on this aspect of collecting data and solving structures, which is the last part of experimentation in x-ray crystallography," said Srikripa Devarakonda, a Ph.D. student from the University of Virginia. This was her first trip to a synchrotron. And with a background in physics, she seemed genuinely excited to see how it worked, like a kid in a candy store.

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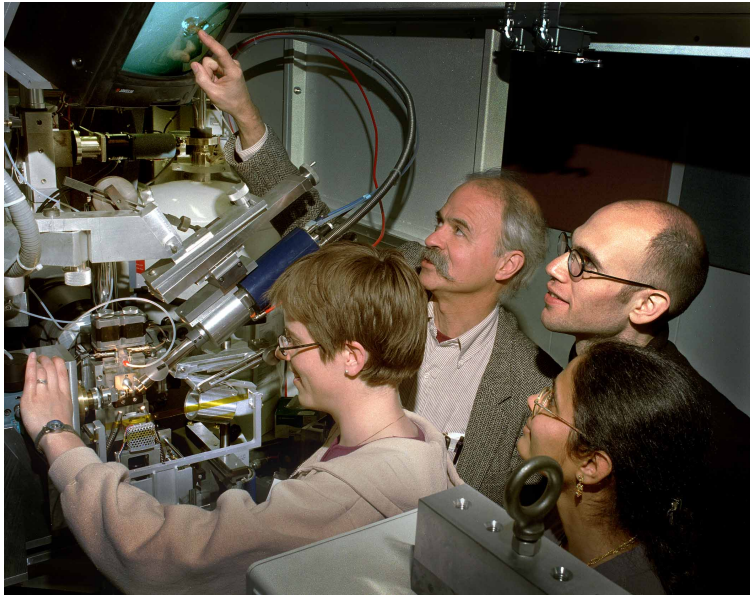

*At BNL's National Synchrotron Light Source, looking at equipment that is being used for the recent week-long course are: (clockwise, from left) Emma Jakobsson from Uppsala University, Sweden; Bob Sweet of the Biology Department, who designed and helped run the program; Oren Rosenberg from Rockefeller University & Yale University; and Srikripa Devarakonda from the University of Virginia.*