

Lawrence Berkeley National Laboratory

Recent Work

Title

First Berkeley-Stanford Summer School in Synchrotron Radiation

Permalink

<https://escholarship.org/uc/item/50g287q5>

Journal

Synchrotron Radiation News, 14(6)

ISSN

0894-0886

Authors

Tamura, Lori
Robinson, Art
Attwood, David
et al.

Publication Date

2001-08-31

First Berkeley-Stanford Summer School in Synchrotron Radiation

As users of synchrotron radiation know full well, there is a learning curve between the states of being interested in the subject and being qualified to conduct experiments. Most new users learn on the job as students or as collaborators with knowledgeable colleagues, but there is an increasingly important role for formal training in the framework of a short course or a summer school. In this spirit, the first-ever Berkeley-Stanford Summer School in Synchrotron Radiation was held Sunday, July 8, through Saturday, July 14, at the Clark Kerr Campus of the University of California, Berkeley (UCB).

Taking advantage of the close proximity between UCB and Stanford University and of the nearby synchrotron sources, the Advanced Light Source (ALS) at the Lawrence Berkeley National Laboratory (Berkeley Lab) and the Stanford Synchrotron Radiation Laboratory (SSRL) at the Stanford Linear Accelerator Center, the week-long residential program was sponsored by Stanford University, Berkeley Lab, SSRL, and the UCB Division of Continuing Education in Engineering. The course itself was coordinated by Anders Nilsson (SSRL/Stanford/Uppsala University) and David Attwood (Berkeley Lab/UCB).

Applicants were admitted based on their academic records, written statements describing how a knowledge of synchrotron radiation would enhance their intended research, and publications lists. The selection process yielded a full roster of 36 graduate students representing 18 different nations around the world from Australia, Asia (China, Japan, India, Korea, and Taiwan), the Middle East (Iran and Turkey), Europe (Denmark, Germany, the Netherlands, Russia, Spain, and Sweden), South America (Chile), and North America (Canada, Mexico, and the United States).

The students, drawn from a wide range of backgrounds (reflecting a typical synchrotron user community) from environmental science to applied chemistry and basic physics, spent a week's worth of cold, foggy mornings and bright, spectacular afternoons in a Berkeley classroom studying what might be called "Synchrotron Radiation 101."

Intended for graduate students pursuing doctoral research in the physical sciences in which synchrotron radiation is expected to play a significant role, the course was designed to introduce prospective synchrotron users to the fundamentals of EUV, soft x-ray, and x-ray synchrotron radiation. In so doing, the program provided a comprehensive overview of the synchrotron radiation process, its requisite technologies, and detailed examples of how these technologies are used in a broad range of scientific applications. It also gave students first-hand exposure to state-of-the-art facilities. Attwood recalls that part of the inspiration for holding the course was the Nordic Summer School on Synchrotron Radiation, a similar program at which both he and Nilsson lectured the previous year in Sweden.

A welcoming reception on Sunday evening opened the week's activities and gave students a chance to get to know one another. After a Monday morning introduction by Attwood and Nilsson, the daily schedule included two morning lectures by the course organizers and several invited speakers, time for a leisurely lunch, and two afternoon lectures. Lecture pairs were punctuated by a half-hour break.

A review of the course syllabus reveals topics tailored to the interests of the group. Lecture topics (and speakers) were "Generation and Properties of Synchrotron Radiation" (two sessions, Attwood); "Spectroscopic Techniques: Basic Principles" (Nilsson); "Photoelectron Spectroscopy: General Aspects" (Nilsson); "Core Level Electron Spectroscopy and Surface Science" (Nilsson); "The Band Structure of Solids by Angle Resolved Photoemission" (Eli Rotenberg, Advanced Light Source); and "X-ray Absorption Spectroscopy: General Aspects" (Joachim Stöhr, SSRL).

Additional lectures were on "X-ray Absorption Spectro-Microscopy: Applications in Magnetism" (Stöhr); "X-ray Optics and Microscopy" (Attwood); "X-ray Speckle and Dynamic Scattering" (Steve Kevan, University of Oregon); "X-ray Emission Spectroscopy and Inelastic X-ray Scattering" (Nilsson); "X-ray Diffraction and Materials Science" (Sean Brennan, SSRL); "XAFS Applications to Environmental Science" (Gordon Brown, Stanford University); and "NEXAFS Microscopy Applications in Polymer Science" (Harald Ade, North Carolina State University).

In addition to the lectures, the program featured extended visits to both the ALS (Wednesday afternoon) and SSRL (Thursday afternoon), where the students had the opportunity to view first-hand the technologies discussed in class and to interact with professional staff and graduate students at both facilities. These visits included lectures on storage rings, beamline design, and the free electron laser project (Linac Coherent Light Source or LCLS) at SSRL, capped off by tours of the experimental facilities.

Friday afternoon featured an opportunity to apply some of the lessons learned during the week in a problem-solving session. Ending the formal proceedings was a stimulating discussion between the students and lecturers in which students were encouraged to ask questions rarely addressed in such a forum, e.g., "What is important for my future career?" and "How do I design a good experiment?" This session was followed by a farewell reception, allowing a last organized chance to exchange email addresses, make plans for future visits, and the like. The school ended on Saturday morning with checkout at the Clark Kerr Campus office.

As part of the course materials, each student received a copy of Attwood's textbook, *Soft X-Rays and Extreme Ultraviolet Radiation: Principles and Applications* (Cambridge University Press, 2000), and the recently updated *X-Ray Data Booklet*, a popular pocket-sized reference book published by the Center for X-Ray Optics at Berkeley Lab that is available in both printed and Web versions (xdb.lbl.gov).

Reflecting more than a century of mostly friendly competition between the two universities, both academically and on the athletic field, each participant also received not one, but two synchrotron summer school t-shirts—one in Berkeley colors (blue with "Berkeley-Stanford Synchrotron Summer School" in gold lettering) and one in Stanford colors (red with "Stanford-Berkeley Synchrotron Summer School" in white lettering).

Co-organizer Nilsson summed up the results of the week's work, "It was rewarding to see all the positive interactions between the lecturers and the students—and among the students themselves. They learned a lot from each other and generated friendships that may last for a long time." Information also flowed from the students to the course organizers, who received valuable feedback and plan to modify their course accordingly next year., when the summer school will be hosted by Stanford. The organizers hope it will become an annual event, alternating between the two sites.

Lori Tamura and Art Robinson
Advanced Light Source, Berkeley Lab

David Attwood
Berkeley Lab and University of California, Berkeley

Anders Nilsson
Stanford Synchrotron Radiation Laboratory and Uppsala University

No electronic figures available.

[Figure 1. XBD200107-01540-9.psd]

Students of the first Berkeley-Stanford Summer School in Synchrotron Radiation gather on the patio of the Advanced Light Source for the obligatory class photo.

[Figure 2. XBD200107-01540-2.psd]

Tony Young of the ALS Experimental Systems Group was one of the guides for the summer school tour of the Advanced Light Source.