

CHES Director's Report

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Artist's rendition of Wilson Lab showing CESR under the present Upper Alumni Athletic field.

Synchrotron radiation (SR) science is evolving rapidly. When CHES started in 1979, synchrotron radiation was largely a niche area populated by a small number of condensed matter physicists who worked parasitically at high energy physics facilities. Today, SR is part of the essential infrastructural fabric of scientists from many disciplines, who would have been shocked to know that they would be working productively at large-scale accelerator-based facilities. For example, modern biological science stands on the two legs of molecular structural determination and genetic engineering; the former is totally dependent on SR protein structure determination. In consequence, many new dedicated SR storage rings are coming on-line around the world to serve a growing and incredibly diverse user community. The size of this community is difficult to estimate, but certainly numbers in the tens of thousands.

CHES has contributed greatly to the evolution of SR. The question we ask ourselves daily is: "How can we best continue to serve the community and to have a unique impact?"

Historically, SR science cut its teeth at three laboratories: Cornell (where SR was first systematically studied in the early 1950's), DESY in Hamburg, Germany, and SLAC in California. In each case SR started as a parasitic activity to elementary particle physics accelerators. Within the last few years all three labs have undergone a transition to primary use of the on-site accelerators for photon science. These three laboratories have historically led the way in SR for user applications, in training accelerator physicists and SR facility scientists who go on to populate other facilities, and as incubators for new technology. So, for example, DESY and SLAC are now commissioning hard X-ray Free Electron Lasers (as is SPring-8 in Japan), whereas

Cornell is developing a hard x-ray Energy Recovery Linac (ERL) x-ray source.

Cornell has arguably trained more accelerator physics and beamline scientist leaders than any other laboratory in the world. Along the way, much of the technology in use at accelerator-based facilities was developed. Recent NSF reviews about the future of SR science at Cornell have emphatically pointed out that these three core missions -- serving SR users, training SR facility scientists and accelerator physicists, and development of new SR and accelerator technology -- are continuing strengths of Cornell's SR activity and offer a uniquely useful and important future for Wilson Lab.

In 2006, Wilson Synchrotron Laboratory, consisting of CHES and the Laboratory for Elementary-Particle Physics (LEPP), was formed into a single administrative umbrella called the Cornell Laboratory for Accelerator-based Sciences and Education (CLASSE). Proposals for continued operation of CHES and ERL R&D through 2014 have been extremely favorably reviewed; we are very optimistic that these activities will continue. These continuing awards will be very positive steps in our hoped for evolutionary path, namely, to continue to operate the storage ring for CHES while completing ERL R&D. Eventually we'd like to build a full-scale ERL facility that incorporates and supersedes the existing facility as the world's first continuous-duty, coherent hard x-ray source.

The Facility Highlights section of this News Magazine shines a spotlight on many CLASSE activities. At the same time, user science is as productive as ever, as highlighted in the Research Highlights section of the News Magazine. Enjoy.