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Six CHESS workshops will explore cutting-edge science with planned Energy Recovery Linac

By Lauren Gold

With the design for the proposed Energy Recovery Linac (ERL) well under way and a prototype already under construction, scientists at the Cornell High Energy Synchrotron Source (CHESS) have invited researchers from around the world to a series of workshops focused on making the most of the facility's potential. The six two-day workshops will be held at the Robert Purcell Community Center between June 5 and June 24.

The workshops, which are open to the public, will cover high-pressure science, ultra-fast processes, materials science, studies of soft-matter, biology, and science with X-ray nanobeams.

Participants will include physicists, chemists, biologists, nanoscientists, geologists and materials scientists -- all with ideas for potential research using the ERL. "We want to identify areas of science and technology that could be greatly advanced by the construction of a first-of-its-kind ERL high-energy X-ray source," said Ernie Fontes, assistant director of CHESS and an organizer of the materials workshop. "We're hoping that the output from the workshop discussion groups will be examples of measurements where scientists are already feeling that they've reached the limits and, therefore, the ERL source will open up new avenues for better data and novel insights."

The ERL, a revolutionary new kind of synchrotron X-ray radiation source, will provide ultra-fast and ultra-high-brilliance X-ray beams (with pulses about a thousand times shorter and brighter than are available anywhere in the world today), allowing researchers to focus on structures just a few atoms wide and whose oscillations can be measured in femtoseconds, or quadrillionths of a second. The facility will open a wide array of possibilities: allowing materials scientists to examine the dynamic interface between a solid and a liquid during the freezing process, for example, or the minute processes that occur during solidification of metal alloys; or giving biologists a view of the rapid folding and unfolding of protein molecules during activation.

The project's principal investigators are Sol Gruner, director of CHESS and the John L. Wetherill Professor of Physics at Cornell, and Maury Tigner, director of the Laboratory of Elementary Particle Physics and Cornell professor of physics emeritus. In addition to Gruner, Cornell faculty members Harold Craighead, Neil Ashcroft, William Bassett, Lois Pollack, Joel Brock, Alex Gaeta, George Malliaras, David Muller and Veit Elser are among the workshops' organizers and speakers.

"The full-scale machine will be a huge project that would help keep Cornell at the forefront of X-ray science in many areas of physics, chemistry, biology and materials research for decades to come," said Fontes. "It would also help with high-technology job creation in the upstate New York area."

Cornell has received \$30 million from the National Science Foundation and New York state to begin technology and engineering studies in anticipation of a proposal to install an ERL on the Cornell campus as an upgrade to the existing CHESS national X-ray facility.

"Like any new microscope, the new ERL source will, for some applications, produce different and even better experimental data than scientists can presently collect anywhere in the world," Fontes said. "We want to extend a special invitation to graduate students and forward thinkers."

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