CENTER FOR BEAM PHYSICS SEMINAR

"The LCLS: Short X-Ray Pulses Open a Window for New Scientific Opportunities"

Jerome Hastings
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Friday December 6, 2002, 10:30 AM
Albert Ghiorso Conference Room (71-264), LBNL
••• *Refreshments served at 10:20 AM* ••

Abstract: X-rays have contributed in no small measure to our understanding of the equilibrium structure of matter with atomic resolution. They provide a probe that is sensitive to electron density variations at the Å-length scale, appropriate for studying the structures of gases, liquids, and amorphous and crystalline solids. X-rays from synchrotron sources are now being used to study not only static structures, but also equilibrium dynamics, complementing and extending the capabilities of the traditional dynamical probes: light scattering and neutron scattering. The new x-ray free-electron lasers hold the promise to extend the role of x-rays to understand the static and dynamic behavior of matter at the Å-length scale. With their high intensity and subpicosecond pulse length, x-ray FELs such as the LCLS at Stanford could be used to determine the structures of single biomolecules and small aggregates, study the nonequilibrium dynamics of chemical reactions, probe the structure and dynamics of warm dense matter (the state of matter in the core of large planets and cool stars), and study the equilibrium dynamics of polymers. The opportunities afforded by LCLS will be presented with an emphasis on the unique source characteristics that will make these studies possible.

Biographical data and research interests: Jerry Hastings obtained his Ph. D. at Cornell in 1975 in applied physics. Following positions at ORNL (74-76), SSRL (76-77) and NSLS (77-01), he joined SSRL in 2001 as Assistant Director. He is the recipient of several awards, including Fellow of the APS. He has served, or is currently serving, in several international advisory committees on synchrotron radiation facilities, including Pohang, Spring-8, ESRF, DIAMOND and DESY. He is the author or co-author of over 100 publications concentrated on the development and use of synchrotron radiation.

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