Ground Breaking New Science at SLAC

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SLAC Director Jonathan Dorfan, Stanford University Provost John Etchemendy, DOE Under Secretary of Science Raymond Orbach, Congresswoman Anna Eshoo and Congresswoman Zoe Lofgren ceremonially shovel the first spades of earth at the LCLS ground breaking ceremony. (Image courtesy of Diana Rogers.)

The Department of Energy's Stanford Linear Accelerator Center officially broke ground today for the Linac Coherent Light Source (LCLS), the world's first X-ray free-electron laser. Scheduled for completion in 2009, the LCLS will produce ultra-fast, ultra-short pulses of X-rays a billion times brighter than any other source on earth.

The LCLS "will drive understanding and opportunity as no facility has ever done before," said DOE Under Secretary of Science Raymond L. Orbach, who delivered the keynote address during the ceremony. "What you'll have here is what we all hope for—a window into the future, one that we think we will understand, but where conventional wisdom can be

turned on its head."

Nearly 1,000 attendees looked on as Orbach and other dignitaries including Congresswomen Anna Eshoo and Zoe Lofgren, Congressman Mike Honda, Stanford University Provost John Etchemendy, and SLAC Director Jonathan Dorfan ceremonially shoveled the first spades of earth at the start of the event. The audience then cheered as an excavator scooped the first bucket of dirt from the site of the LCLS Near Experimental Hall.

"This is a profound moment, and it's important that the moment be marked," said Lofgren.

The festivities concluded with a first-ever performance at SLAC by the Stanford marching band, who rallied participants to the tunes of Phish and Golden Earring.

The Future of X-ray Science

The LCLS represents the 4th generation of machines designed to produce synchrotron radiation for scientific studies, an idea originally pioneered at SLAC in the 1970s. Synchrotron radiation, in the form of x-rays or light, is typically produced by electrons circulating in a storage ring at nearly the speed of light. These extremely bright x-rays can be used to investigate various forms of matter ranging from objects of atomic and molecular size to man-made materials with unusual properties.

Unlike a circular storage ring, the LCLS will produce x-rays using the final 1/3 of SLAC's existing linear accelerator, in conjunction with long arrays of special magnets called "undulators." These powerful devices also owe their existence to research conducted at SLAC. Because undulators produce intense pulses of radiation lasting barely a billionth

of a second, the LCLS will work much like a camera's flash, enabling scientists to take images of atoms and molecules in motion, shedding light on the fundamental processes of life on an unprecedented scale.

"The power of this light source to unveil the structure of the molecular world is limitless," said Dorfan. "This is a historic event in the already illustrious history of the laboratory."

The LCLS project is a collaboration among Department of Energy laboratories including Argonne National Laboratory, Lawrence Livermore National Laboratory, and the University of California Los Angeles.

Source: Stanford Linear Accelerator Center