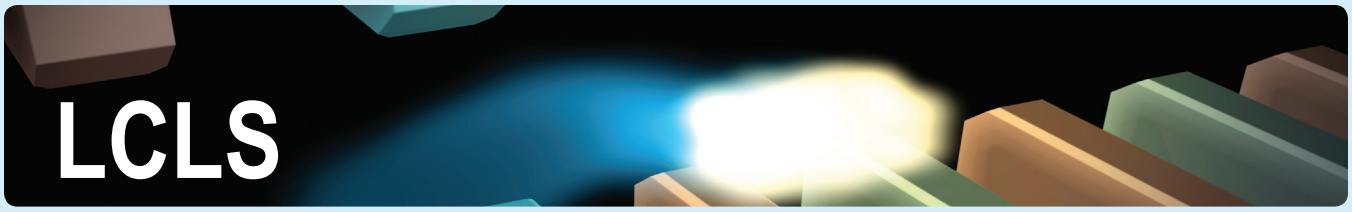
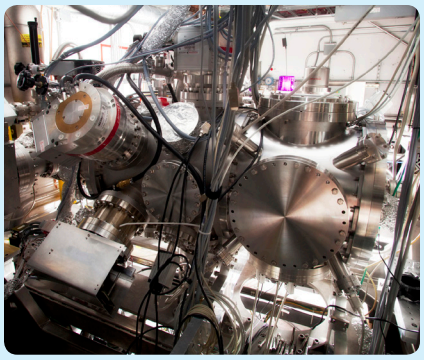


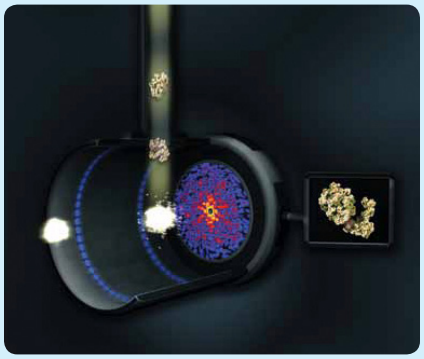

# LINAC COHERENT LIGHT SOURCE

**The Linac Coherent Light Source at SLAC National Accelerator Laboratory is the world's most powerful X-ray laser. The LCLS's highly focused beam, which arrives in staccato bursts one-tenth of a trillionth of a second long, gives researchers the intensity needed to probe complex, ultra-small structures and the ultrafast pulses required to freeze atomic motions, thus shedding light on the fundamental processes of chemistry, drug development, technology and life itself.**



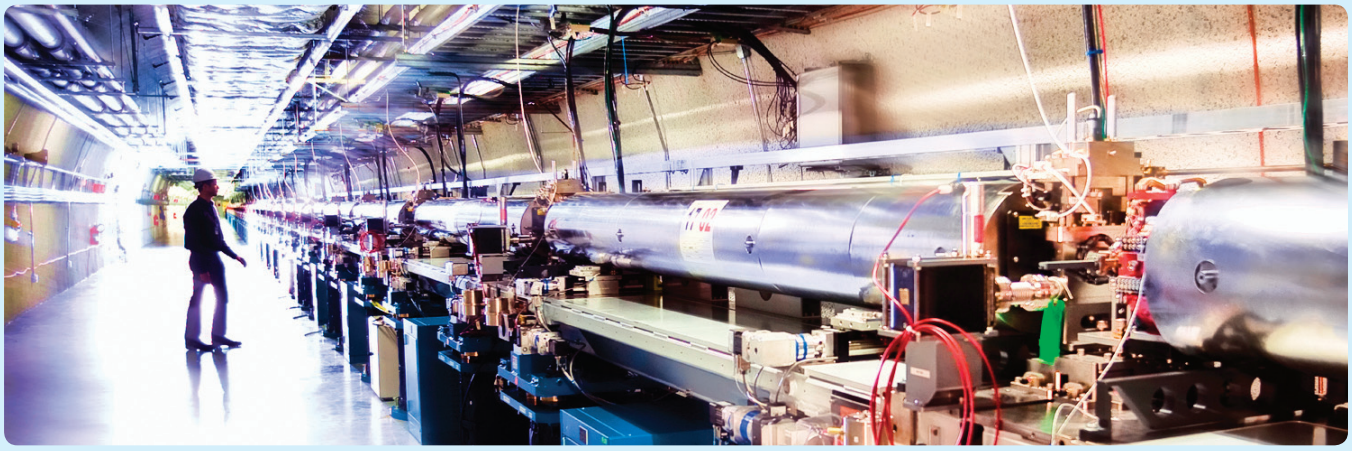
## World's First Hard X-ray Laser

For nearly 50 years, SLAC's linear accelerator has produced high-energy electrons for cutting-edge physics experiments. Now, scientists continue this tradition of discovery by using the SLAC accelerator to drive the LCLS, producing pulses of X-rays more than a billion times brighter than other X-ray sources. The ultrafast X-ray pulses enable scientists to observe matter and molecular interactions, revolutionizing our view of the atomic world one snapshot at a time.



## Breakthrough Innovation

*Science* magazine selected the LCLS as of one of its top-ten breakthrough innovations because "it takes a qualitative stride far beyond its predecessors" by providing exceedingly bright X-ray light, driving applications in energy and environmental sciences, drug development and materials engineering.



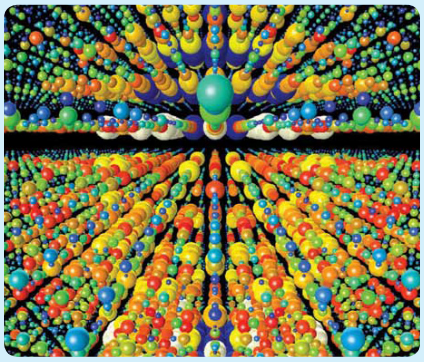
SLAC National Accelerator Laboratory, Menlo Park, CA
Operated by Stanford University for the U.S. Dept. of Energy

http://lcls.slac.stanford.edu

*Printed April 2011, General Handout*

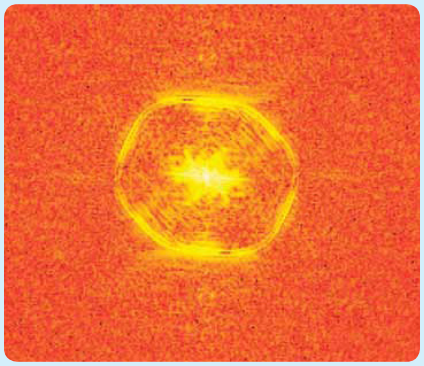
## Parsing Proteins

Viewing the 3-D structures of proteins that generate energy for life and play key roles in disease is surprisingly difficult. Experiments with the LCLS beam, however, will lop years off the time it takes to map proteins, speeding our understanding of how these versatile molecules function in all living things.



## Viewing Viruses

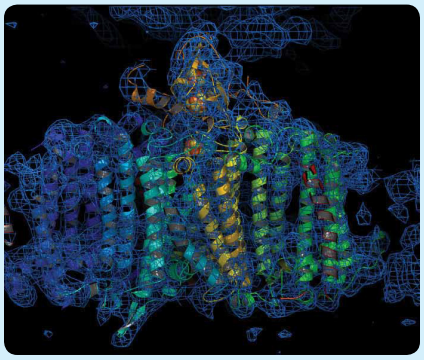
The first images of an intact virus in its natural state were taken in late 2009 using the LCLS's brilliant pulses of X-ray light. This work paves the way for similar portraits of microbes, molecules and living cells, studies that seek to expose the internal, living structure of these biological entities.

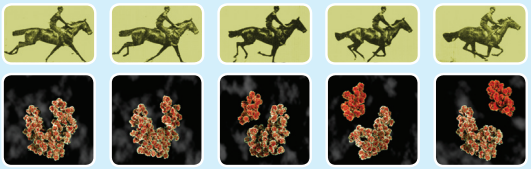


## Harnessing Nature's Energy

Experiments at the LCLS are studying parts of the photosynthetic system found in nature. Understanding how nature converts sunlight to energy could lead to the technology we need to safely and efficiently power the future.

Upcoming LCLS experiments will make the first atomic-scale movies of molecules in action. These movies will help scientists understand how a catalyst enables a chemical reaction, allowing the design of more efficient catalysts for energy production and spurring revolutionary new ways to make use of our energy resources.

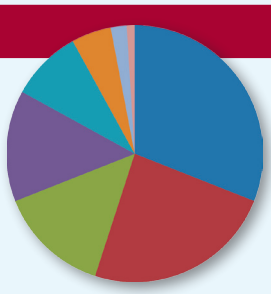




*The Linac Coherent Light Source is operated by Stanford University for the U.S. Department of Energy*

## LCLS FACTS

| | |
|---|---|
| 380 | Total LCLS Staff |
| 359 | Scientists Who Conducted Experiments in 2010 |
| 3 | Number of Experimental Stations in 2010 |
| 6 | Number of Experimental Stations by End of 2011 |
| 3,346 | Operating Hours in 2010 |



*Users by Field*

- *Physics (31%)*
- *Materials Sciences (24%)*
- *Chemistry (14%)*
- *Biological and Life Sciences (14%)*
- *Methods and Instrumentation (9%)*
- *High Density Science (5%)*
- *Optics (2%)*
- *Environmental Sciences (1%)*

SLAC NATIONAL ACCELERATOR LABORATORY

U.S. DEPARTMENT OF ENERGY | Office of Science