

# Lawrence Berkeley National Laboratory

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**Title**

Berkeley Lab Computing Sciences: Accelerating Scientific Discovery

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**Author**

Hules, John A

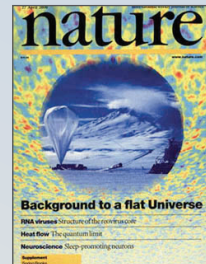
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Computing Sciences' national user facilities, services, and research enable discovery in a wide range of scientific disciplines, including:



Applied Mathematics



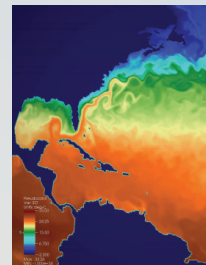
Astrophysics



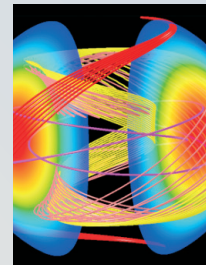
Biology



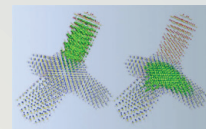
Chemistry



Climate Research



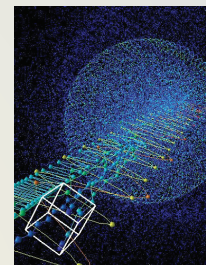
Fusion Energy



Materials Science



High Energy Physics



Visualization & Analytics



Nuclear Physics

## LEADERSHIP



**Horst Simon** (left)  
Associate Laboratory Director for  
Computing Sciences and Computational  
Research Division Director  
510 486 7377  
HDSimon@lbl.gov

**Katherine Yelick** (right)  
NERSC Division Director  
510 495 2431  
KAYelick@lbl.gov

## OUTREACH

Computing Sciences co-sponsors Berkeley CSE, a multidisciplinary research and education program in computational science and engineering. We also sponsor the Luis W. Alvarez Postdoctoral Fellowship in Computational Science and participate in the DOE Computational Science Graduate Fellowship program. Our Summer Student Program gives university students an opportunity to gain relevant research experience while pursuing their degree. Our Diversity Committee works to recruit women and minorities and encourages K-12 students to study and pursue a career in math and science.

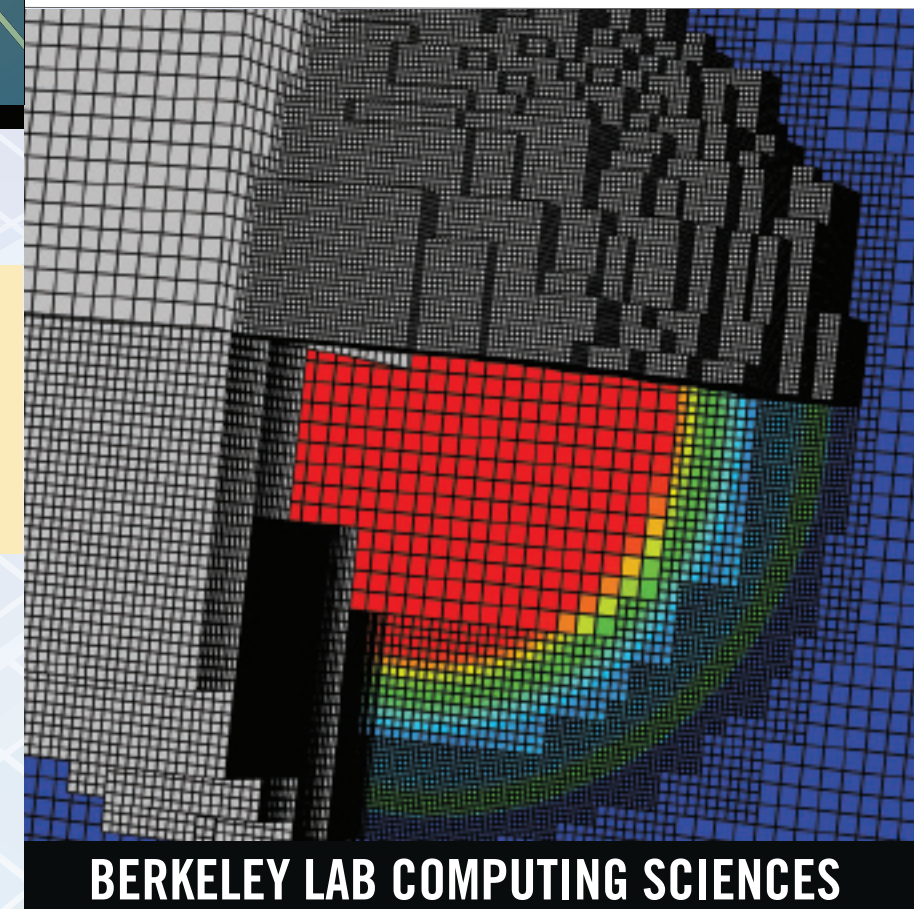
## JOB AND FELLOWSHIPS

Current opportunities are listed online at:  
<http://www.lbl.gov/CS/Careers/OpenPositions/>

## CONTACT US

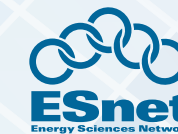
Computing Sciences  
Lawrence Berkeley National Laboratory  
Mail Stop 50B4230  
1 Cyclotron Road  
Berkeley, CA 94720  
510 486 6426  
<http://www.lbl.gov/CS>

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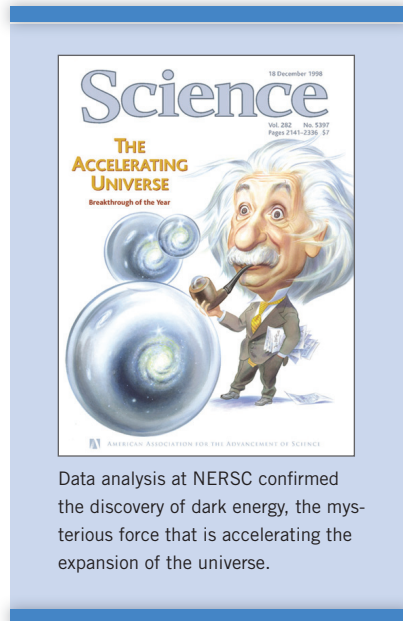


**BERKELEY LAB COMPUTING SCIENCES**

# Accelerating Scientific Discovery



Whether running trillions of calculations on a supercomputer or visualizing and analyzing massive datasets, scientists today rely on advances in computer science, mathematics, and computational science, as well as large-scale computing and networking facilities, to increase our understanding of ourselves, our planet, and our universe. Berkeley Lab's Computing Sciences organization researches, develops, and deploys new tools and technologies to meet these needs and to advance research in such areas as global climate change, combustion, fusion energy, nanotechnology, biology, and astrophysics.



Data analysis at NERSC confirmed the discovery of dark energy, the mysterious force that is accelerating the expansion of the universe.

The Computing Sciences organization was created in 1996 to advance computational science throughout the U.S. Department of Energy (DOE) Office of Science research programs. The organization consists of about 200 experienced staff with a wide range of expertise in computer hardware and software, computational science, applied mathematics, networking and middleware — and who specialize in applying their skills to solve scientific problems and provide services to the nationwide research community.

Computing Sciences consists of two divisions — the Computational Research Division (CRD) and the National Energy Research Scientific Computing (NERSC) Division. They are funded primarily by the Advanced Scientific Computing Research (ASCR) program in the DOE Office of Science.

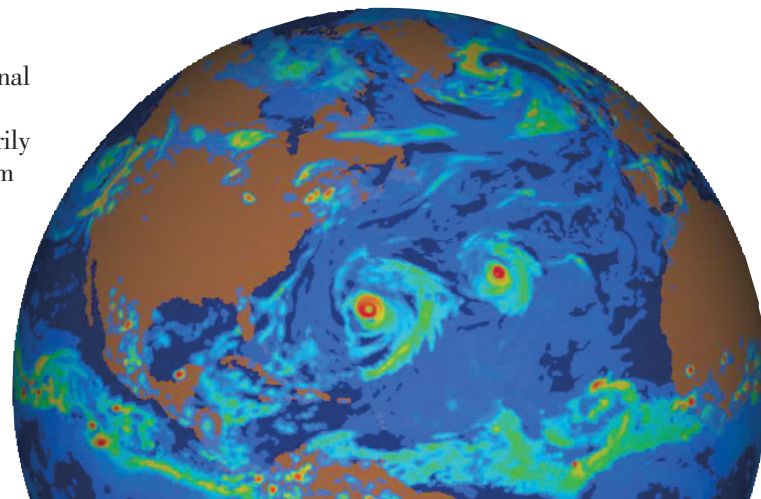
### COMPUTATIONAL MODELING AND SIMULATION

Computation has joined experiment and theory as one of the three principal elements of modern scientific research. Computational modeling and simulation are helping to solve problems that cannot be solved by traditional experimental methods because they are prohibitively large or small, unfold too quickly or too slowly, or cost too much. And many of the data sets produced by modern experiments and observations are so large that scientific discovery depends on computational analysis of the results.

Developing computational models of physical phenomena involves three kinds of research:

- **APPLIED MATHEMATICS** provides the algorithms (mathematical recipes) to be used in the computer code.
- **COMPUTER SCIENCE** provides programming languages and tools, computer systems software and middleware, and the hardware on which the scientific application will run.
- **COMPUTATIONAL SCIENCE** creates mathematical models of the phenomena to be researched, then uses the programming languages, tools, and algorithms to create codes that run efficiently on high performance computers.

CRD staff are actively involved in all three areas of research and development. NERSC and ESnet staff participate in advanced development projects that support their missions when commercial products do not meet the needs of the DOE scientific research community.

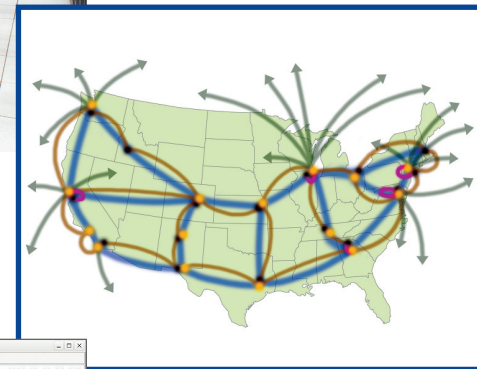


### FACILITIES AND R&D

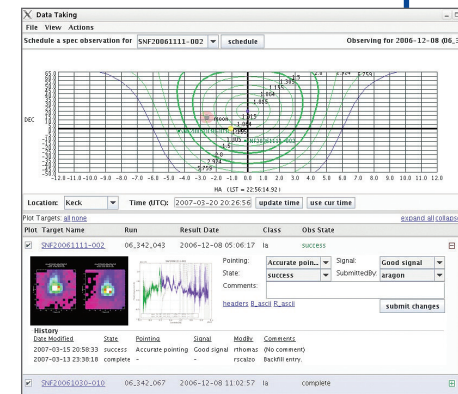
Computing Sciences carries out its mission by operating two national user facilities — NERSC and ESnet — and by conducting applied research and development in computer science, computational science, and applied mathematics.



NERSC serves more than 3,000 scientists nationwide in universities, DOE laboratories, industry, and other Federal agencies.



ESnet is a reliable, high-bandwidth network serving thousands of DOE scientists and collaborators worldwide.



Computing Sciences staff develop new scientific software tools that enhance researchers' productivity

Combining computer and network operations with research and development in a single organization provides tangible benefits for the scientists who use our systems. Just as our R&D programs solve scientific problems, the needs of scientists determine the direction of our research.