Fermilab's Norman Ramsey

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Research Highlights . . .

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Longer-lasting lithium batteries

DOE's Sandia National Laboratories is developing new materials that may double the capacity of current battery anodes, potentially leading to rechargeable lithium-ion batteries with more power, longer life, and smaller sizes. Jim Wang, manager of Analytical Materials Science at Sandia's California site, says the new class of silicon-graphite material may improve capabilities up to 400 percent. And Wang welcomes potential commercial partners to help further development. "The promising aspects of these materials are the large capacities, the capacity retention during cycling compared to other high-capacity materials, and the ability to control its performance by changing the composite composition and microstructure," he said.

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Sub-Picosecond Photon Source Built at SLAC

The Sub-Picosecond Photon Source (SPPS) project is an upgrade to the existing SLAC Linac. It will provide a fast, relatively inexpensive way to experiment with very bright, sub-picosecond, hard x-rays. Its pulse length has been simulated to be about 80 femtoseconds, or about a millionth of a billionth of a second. The peak brightness of SPPS will exceed that of any existing hard x-ray source by several orders of magnitude. It will allow the collection of diffraction images of atomic positions as they change on time scales of the pulse length. The first SPPS experimental period will be in Spring 2003. SSRL is coordinating and managing SPPS as a consortium involving laboratory and university participants, including Uppsala University and DESY.

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Jefferson Lab builds crymodules for SNS

After months of intense R&D, Jefferson Lab is in construction mode, building cryomodules for DOE's newest research facility—the Spallation Neutron Source—near Oak Ridge, Tenn. Used in the final portion of the SNS accelerator, Jlab's superconducting radiofrequency techniques and advanced cryomodule design are being incorporated into the SNS accelerator to enable low-cost, high-efficiency operation. The prototype is at Oak Ridge and cryomodule production is moving steadily at JLab. The SNS is being built by a team of federal labs including Argonne, Brookhaven, Lawrence Berkeley, Los Alamos, Oak Ridge, and JLab to provide the most intense pulsed-neutron beams in the world for scientific research and industrial development.

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PPPL's science ed lab opens

Recently DOE's Princeton Plasma Physics Laboratory opened its new Plasma Science Education Laboratory. This innovative 3,600-square-foot classroom-laboratory is a fusion of physics research and educational opportunities for students and teachers alike. Large enough to handle a class of 25 or more students, it includes 12 individually powered lab benches that can be moved into a variety of configurations, depending upon the needs of a particular program. There are also small rooms for advanced projects, including small plasma physics experiments. The entire facility has a high-speed wireless connection to the Internet and a variety of desktop and laptop computers available. Next summer the lab will be the site of student and teacher workshops, as well as individual projects.

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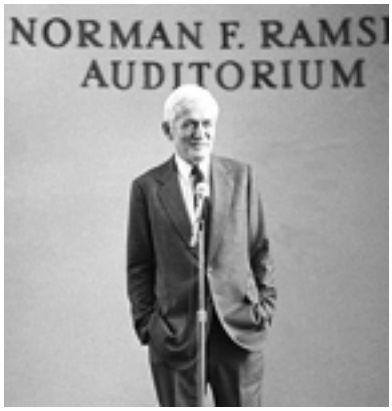
DOE Pulse highlights work being done at the Department of Energy's national laboratories. DOE's laboratories house world-class facilities where more than 30,000 scientists and engineers perform cutting-edge research spanning DOE's science, energy, national security and environmental quality missions. ***DOE Pulse*** (www.ornl.gov/news/pulse/) is distributed every two weeks. For more information, please contact Jeff Sherwood (jeff.sherwood@hq.doe.gov, 202-586-5806).

Norman Ramsey has faced real-life issues of scientists in times of war

When Norman Ramsey delivered a recent Fermilab Colloquium presentation on "Scientists in Times of War," he spoke from first-hand knowledge.

Before chairing the advisory committee that recommended establishing a national accelerator laboratory; before serving as the first president of www.ura-hq.org/ Universities Research Association, Inc., the consortium operating the laboratory; before having Ramsey Auditorium named for him at DOE's Fermilab; before winning the 1989 Nobel Prize in physics for developing the maser, used in atomic clocks; before launching his decades-long search for an electric dipole moment in the neutron, Norman Ramsey had already played a significant role in history when the world was at war and scientists were needed to develop weapons and defenses. Ramsey headed the group developing three-centimeter radar at the MIT Radiation Laboratory. He joined the Manhattan Project in 1943, and served as head of the Delivery Group at Los Alamos when the first atomic bomb was built and tested.



Norman Ramsey speaking at the 1981 dedication of Ramsey Auditorium at Fermilab's Wilson Hall.

"In World War II, it was clear who were the good guys and who were the bad guys," said Ramsey. "I think there's rarely been a war for which the distinctions were so clear—who started it, what aggressions preceded it. This is a moral help to scientists or anyone else in a war, because there are so many terrible aspects. It's worth spending a great deal of effort on that moral distinction."

Ramsey was instrumental in founding Brookhaven National Laboratory. He headed the physics department at Harvard University, and in 1962 was tapped to chair a committee pondering the future of U.S. high-energy physics. The report of his group, and of a subsequent design committee from Berkeley Lab, pointed the way to establishing a national accelerator laboratory operated by a consortium of universities. The original group of 30 universities formed a small group to lead the search for a director. The group included Ramsey, who had been named president of the consortium (Universities Research Association, Inc.), and Robert Rathbun Wilson of Cornell University, destined to be the lab's founding director.

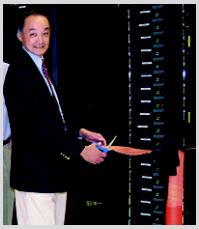
"The board of trustees was mainly worried about the selection of a director, and was compiling a list during the site selection process," Ramsey recalled. "Bob Wilson was on the board, but he was regarded as ineligible. He was finishing up the Cornell accelerator lab, and the trustees felt that if he abandoned that project, he wasn't responsible enough to be a good director. Well, typical of Bob Wilson, he finished the Cornell project a year ahead of schedule. So he was available."

Ramsey continues to work on the goal he has pursued for more than four decades: finding an electric dipole moment in the neutron.

"It's still a very open and fundamental question," he said. "I'm 87 years old, but I'm not giving up."

Submitted by DOE's Fermi National Accelerator Laboratory

PPPL opens pilot topical computing facility



PPPL Chief Scientist Bill Tang opens the Pilot Topical Computing Facility.

Officials at the DOE's Princeton Plasma Physics Laboratory (PPPL) recently opened the Fusion Energy Science (FES) Pilot Topical Computing Facility (TCF). The goal of the pilot is to determine the best configuration for a full TCF for the Fusion Energy Science community.

The TCF will support computing throughout the fusion community, offering a unique capability that joins advanced computing and modeling with theory and experiment to improve advancements in the field of fusion. "Predicting the properties of energy producing fusion plasma systems is a formidable challenge. It can only be met with advanced scientific computing in tandem with theory and experiment. Knowledge gained through this pilot project about capability as well as capacity computing issues can be usefully applied toward planning a full Fusion Energy Science TCF," said PPPL Chief Scientist Bill Tang, principal investigator for the project. Tang explained that future research requires the accelerated development of computational tools and techniques for the timely development of more realistic predictive models. When properly cross validated against experiments, the resultant codes would allow FES simulations of increasingly complex phenomena with greater fidelity.

In support of this mission, FES researchers actively participate in the DOE Office of Science's Scientific Discovery through the Advanced Computing program. The SciDAC strategy involves establishing TCFs to concentrate on specific sets of scientific applications in which the computer system is optimized for those applications.

The pilot TCF focuses on national FES collaborations involving the SciDAC centers for Plasma Microturbulence, Extended Magnetohydrodynamics, and the Fusion Collaboratory. In addition, the facility includes the strong involvement of Princeton University and the National Oceanic and Atmospheric Administration's Geophysical Fluid Dynamics Laboratory.

Submitted by DOE's Princeton Plasma Physics Laboratory