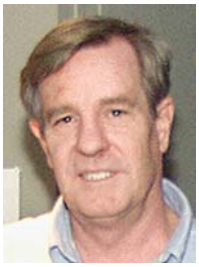

Steve Davis

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DOE Pulse

Science and Technology Highlights from the DOE National Laboratories

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Research Highlights . . .

Super results for superconducting LHC magnets

DOE's Fermilab has completed highly successful tests of the first superconducting quadrupole-corrector assemblies for the US/LHC project. The six-meter, 12,000-pound magnets, part of an overall $531 million effort in the U.S., are bound for the Large Hadron Collider under construction at CERN, the European Particle Physics Laboratory in Geneva, Switzerland. The LHC superconducting magnets are designed to reach a peak magnetic field of 9 Tesla; superconducting magnets at Fermilab's Tevatron reach 4.4 Tesla. "These are some of the best production accelerator magnets ever made," said Fermilab's Jim Strait, the US/LHC project manager, "and they're the best Fermilab has ever made."

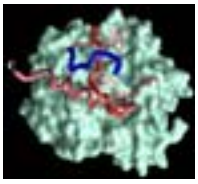
[Mike Perricone, 630/840-5678, mikep@fnal.gov]

Invention detects lethal nerve agent on concrete

A new instrument developed by researchers at DOE's Idaho National Engineering and Environmental Laboratory detects the presence and degradation of the chemical weapon VX on concrete. VX is an easily absorbed nerve agent that can kill with a tiny fraction of a gram. What's more, the novel device—called an ion trap secondary mass spectrometer (IT-SIMS) not only identifies the chemical's presence, but can also measure its rate of decay. Understanding of how VX breaks down in natural and urban environments could boost national security by aiding government decision-making in the event of a VX attack.

[Deborah Hill, 208/526-4723, dahill@inel.gov]

'Knot' to be undone



Researchers at DOE's Argonne National Laboratory have determined the structure of a protein with a surprising feature in it: a knot. This is the first time a knot has been found in a protein from the most ancient type of single-celled organism, an archaebacterium, and one of only a few times a knot has been seen in any protein structure. "This makes us want to find out why nature goes to the trouble of creating a knot instead of a more typical fold," said Andrzej Joachimiak, who directs the Midwest Center for Structural Genomics, located at DOE's Advanced Photon Source at Argonne.

[Catherine Foster, 630/252-5580, cfoster@anl.gov]

Viruses cause cells to self-destruct

Scientists at DOE's Brookhaven National Laboratory and their collaborators have discovered that some viruses can use the most abundant protein in the cells they are infecting to destroy the cells and allow new viruses to escape to infect others. The findings, described in the November 29, 2002, issue of the Journal of Biological Chemistry, build upon earlier Brookhaven research on how virus particles become infectious and may lead to the design of more effective antiviral remedies. "This is a new and philosophically interesting way for a virus to escape from cells," said Brookhaven biologist Walter Mangel, a coauthor on the paper. "In essence, a protein in the infected cells can serve as the seed of the cells' own destruction."

[Peter Genzer, 631/344-3174, genzer@bnl.gov]

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).

Tevatron cranks it up with help from Fermilab's friends

In high-energy physics, friends don't let friends run at low luminosity.

And with more than a little help from high-energy physics friends, the Tevatron at DOE's Fermilab has set a series of luminosity records, leading the way for high grades from a DOE review panel examining accelerator performance for Collider Run II of the Tevatron. The review panel findings included references to excellent progress in pursuit of luminosity goals; especially notable progress on stochastic cooling; confidence in the Recycler's success; impressive combined availability of the Linac and Booster, and very good availability for the Main Injector; and the judgment that the laboratory's technical approach for increasing luminosity at the Tevatron is "sound and well-motivated."

These achievements required not only Fermilab 's best efforts, but also physicists from outside the laboratory to lend a hand. Fermilab has called on its friends for help, and friends have answered the call from around the world: from nearby Argonne National Laboratory, from Stanford Linear Accelerator Center in California, from Brookhaven National Laboratory in New York, from Lawrence Berkeley Laboratory in California, and from CERN, the European Particle Physics Laboratory in Geneva, Switzerland.

Comparing notes on Tevatron performance in the Main Control Room are (from left) Jim Sebek of Stanford Synchrotron Radiation Lab, Marc Ross of Stanford Linear Accelerator Center, and Till Straumann of SSRL.

Some examples:

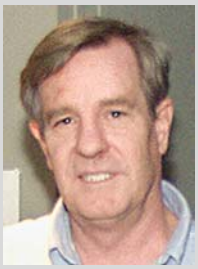
Scientist Yunhai Cai of SLAC is developing simulations of beam effects in the Tevatron to help elucidate the lifetime of the accelerator's particle beams. Physicist Marc Ross, also from SLAC, is providing electronics to facilitate beam transfers between links in the accelerator chain. Argonne National Laboratory is working with the Tevatron Department to develop a plan to improve the vacuum in the Tevatron by a factor of two. An accelerator expert, Wolfram Fischer of Brookhaven Laboratory, recently spent a month at Fermilab to help analyze Tevatron performance. CERN sent Frank Schmidt to Fermilab for six weeks to work with the Tevatron and to take shifts in the control room.

"It has been extremely gratifying to be fielding offers of support from other labs," said Steve Holmes, Fermilab's Associate Director for Accelerators and Interim Head of the Beams Division. "It really shows us that there is a widespread feeling that this endeavor is important to everybody in the field, not just Fermilab."

Submitted by DOE's Fermi National Accelerator Laboratory

Davis connects fusion researchers world wide

Remote collaboration technologies and media services at DOE's Princeton Plasma Physics Laboratory have grown tremendously thanks to Steve Davis, Head of PPPL's Computer Systems Division.



Steve Davis

In late 1999, PPPL had one small videoconferencing facility that supported eight to 10 videoconferences each month. There are now four dedicated facilities and two mobile systems that can be used in any office or conference room at the Lab. Use has grown to more than 50 video conferences per month, 15 real player/show station broadcasts, and one or more satellite broadcasts monthly. An estimated 150 people now participate remotely in PPPL activities each month.

"Steve initiated, championed, and spearheaded a program at PPPL to facilitate remote conferencing and collaborations. He engineered a disciplined and structured approach to introducing state-of-the-art audio and video technologies into every facet of PPPL's environment," noted PPPL Computer Division Head Dori Barnes.

This work ranged from outfitting an experimental control room at PPPL with cameras, microphones, and remote display stations to converting conference rooms into "visual phone booths" to remodeling the Laboratory's stadium-style auditorium for receiving and broadcasting high-quality productions.

"Steve has significantly changed the way business is conducted at PPPL," added Barnes, noting that the motivations for the effort were money, convenience, and better science. Teleconferences, videoconferences, and Internet broadcasts result in a significant savings in travel expenses, as well as in the travel time of conference participants.

Davis came to the Lab in 1974, the same year he received a Ph.D. in nuclear physics from Rutgers University. He initially worked as a diagnostic physicist, while doing computational analysis and working as a physics operator for the Princeton Large Torus and the Tokamak Fusion Test Reactor.

Submitted by DOE's Princeton Plasma Physics Laboratory