Livermore's Cooper has made his mark on IT.

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DOE Pulse

Science and Technology Highlights from the DOE National Laboratories

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Research Highlights . . .

Labs, university team toward better mouse imaging

At DOE's Thomas Jefferson National Accelerator Facility, new cutting-edge research for nuclear imaging of small animals has begun in collaboration with DOE's Oak Ridge National Laboratory and Johns Hopkins University. The goal of the collaboration is the development of instrumentation that will allow bio-medical researchers to study mice with nuclear medicine imaging techniques while the mouse is awake and unrestrained during imaging. The novel technology should offer neural scientists the opportunity to use conscious mice to study neural processes in real-time and over an extended period.

[Katie Showalter, 757/269-6206, kshowalt@jlab.org]

Pit Viper takes bite out of worker radiation exposures

Radiation exposure to personnel working in highly contaminated nuclear tank waste equipment pits may be reduced by as much as 75 percent thanks to the Pit Viper, a remotely operated cleanup system developed by DOE's Pacific Northwest National Laboratory. The Pit Viper consists of a hydraulic manipulator arm, which is capable of lifting 200 pounds while fully extended, mounted on a backhoe. A variety of tools can be attached to the manipulator's gripper to perform cleanup, repair and maintenance tasks. The tool is operated remotely from a console in a trailer located up to 200 feet away from the equipment pit. The operators view cleanup activities on television monitors.

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Plasmas steer particle beams

Working at DOE's Stanford Linear Accelerator Center, physicists from UCLA, the University of Southern California and SLAC recently used charged-particle plasmas to deflect powerful beams of high-energy electrons. A plasma is created just before the beam arrives by shining an intense laser beam upon lithium vapor, stripping electrons from its atoms. As it bores through the resulting electrically charged cloud, asymmetries in the plasma divert the beam slightly. The researchers observed deflections of almost 0.1 degree and expect to do substantially better. Once the technique is perfected, it could provide a completely new way to steer particle beams without having to employ magnets.

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Software transforms desktop computers into supercomputer

A computer program that can turn a collection of off-the-shelf desktop computers into one of the world's fastest supercomputers has been released to the public by DOE's Sandia National Laboratories. Neil Pundit, manager of Sandia's Scalable Computing Systems group, says the release of Cplant™ system software will allow researchers free access to the body of research and development that created the most scalable, Linux-based, off-the-shelf computer available. He says the hope is that modifications made by researchers elsewhere will enrich the system software, and that those improvements will come back to Sandia. The software can be downloaded from the Cplant website at http://www.cs.sandia.gov/cplant/.

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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).

National labs to strengthen nation's natural gas pipelines

To identify and develop advanced technologies to bolster the nation's natural gas pipelines, the Energy Department is calling upon the national labs to help private industry develop innovative technologies toward future natural gas transmission and distribution systems

Eight laboratories will help government-industry cost-shared projects, many of which center around detection devices designed to prevent pipeline damage, DOE selected in May. DOE estimates that natural gas consumption will increase by 60 percent by 2020, placing an unaccustomed demand on the U.S.'s aging natural gas infrastructure.

DOE's National Energy Technology Laboratory, working to enhance future pipeline designs in one project, will manage the research-and-development projects, valued at almost $3 million.

NETL will utilize new techniques such as neural networks to analyze reliability, availability, and maintain natural gas pipeline systems to provide a framework that will lead to future designs with enhanced reliability and availability. The results can be applied to existing systems to provide a baseline to evaluate proposed modifications and improvements. Other projects are

• Albany Research Center will develop and test a novel electrochemical noise sensor to measure corrosion in pipelines.

• Argonne National Laboratory will develop and field test a pulsed microwave radar-imaging system that detects and locates gas leaks from above or underground natural gas pipelines. The system can be mounted on a van or fitted on an aircraft for fast mapping of natural gas leaks.

• Idaho National Engineering and Environmental Laboratory will develop and demonstrate thermally sprayed conductive traces that are applied in natural gas pipelines to communicate, detect and locate damage, and are a conductive pathway for attaching or embedding sensors for performance monitoring.

• Lawrence Livermore National Laboratory will develop hyperspectral geobotanical remote sensing techniques and radar remote-sensing techniques for detecting and evaluating third-party damage, detecting and discriminating leaks and monitoring pipeline system reliability. In another project, LLNL will develop and test a low-power, lightweight system using micropower impulse radar (MIR) to detect underground pipe facilities including non-metallic facilities such as plastic pipes, fiber optic cables, concrete ducts and foundations.

• Oak Ridge National Laboratory will develop and demonstrate a new waveguide pipe-flaw detection technique that has the potential to detect pipeline flaws in a single pass at speeds of approximately 2 miles per hour.

• Pacific Northwest National Laboratory will develop and demonstrate an ultrasonic, nondestructive test method to detect and evaluate the severity of third party damage in pipelines.

• Sandia National Laboratory will evaluate the application of emerging laser-illuminated and thermal-emission imaging and mapping approaches to detect leaks remotely. In a separate project, SNL will evaluate emerging sensor technology compatible with their IPP robotic vehicle. The robotic system will nondestructively locate and assess pipeline defects.

Submitted by DOE's National Energy Technology Laboratory

Livermore's Cooper has guided IT investment

Dave Cooper

Dave Cooper recently stepped down as Lawrence Livermore National Laboratory's associate director for Computation and chief information officer for health reasons. He remains on the DOE Lab's director's staff, however, to represent Lawrence Livermore on national panels and committees, and to take on special projects.

As associate director, Cooper led the direction, execution and development of a broad research and support program in computational science and advanced information technologies, including supervision of the operation of the Lab's Accelerated Strategic Computing Initiative computers.

As the Laboratory's first chief information officer, he developed an information architecture plan to strategically guide the Laboratory's future information technology investments.

In May, Cooper received DOE's highest civilian recognition, the Distinguished Associate Award. The award honors Cooper's leadership of the DOE/National Nuclear Security Administration's Accelerated Strategic Computing Initiative, the effort to simulate nuclear weapons performance with computer models.

The award was presented in Washington, D.C., during a meeting of the President's Information Technology Advisory Committee (PITAC). Cooper was appointed to the national committee in 1997 by President Clinton.

Cooper also has served on the California Information Technology Committee, which advises the governor of California on issues related to Information Technology and how the state can make better use of IT in the operation of its business. He was also honored in June of 2000 by *ComputerWorld* magazine when he was named as one of the top one hundred most influential Information Technology leaders in the United States.

In demand as a speaker on computation issues, Cooper was invited to speak at New York's Museum of National History on "State-of-the-Art in Supercomputing."

Submitted by DOE's Lawrence Livermore National Laboratory