



LLNL's
Salvador
Aceves



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Research Highlights . . .

PNNL tests first responder radiation detectors

Testing is under way at DOE's [Pacific Northwest National Laboratory](#) to ensure that personal radiation detection equipment purchased with Department of Homeland Security funds meets new standards for [identifying potential threats](#). More than 100 instruments, representing approximately 30 different equipment models, will [undergo tests](#) of their electrical systems performance, mechanical operations, environmental susceptibilities and radiological sensitivities. The result will be a Consumer Reports-style guide for agencies purchasing radiation detection equipment with DHS funds. First responders will be able to select equipment based on actual instrument performances, rather than on manufacturer's claims.

[[Judy Graybeal](#), 509-375-4351;
[Graybeal@pnl.gov](#)]

Dramatic difference in behavior of matter vs antimatter

Results from DOE's [Stanford Linear Accelerator Center's](#) BaBar experiment demonstrate a [dramatic difference](#) in the behavior of matter and antimatter. "If there were no difference between matter and antimatter, both the B meson and the anti-B meson would exhibit exactly the same pattern of decays. However, our new measurement shows an example of a large difference in decay rates instead," said BaBar spokesman Marcello Giorgi. This striking matter-antimatter asymmetry is the first instance in B decays of a difference obtained by simply counting up the number of matter and antimatter decays, a phenomenon known as direct charge parity (CP) violation.

[[Neil Calder](#), 650/926-8707;
[neil.calder@slac.stanford.edu](#)]

ORNL helped get Cassini to Saturn

Cassini-Huygens' arrival at Saturn following a seven-year voyage was made possible partly by work done at DOE's [Oak Ridge National Laboratory](#). The spacecraft's instruments are powered by generators that convert heat from plutonium-238 fuel into electricity. ORNL developed and fabricated the protective cladding for the fuel. The iridium alloy "clad vent sets" are resistant to heat and impact and would remain intact even during a launch accident. NASA remains an ORNL customer: The iridium alloy-clad vent sets have been used in other deep-space missions (such as Voyager, Galileo and Ulysses) and will be present on the future NASA missions, including the Pluto New Horizons mission planned to explore Pluto and the Kuiper Belt.

[[Bill Cabage](#); 865/574-4399;
[cabagewh@ornl.gov](#)]

Sandia supercomputer fastest, but smaller and less expensive

[Red Storm](#) will be faster, yet smaller and less expensive, than previous supercomputers, say researchers at DOE's [Sandia National Laboratories](#), where the machine will be assembled. The first quarter of the \$90 million, 41.5 teraflops machine is expected to be installed at Sandia by the end of September and fully up and running by January. Performance testing will begin in early 2005 and by the end of 2005. Japan's Earth Simulator, currently the world's fastest supercomputer, uses as much as eight megawatts of power compared to Red Storm's projected two megawatts and takes up approximately three times the space. Red Storm, an air-cooled supercomputer, is being developed by Sandia and Cray Inc. using mostly off-the-shelf parts.

[[Howard Kercheval](#), 505/844-7842,
[hckerch@sandia.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).

Robot disarms improvised explosive devices

Two prototype bomb disposal robots developed by DOE's Savannah River National Laboratory are being deployed for military use in Iraq.

The Mobile Platform for Explosives Darming (MoPED) was developed under the direction and funding of the Defense Threat Reduction Agency (DTRA). The Combat Support branch of DTRA provides combat support to the military services.



SRNL's MoPED is designed to disable or disarm Improvised Explosive Devices in Iraq and other military theaters.

explosive devices safe, while protecting our soldiers and Iraqi citizens. Successful use of the MoPED is expected to save numerous lives."

The on-board video cameras allow the operator to drive the robot up to the suspected Improvised Explosive Device and examine the device without placing personnel in range of the explosive charge. The operator console includes video monitoring, drive control and darming device activation.

The operator can visually examine the Improvised Explosive Device and target the vulnerable locations for aiming and firing the darder. Following disarming the operator may use the robot to inspect the Improvised Explosive Device to verify that it has been made safe before personnel walk up to the device.

Submitted by DOE's Savannah River National Laboratory

LIVERMORE ENGINEER DRIVEN TO IMPROVE VEHICLE TECHNOLOGY

If the car or truck you're driving 10 years from now is more efficient, pollutes less, and is less dependent on foreign energy sources than today's vehicles, you may have the analytical skills of Salvador Aceves to thank.



Salvador Aceves

Aceves, associate program leader for energy efficiency and renewable energy in Lawrence Livermore National Laboratory's Energy and Environment Directorate, heads up several research programs aimed at improving vehicle engine design and fuel storage technology.

"The energy system as it is now is very nice," Aceves says. "We basically have an unlimited supply of energy at a very low cost to satisfy all our transportation, comfort, nutritional and entertainment needs.

"But there are also many problems related to our use of energy. Environmental pollution, dependence on foreign oil and global warming (caused by carbon dioxide emissions) are very serious problems," he says. "We may not be able to completely solve them in the short term, but at least we can reduce them to where they cause the least possible damage."

One of the most promising paths to solving these problems is the development of hydrogen-powered vehicles. Hydrogen fuel has multiple benefits. Hydrogen-fueled vehicles are more efficient and cleaner than gasoline or diesel vehicles. In addition, production of hydrogen from carbon-free sources (such as nuclear or renewable energy) is the most efficient and economical way to achieve deep cuts in carbon dioxide emissions.

Aceves, who has worked on hydrogen technologies for many years, is now focused on overcoming one of the major barriers to practical hydrogen-fueled vehicles: onboard storage. Aceves and his team have developed and are testing a safe, compact hydrogen storage tank that combines the around-town energy efficiency of conventional compressed hydrogen gas with the long-distance driving range of cryogenic (low-temperature) compressed gaseous and liquid hydrogen.

Submitted by DOE's Lawrence Livermore National Laboratory