



Ames Lab's
Alan
Russell



Science and Technology Highlights from the DOE National Laboratories

Number 141

September 15, 2003

Research Highlights . . .

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).

Developing inspection methods for ceramics

DOE's **Argonne National Laboratory** is collaborating with NASA to develop a method of inspecting the leading-edge thermal protection system for space shuttle wings. Researchers want to define methods to eliminate or significantly reduce the chance for reoccurrence. NASA researchers suspect that the impact of a piece of foam insulation broken off during liftoff may have damaged one of the ceramic composite panels that protect the wing's leading edge. "NASA invited us to work on this very short-term effort because we have been funded by DOE for 20 years to work on inspection methods for ceramics," said Argonne engineer Bill Ellingson. "We have the knowledge base for developing inspection methods for ceramics at high temperatures."

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Smoking zaps enzyme in peripheral organs

Researchers at DOE's **Brookhaven National Laboratory**, who previously found reduced levels of **monoamine oxidase B (MAO B)** in smokers' brains, now provide compelling evidence from whole-body positron emission tomography (**PET**) scans that MAO B in the kidneys, heart, lungs and spleen is also **reduced by smoking**. The implications of the findings need to be examined in greater detail, the scientists say. One role of the enzyme is to break down chemical compounds that elevate blood pressure, such as certain chemicals in cheese and wine as well as some chemicals released by nicotine. Thus, any health consequences of reduced MAO B may be indirect and associated with other factors.

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Tevatron exceeds luminosity goal for the year

On August 22 the integrated luminosity at the **Tevatron** exceeded 225 inverse picobarns—the luminosity goal for the entire fiscal year at the DOE's **Fermilab**. Peter Garbincius, the Beams Division deputy head, was pleased with the achievement at the world's highest-energy particle accelerator, coming more than a month before the finish of the fiscal year. "Everyone in the Beams Division and the laboratory has worked very hard to achieve this goal," he said. Integrated luminosity is a measure of total particle interactions over a given time. The greater the luminosity of an accelerator, the greater its chances for discovery.

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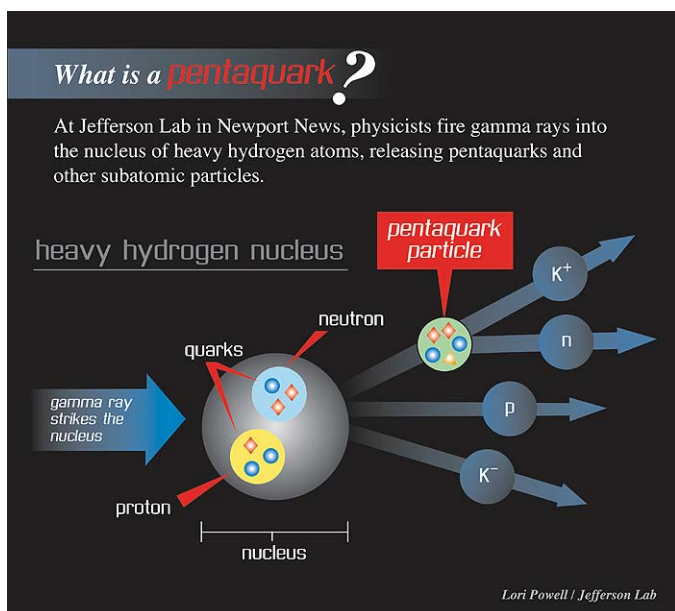
PNNL supercomputer fastest open system in U.S.

DOE's **Pacific Northwest National Laboratory** is now home to the United States' fastest operational unclassified supercomputer. The laboratory's 11.8 teraflops industry-standard HP Integrity system came to full operating power in late August. Based on peak performance, the PNNL machine is the fifth fastest system in the world and is the fastest unclassified computer operating in the U.S. The PNNL system is the world's fastest **supercomputer** based on the Linux operating system and is the largest machine ever built using Intel's 64-bit architecture. The additional power and speed will enable novel studies in atmospheric chemistry, climate and subsurface chemistry, systems biology, catalysis and materials science. The PNNL supercomputer is housed in a DOE user facility where scientists from around the country can access the supercomputer for research through a competitive proposal process.

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Jefferson Lab, three other international collaborations announce evidence of five-quark particle

For almost 40 years, all subatomic particles have fit neatly into two categories: three-quark baryons, like protons and neutrons; or mesons, made up of one quark and one anti-quark. Recently, the Department of Energy's [Jefferson Lab](#), in Newport News, Va., revealed strong evidence for a subatomic particle consisting of [five quarks](#). The new particle, spotted at Jefferson Lab and by three other international collaborations, is a sort of baryon-meson hybrid with five quarks — or, more precisely, four quarks and one anti-quark. Dubbed the pentaquark, it is a member of the baryon family, but is described as “exotic” because the anti-quark has a different “flavor” from the other quarks.



At Jefferson Lab, physicists fire gamma rays into the nucleus of heavy hydrogen atoms, releasing pentaquarks and other subatomic particles.

and Experimental Physics (ITEP) in Moscow, Russia, who re-analyzed old xenon bubble-chamber data.

Jefferson Lab presented its results at the Conference on the Intersections of Particle and Nuclear Physics (CIPANP) held in May in New York City, where JLab collaborators revealed the most statistically significant result to date. Jefferson Lab made use of the unique CEBAF Large Acceptance Spectrometer (CLAS), which can measure exclusive reactions over a large solid angle. The data was taken in August 1999, during an unrelated experiment.

The most recent experimental evidence for the pentaquark comes from the SAPHIR collaboration at the ELectron Stretcher Accelerator (ELSA) in Bonn, Germany. Again using older data, taken in 1997 and 1998, they measured the reaction in the SAPHIR detector at ELSA.

Submitted by [Jefferson Lab](#)

AMES LABORATORY'S MEDAL-WINNING METALLURGIST



Alan Russell

You'll find gold, silver and bronze in Alan Russell's office, but not because the [Ames Laboratory](#) metallurgist is conducting research on precious metals. These medallions represent Russell's athletic prowess as a nationally ranked master's decathlete and pentathlete.

For a number of years, Russell has been at or near the top of the USA Track and Field National Master's Outdoor Decathlon Championships, winning the event in 1997, 2000, 2001, and last year and placing fourth this summer in the 50-54 age group. The decathlon is comprised of the 100-meter dash, long jump, shot put, high jump, 400-meter dash, 110-meter high hurdles, discus, pole vault, javelin throw, and 1500-meter run with points awarded based on place and time/distance/height cleared.

Oddly enough, Russell turned to the track as an outlet after deciding that his favorite pursuit of mountain climbing was too dangerous for the father of three small children.

"I got into climbing when I worked at [Los Alamos](#)," Russell said, "and climbed all over the western hemisphere—Alaska, Baffin Island, Peru and Argentina." An avalanche during a climb on Aconcagua in the Argentinian Andes convinced him to hang up the ice axe.

After success running the 200m and 400m in the annual Iowa Games, he moved up to the national level, but found he wasn't built to race at that level.

"I could make it into the finals, but didn't have much hope of winning," Russell said, "so a friend suggested I try the multi-events. It's daunting to take up pole vaulting and discus in your mid-40's, but the [Iowa State](#) track athletes have graciously given the old professor some pointers and it's turned out pretty well."

The variety of training required is what keeps him coming back, and helps keep him refreshed in both the laboratory and classroom. "I really value that change of pace," he said. "I'm just sharper mentally if I can work out."

Submitted by DOE's [Ames Laboratory](#)