Assamagan's inspiration in chalk.

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Research Highlights . . .

DOE Pulse

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ADVISORLite simplifies vehicle analysis

Engineers at DOE's National Renewable Energy Laboratory unveiled a newly developed Web-based analysis tool called ADVISORLite. ADVISORLite is an analysis tool for understanding the relationships between vehicle characteristics, vehicle performance targets, and system requirements. Unlike ADVISOR, a hybrid electric vehicle simulation model that considers all vehicle subsystems and interactions such as the type of motor or battery, ADVISORLite simplifies the vehicle systems analysis by considering only the top level of a vehicle system, the vehicle itself. "ADVISORLite simplifies the analysis, eliminating some assumptions from the process," said NREL engineer Anthony Markel.

[Sarah Holmes Barba, 303/275-3023, sarah_barba@nrel.gov]

Tiny airborne particles bad for breathing

Tiny airborne particles are more plentiful and may pose a greater health hazard than previously thought, says a researcher at DOE's Oak Ridge National Laboratory. Recent evidence suggests that a relatively small increase in the concentration of particulate matter—a tenth the diameter of a human hair—results in a small but consistent increase in death rates and illnesses caused by effects on the cardiopulmonary system. Such particles generally come from manmade emissions such as engine combustion. ORNL's Mengdawn Cheng is tracking and characterizing the airborne particles at 30 sites. He is also examining their toxicity in a process called "direct cell deposition," which was developed by his team.

[Ron Walli, 865/576-0226, wallira@ornl.gov]

Sulfur lamps offer high performance

Through a cooperative agreement with DOE's National Energy Technology Laboratory, Fusion Lighting of Rockville, Md., is doing research aimed at developing highly efficient, bright, sulfur lamps that operate at less than 100 watts. Typical sulfur lamps, used primarily for lighting large spaces such as factories, run at 1000 watts. New low-wattage lamps would serve many more applications. Electrodeless sulfur lamps have demonstrated full-spectrum color and higher lamp efficacies than any conventional white light source. Low-power sulfur lighting has the potential to be over five times as efficient as halogen parabolic reflector lamps and nearly twice as efficient as the newest compact fluorescent lamps.

[David J. Anna, 412/386-4646, anna@netl.doe.gov]

Up on the rooftop: energy savings

Using equipment intended to save energy is a losing battle if that equipment isn't working properly. A new diagnostic system developed at DOE's Pacific Northwest National Laboratory can help ensure economizer devices purchased for rooftop air-conditioning units are working at peak performance. PNNL's "diagnostician" allows building managers to remotely monitor conditions like temperature and thermostat control commands. Rather than a technician climbing onto the roof, opening the air-conditioning unit and taking measurements by hand, the rooftop diagnostician records all that information and posts it on a web page, enabling technicians to monitor the system from a desk. The constant collection of data also provides a more comprehensive view of the system's performance.

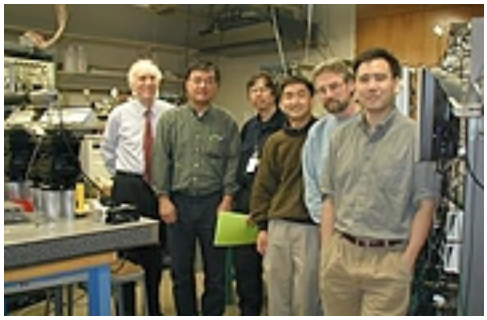
[Staci Maloof, 509/372-6313, staci.maloof@pnl.gov]

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).

SLAC team seeks the exotic, elementary, and practical

Most Nobel Prize winners are content to rest on their laurels, basking in the glow of public adulation—but not Martin Perl, who shared the 1995 physics prize for his discovery of the tau lepton, a heavy cousin of the electron. For several years, he has been leading a group at DOE's Stanford Linear Accelerator Center in a series of experimental searches for exotic elementary particles that carry only a fraction of the electrical charge found on familiar electrons and protons. Or for other weird particles that might be over ten trillion (that's 10,000,000,000,000!) times heavier than a hydrogen atom. Such ultraheavy particles might have been created during the Big Bang birth of the Universe; finding one would tell us much about these cataclysmic origins.

Perl's group searches for such curiosities by observing how tiny "microdrops" fall under the force of gravity or when influenced by electric fields. Small deviations from the expected velocities would signal the presence of unconventional particles in the drops. To enhance their chances of finding one, the SLAC physicists pulverize meteoritic material thought to be 4-5 billion years old (about the Earth's age) to granules smaller than a micron (a millionth of a meter). Then they generate microdrops containing these granules that are about a dozen microns across – comparable to droplets produced by today's ink-jet printers.



Physicists involved in the Microdrop Particle Search experiment at SLAC. Group leader, Martin Perl, is at left.

A small biotech company recently experimented with the SLAC microdropper technology and found it quite suitable for making "gene chips." To generate these arrays of DNA fragments, one must lay down precise two-dimensional droplet patterns on glass plates. So yet another technology developed for fundamental physics research may soon find practical applications in biomedicine.

Submitted by DOE's Stanford Linear Accelerator Center

Physicist and philosopher

Ketevi Assamagan

Physicist Ketevi Assamagan of DOE's Brookhaven Lab has a quote from Albert Einstein — about the danger of being passive in the face of evil — scribbled on his office blackboard. "Einstein is one of my heroes, as a physicist and as a humanist," he says. "He speaks to the truth, that one should be proactive instead of not taking an interest."

Right now, Assamagan's interest is focused on his work. He is helping to design and build a muon spectrometer for ATLAS, one of two large, multipurpose detectors for the Large Hadron Collider (LHC), now under construction at CERN.

The LHC has several goals, including probing for new physics beyond currently accepted theories. Assamagan is most intrigued by the search for the elusive Higgs particle, a particle predicted by theory that should help explain the origin of matter, or how particles get their mass. "If it does exist, it will basically legitimate our current understanding of electro-weak symmetry breaking."

Assamagan grew up in the West African nation of Togo. In high school he chose to major in modern physics because he was good in math. He earned a bachelors degree in Togo, then came to the United States as an exchange student, sponsored by the U.S. Agency for International Development. He earned masters and doctorate degrees from Ball State University and the University of Virginia, respectively, and did post-doc work at Hampton University and Jefferson Lab. He then went to CERN for a three-year appointment to begin his work on ATLAS, and came to Brookhaven in July 2001 to continue that work.

"I find this a very exciting field," he said, noting the opportunity to work with experienced people on fundamental research. "Plus, there is room for independent research and independent thinking and growth."

Albert Einstein would be pleased that his philosophy still inspires.

Submitted by DOE's Brookhaven National Laboratory