



*Rohit Trivedi bridges the art-science gap.*

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Number 61

August 7, 2000

## 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/](http://www.ornl.gov/news/pulse/)) is distributed every two weeks. For more information, please contact Jeff Sherwood ([jeff.sherwood@hq.doe.gov](mailto:jeff.sherwood@hq.doe.gov), 202-586-5806).

### Ames Lab expands analytical arsenal

A unique Auger electron spectroscopy microscope at [DOE's Ames Laboratory](#) is giving researchers new insights into critical materials used in semiconductors, automobiles, catalysts, optics, thin films, computer hard disks and elsewhere. The instrument allows scientists to understand the composition of surface layers as well as the distribution of elements in materials. Such capability is important to researchers evaluating material properties, failure, corrosion, surface cleanliness and other factors. The system, which has a spatial and energy resolution 10 times greater than older instruments, is operated by Ames Lab's Materials Preparation Center and is the first of its kind in the United States.

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### Fermilab finds first direct evidence for tau neutrino

An international collaboration of scientists at [DOE's Fermi National Accelerator Laboratory](#) has seen the first direct evidence for the subatomic particle called the tau neutrino, the third kind of neutrino known to particle physicists. On July 21, the collaboration reported four instances of a neutrino interacting with an atomic nucleus to produce a charged particle called a tau lepton, the signature of a tau neutrino. Although earlier experiments had produced convincing indirect evidence for the particle's existence, no one had directly observed the [tau neutrino](#), a massless or almost massless particle carrying no electric charge and barely interacting with surrounding matter.

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### New test for radiation-induced damage clusters in DNA

[Brookhaven](#) biologists have devised a method for measuring radiation damage to DNA, including clusters of oxidized bases, strand breaks and abasic sites, which may turn out to be more harmful than breaks through both strands of the DNA double helix. Such forms of clustered damage have long been hypothesized, but no one had a way to measure them until now. The technique, which uses special enzymes to cut and count the kinds of damage, could help distinguish low-level radiation damage from changes caused by normal living, assess the radiation risks faced by astronauts, and improve the cancer-killing potential of radiation therapy.

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### Reactor-based system to manufacture hydrogen fuel

[DOE's Argonne National Laboratory](#) will spearhead development of a proliferation-resistant and economical nuclear-based energy supply system for use in industrialized and developing nations after the year 2020. "The basic concept is to use clean nuclear energy as the heat source for manufacturing hydrogen, a clean chemical fuel that burns without releasing carbon dioxide or other greenhouse gases that contribute to global warming," said Dave Wade, director of Argonne's Reactor Analysis Division. Working with Argonne are [Texas A&M University](#), [General Electric](#), and research institutes from Japan and Italy. The three-year project will receive about \$465,000 for the first year's work under [DOE's Nuclear Energy Research Initiative](#).

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