

are critical to healthy cell function, but deviant metal metabolism can be toxic to the body and result in disease. "Although Rosenzweig's research focuses on bio-inorganic structures and the atomic and molecular scale," says the citation, "the implications for biology are profound."

An associate professor of biochemistry, molecular biology, and cell biology at Northwestern University, Rosenzweig is currently working with colleagues on a number of projects, including one to help understand the molecular mechanisms of metal ion homeostasis. Other research areas include the chemical mechanisms of dioxygen activation at multinuclear metal centers and the structure and chemical mechanisms of enzymes involved in biosynthesizing antibiotics. Her research, says the foundation, "expands our understanding of basic processes at the interface of bio-inorganic chemistry and cell physiology."

Zhuang is working on developing biophysical techniques to monitor the behavior of biological molecules or systems at the single-molecule or single-functional-unit level. An assistant professor in Harvard University's departments of physics and of chemistry and chemical biology, she has used single-molecule fluorescence spectroscopy to demonstrate that a given enzyme molecule can take more than one path during folding or catalysis and that individual molecules in reversible processes seem to "remember" their preferred path.

Her group is investigating the molecular mechanisms and cellular pathways of viral infections by tracking the behavior of individual viruses, single viral proteins, and single viral genes using state-of-the-art fluorescence microscopy. "Understanding this process . . . at the individual molecule level," says the citation, "will provide critical insights into the basic biology of infection." Zhuang and her group are using fluorescence spectroscopy to study the folding and assembly dynamics of ribonucleic acid and ribonucleoprotein enzymes at the single-molecule level. In collaboration with Charles Lieber's group at Harvard, they are developing nanoelectronic devices to sense both biological molecules and pathogens at the single-unit level.

Since 1981, the foundation has awarded MacArthur fellowships to approximately 20–25 people annually. Each of this year's fellows will receive an unrestricted grant of \$500 000 over the next five years.

Laurel Vincenty

Fermi Award Honors Three Individuals

During an October ceremony in Washington, DC, Secretary of Energy Spencer Abraham honored this year's Enrico Fermi Award winners, **John Bahcall, Raymond Davis Jr., and Seymour Sack**. The presidential award, administered by the US Department of Energy and given in recognition of a lifetime of scientific achievement in the development, production, or use of energy, was established in 1956 to encourage excellence in energy science and technology.

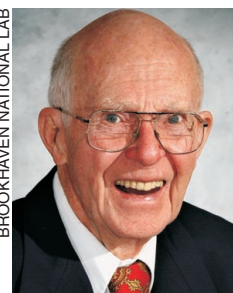
Bahcall and Davis share part of the award for their "innovative research



Bahcall

in astrophysics leading to a revolution in understanding the properties of the elusive neutrino, the lightest known particle with mass." According to the citation, their contributions to the field of solar neutrino physics and neutrino astronomy "have helped determined that neutrinos have mass and that electron neutrinos oscillate into many 'flavors' on their way from the Sun to the Earth."

Bahcall is the theorist whose work made possible the design and interpretation of Davis's experimental work on how neutrinos behave. He is the Richard Black Professor of Natural Sciences at the Institute for Advanced Study in Princeton, New Jersey, and a visiting lecturer with the rank of professor at Princeton University.

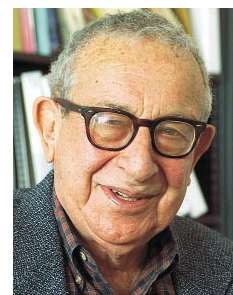


Davis

Davis, unable to attend the ceremony, led the group at the Homestake gold mine in South Dakota that discovered that most of the neutrinos made in the Sun do not arrive at Earth in their original state. He was a corecipient, with Masatoshi Koshiba and Riccardo Giacconi, of the 2002 Nobel Prize in Physics and is an emeritus research chemist at Brookhaven National Laboratory and a research professor of astronomy at the University of Pennsylvania. Bahcall and Davis

each received a \$93 750 cash award.

Sack, who was instrumental in designing nuclear weapons for the US while at Lawrence Livermore National Laboratory, was honored for his "contributions to the national security of the United States in his work assuring the reliability of nuclear weapons and thus deterring war between the superpowers."



Sack

Sack is responsible for developing modern nuclear-weapons safety features, such as insensitive explosives and fire-resistant pits. Although he retired from Lawrence Livermore in 1990, he remains affiliated with the laboratory as a consultant. He received a \$187 500 cash award.

APS Acknowledges Achievements

The American Physical Society has named several recipients of its awards for 2003.

The Fluid Dynamics Prize went to **Jerry Gollub** for his "elucidation of chaos, instabilities, mixing and pattern formation in various contexts including fluid convection," and for his contributions to our understanding of surface waves, film, and granular flows "through his clever experiments, lucid papers, and lively lectures." Gollub is a professor in the natural sciences and a professor of physics at Haverford College in Pennsylvania and also an adjunct professor of physics at the University of Pennsylvania.

Eugene Parker won the James Clerk Maxwell Prize for his "seminal contributions in plasma astrophysics, including predicting the solar wind, explaining the solar dynamo, and formulating the theory of magnetic reconnection, and the instability which predicts the escape of the magnetic fields from the galaxy." Parker is the S. Chandrasekhar Distinguished Service Professor Emeritus in the department of physics, the department of astronomy and astrophysics, and the Enrico Fermi Institute, all at the University of Chicago.

Mark Kasevich, professor of physics and applied physics at Stanford University, received the I. I. Rabi Prize for "developing atom interfer-

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ometer inertial sensors with unprecedented precision" and "pioneering studies of Bose-Einstein condensates, especially the achievement of non-classical spin states and the demonstration of a mode-locked atom laser."

David Pritchard, Cecil and Ida Green Professor of Physics and associate director of the Research Laboratory of Electronics at MIT, was honored with the Arthur L. Schawlow Prize for his "groundbreaking studies of coherent atom optics and pioneering work on laser cooling and trapping of atomic gases."

The Otto LaPorte Award recipient was **Norman J. Zabusky**, State of New Jersey Professor of Computational Fluid Dynamics at Rutgers University. He was recognized for his "enduring contributions in nonlinear and vortex physics and computational fluid dynamics including the soliton; contour dynamics and V-states for [two-dimensional] flows; vortex projectiles for accelerated inhomogeneous flows; and visimetrics for reduced modeling."

Siegfried Glenzer received the Award for Excellence in Plasma Physics Research for "elegant diagnostics using collective Thomson scattering together with x-ray spectroscopy which greatly advanced the understanding of the complex plasma environment in laser-driven hohlraums used in inertial confinement fusion."

Glenzer is the plasma physics group leader in the National Ignition Facility program at Lawrence Livermore National Laboratory.

The Shock Compression Science Award went to **James Asay** for his "personal research in shock compression science, for leadership in developing programs and tools that have strongly impacted the field, and for leadership in the technical community." Asay is associate director of the Institute for Shock Physics at Washington State University in Pullman.

The Mitsuyoshi Tanaka Dissertation Award went to **Geralyn Zeller**, postdoctoral research scientist at Columbia University, for her dissertation entitled "A Precise Measurement of the Weak Mixing Angle in Neutrino-Nucleon Scattering," which was completed under the supervision of Heidi Schellman at Northwestern University. According to the citation, Zeller's work "provides the most accurate measurement to date of the weak mixing angle using this technique. The value lies three standard deviations away from global electroweak fits, suggesting the existence of physics contributions from beyond

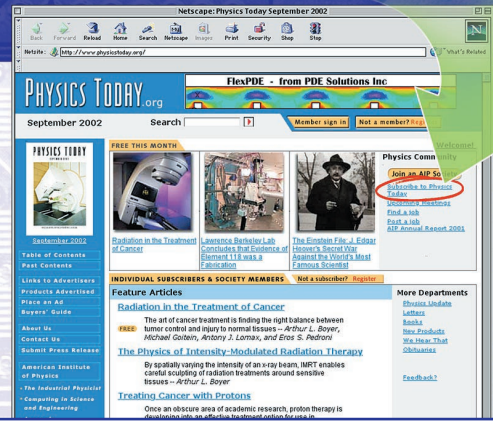
the standard model."

Daniel Steck, postdoctoral fellow at Los Alamos National Laboratory, garnered the Outstanding Doctoral Thesis in Atomic, Molecular, or Optical Physics for his dissertation "Quantum Chaos, Transport, and Decoherence in Atom Optics" completed under the guidance of Mark Raizen at the University of Texas at Austin.

The Outstanding Doctoral Thesis in Plasma Physics Award went to **Alex Arefiev** for his dissertation, which discusses "first-principles theoretical analysis of a plasma thruster that models the helicon plasma source, single-pass radio frequency heating, and particle and momentum balance." Arefiev, whose thesis advisers were Boris Breizman and Roger Bengtson at the University of Texas at Austin, is now a postdoctoral fellow in the university's Institute for Fusion Studies.

The Nicholson Medal for Humanitarian Service was presented to **H. Eugene Stanley**, University Professor and director of the Center for Polymer Studies at Boston University, for his "extraordinary contributions to human rights, for his initiatives on behalf of female physicists, and for his caring and supportive relationship with those who have worked in his laboratory."

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