Newly elected foreign members of the National Academy include

Edward Irving, an emeritus scientist at the Pacific Geoscience Centre of the Geological Survey of Canada in Sidney, British Columbia

Olli V. Lounasmaa, a professor of physics at the Helsinki University of Technology in Espoo, Finland

Roger Penrose, the Rouse Ball Professor of Mathematics at University of Oxford in the UK

Yasuo Tanaka, a senior scientist at the Max Planck Institute for Extraterrestrial Physics in Garching, Germany.

IN BRIEF

At a conference in Boston in April, **Peter Clarke** received the Nathaniel H. Sugerman Memorial Award from the Society of Vacuum Coaters. Clarke is the founder and president of Sputtered Films, Inc, in Santa Barbara, California.

In June, **Jacqueline Krim**, formerly a professor of physics at Northeastern University, joined the physics faculty at North Carolina State University.

Beating out other journals of science as well as those of medicine, the humanities and the arts, *Geophysical Research Letters* has won the award for the best single issue of a journal in 1997. The award, given annually by the professional and scholarly publishing division of the Association of American Publishers, honored the 15 November 1997 issue, which featured groups of papers on three subjects: record low levels of ozone in the Arctic, Indian Ocean circulation and the corona's influence on solar wind acceleration. GRL is published by the American Geophysical Union.

In a ceremony on 27 June, **Rolf Landauer** received the 1998 Edison Medal from the Institute of Electrical and Electronics Engineers (IEEE) for "his pioneering contributions to the physics of computing and conduction." Landauer is an IBM fellow at IBM's T. J. Watson Research Center in Yorktown Heights, New York.

IEEE's Engineering in Medicine and Biology Society has given a Career Achievement Award to **J. Lawrence Katz**, a professor of biomedical engineering at Case Western Reserve University. Katz was recognized for his use of ultrasonic wave propagation and scanning acoustic microscopy to study the relationship between the structure and properties of bone and teeth, with a view to developing biomaterial replacements.

Columbia University has added two Bell Laboratories researchers to the ranks of its faculty. **Aron Pinczuk** and **Horst Stormer** are now professors in the departments of physics and of applied physics, although they both remain affiliated with Bell Labs.

Donald Lynden-Bell has garnered the 1998 Catherine Wolf Bruce Medal, given by the Astronomical Society of the Pacific. The society is honoring Lynden-Bell, a professor of astrophysics at the University of Cambridge in the UK, for his lifetime contributions to astronomy. The citation notes that his contributions are exceptional in their scope, ranging from mathematical physics through observational astronomy.

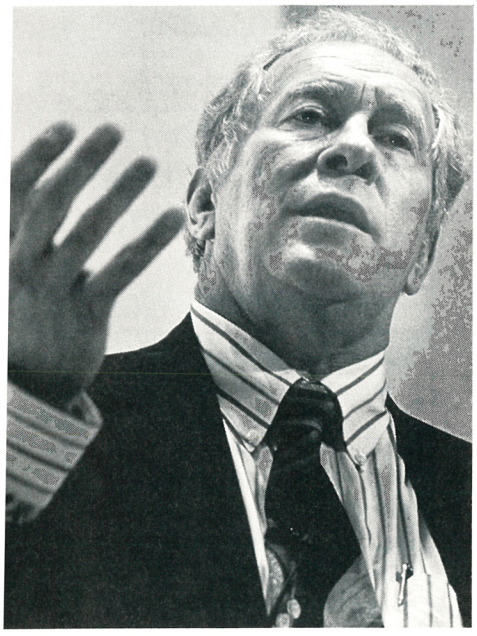
OBITUARIES

David Norman Schramm

On 19 December 1997, David Norman Schramm was killed when the twin-engine plane he was piloting crashed near Byers, Colorado. Schramm had been a faculty member at the University of Chicago since 1974 and, at the time of his death, was the Louis Block Distinguished Service Professor in the Physical Sciences and the university's vice president for research. One of the foremost cosmologists and most influential astrophysicists of his generation, Schramm was a statesman of science and a vocal advocate for the importance of basic research.

Schramm was born in St. Louis, Missouri, on 25 October 1945. His physics career began at MIT, where he received his SB in 1967 (and also was a national collegiate heavyweight champion in Graeco-Roman wrestling). He went next to Caltech, where the breadth of his interests and his exceptionally vigorous scientific energy led to his being supervised by two physicists of great stature—Jerry Wasserburg and the late Willy Fowler. At a memorial session held for Schramm at the January 1998 meeting of the American Astronomical Society, Wasserburg recalled graduate student Schramm arriving at his home one evening with a large box filled with computer output and announcing that they would write a paper that evening. Schramm earned his PhD in physics in 1971.

While at Caltech, Schramm's research focused on nuclear astrophysics.



DAVID NORMAN SCHRAMM

His work on the r-process—the buildup of the heaviest elements through rapid capture of neutrons—was influential, and his introduction of the concept of a model-independent mean age for the heavy elements enabled radioactive elements such as uranium, thorium, rhenium and osmium to be used to place realistic constraints on the age of the universe. In two papers with James Lattimer—the first in 1974—he developed what later because known as the Lattimer–Schramm model for the tidal breakup of a neutron star near a black hole. Originally put forth as a possible site for the r-process, the Lattimer–Schramm model turned out to be the first discussion of a now-popular model for the enigmatic cosmic gamma-ray bursters. He and David Arnett pointed out the importance of the discovery of the neutral-current weak interaction of neutrinos for the collapse and explosion of massive stars in supernovae.

In cosmology, Schramm found a field large enough to match his scientific appetite and accommodate his creative energies. In 1974, in one of his first and most cited papers on cosmology, he and J. Richard Gott III, James Gunn and the late Beatrice Tinsley laid out the case for a low-density universe. Their arguments are still valid and used today. Among the first to appreciate the richness and importance of the connection between elementary particle physics and cosmology, he, perhaps more than any other, helped to establish the now-vibrant interdisciplinary field of particle cosmology. For years, Schramm was bullish on cosmology, foreseeing—even boldly predicting—the present golden age of cosmology, in which an abundance of high-quality observations would test bold ideas, such as inflation and cold dark matter, that are based upon the particle physics connection.

Although his contributions to cosmology were manifold, Schramm's most widely recognized work was on Big Bang nucleosynthesis—that is, the sequence of events that led to the production of deuterium, helium-3, helium-4 and lithium a few seconds after the Big Bang. Opening with a seminal paper written with Hubert Reeves, Jean Audouze and Fowler in 1973, Schramm made the case for the Big-Bang origin of these four light elements. Over the years, Schramm and his many collaborators went on to exploit Big Bang nucleosynthesis as a crucial test of the Big Bang model, as the most accurate means of determining the density of ordinary matter and as a powerful probe of elementary particle physics. Of these applications, he was proudest of the Big Bang limit on the number of light neutrino species—fewer than four—that originated in a 1977 paper he wrote with Gary Steigman and Gunn. This limit was verified in 1989 by experiments at CERN and the Stanford Linear Accelerator Center that measured the properties of the Z boson.

Equally important, however, was the conclusion reached by Schramm and various collaborators—again based upon Big Bang nucleosynthesis—that ordinary matter falls far short of accounting for the observed amount of matter in the universe. This fact is the linchpin in the case for the bulk of the dark matter being elementary particles left over from the earliest moments. It is fitting that the primordial abundance of deuterium, which Schramm viewed as the light element best suited for accurately determining the baryon density, was measured shortly before his death in high-redshift hydrogen by David Tytler and his student Scott Burles. (In fact, Schramm's last published paper was an article in *Reviews of Modern Physics* on the implications of Tytler and Burles's measurement.)

Over the years, Schramm wrote papers on a remarkably diverse set of topics with an equally diverse group of coauthors. His papers addressed the solar neutrino problem, isotopic anomalies in meteorites, the origin and propagation of ultrahigh-energy cosmic rays and phase transitions in the early universe. With particle theorist John Ellis, he speculated that the sudden demise of the dinosaurs might have been triggered by a nearby supernova, and with particle experimentalist Leon Lederman, he wrote the acclaimed book *Quarks and the Cosmos* (W. H. Freeman, 1990), a popular account of the connections between cosmology and particle physics.

Beyond his own important contributions, Schramm helped to make science happen. A unique and multidimensional mentor, he encouraged his students and postdocs with unbounded generosity, providing ideas and support throughout their careers. He defied geographical bounds by sharing the latest scientific news with colleagues of all ages all over the world. An excellent matchmaker, he stimulated new collaborations connecting researchers in different subfields with complementary expertise.

Schramm's energy, enthusiasm and positive attitude were legendary. It seemed that he attended or organized every meeting, served on or chaired every committee and wrote or coauthored every paper. As the chair of the National Academy of Sciences' Board on Physics and Astronomy, he led the ten-year review of physics that is now in its final stages. During his twenty-year association with the Aspen Center for Physics, astrophysics became a major focus of the center, and as chairman of the board, he led the fund-raising drive that resulted in three new buildings.

Schramm lived life with the same verve—he was an avid mountaineer and expert skier, he had a passion for flying, and he was a devoted husband and father.

To all who knew him, Schramm seemed like a primeval force of nature, which makes his premature death seem all the more unreal.

ANGELA V. OLINTO
JAMES W. TRURAN
MICHAEL S. TURNER
University of Chicago
Chicago, Illinois

Gertrude Scharff Goldhaber

Gertrude Scharff Goldhaber, a renowned nuclear physicist and the first woman PhD hired by Brookhaven National Laboratory (BNL), passed away in Patchogue, New York, on 2 February after a long illness.

Born in Mannheim, Germany, on 14 July 1911, Trude Scharff began her physics career in 1935, when she earned a PhD from the University of Munich. From 1935 to 1939, she lived in England, where she held a postdoctoral position at the University of London's Imperial College.