Award for Scientific Contributions to Archaeology to **Garman Harbottle**. He was recognized for his "contributions in the development of the archaeological sciences and being at the forefront of applying nuclear sciences to problems in archaeology, especially in the fields of proveniencing, radiocarbon dating, and archaeometallurgy." Harbottle is a senior chemist at Brookhaven National Laboratory in Upton, New York.

Last month at the 91st session of the Joint Institute for Nuclear Research scientific council in Dubna, Russia, the JINR presented the Bruno Pontecorvo Prize to **Nicholas Samios**, Distinguished Senior Scientist with Brookhaven National Laboratory in Upton, New York, and former director of BNL. The JINR recognized Samios for his "outstanding contribution to particle physics."

Katepalli R. Sreenivasan joined the University of Maryland, College Park, in January as a Distinguished University Professor of Physics and Mechanical Engineering and director of the Institute for Physical Science and Technology. He was previously the Harold W. Cheel Professor of Mechanical Engineering at Yale University.

Last November, at its annual assembly in Strasbourg, France, the European Science Foundation awarded the 2001 European Latsis Prize in the field of climate research to **André Berger**, a professor of climatology and meteorology at the Catholic University of Louvain, in Belgium. Berger, who established an accurate description of the variations of the astronomical factors that influence global climate, was honored for his "outstanding contributions to the understanding of the Ice Age climate" and, in particular for "understanding how the climatic fluctuations are generated, using computer models of different complexity." The European Latsis Prize is awarded annually to an individual or group who has made the greatest contribution to a particular field of European research. It includes a cash prize of 100 000 Swiss francs (about $60 000).

The Foresight Institute in Palo Alto, California, presented its 2001 Feynman Prize in Nanotechnology, Experimental, at the conference on molecular nanotechnology held last November in Santa Clara, California. The institute awarded the prize to **Charles Lieber**, Mark Hyman Professor of Chemistry, Harvard University, for his "pioneering experimental work in molecular nanotechnology, which included seminal contributions to the synthesis and characterization of the unique physical properties of carbon nanotubes and nanowires." Lieber's work, adds the citation, "represents a significant advance toward molecular-scale computation and nanotechnology." He received a cash prize of $5000.

The Foresight Institute also handed out the 2001 Feynman Prize in Nanotechnology, Theoretical, to **Mark Ratner**. According to the citation, he has made "major contributions to the development and success of nanometer-scale electronic devices. . . . His work has been instrumental in establishing scientific understanding worldwide about the mechanisms and magnitudes of conduction in molecular junctions and, in particular, the nature of charge transport in single-molecule nanostructures." Ratner is a professor of chemistry at Northwestern University. He also received $5000.

At its annual meeting in Boston at the end of November, the Materials Research Society presented its highest honor, the Von Hippel Award, to **Simon C. Moss**, M. D. Anderson Chair of Physics at the University of Houston, for "consistently timely and essential contributions to identifying and understanding the atomic-level structure of almost every new type of material discovered in the past 30 years." The award included a $10 000 cash prize.

The Materials Research Society also handed out other awards at the Boston meeting, including the 2001 MRS Medal Award to **Norm Bartelt**, a distinguished member of the technical staff at Sandia National Laboratories in Livermore, California, and to **C. Mathew Mate**, a research staff member with the IBM Almaden Research Center in San Jose, California. The society acknowledged Bartelt for "contributions to the statistical mechanics of materials surfaces." Mate was noted for "pioneering studies of friction at the atomic and molecular level." **James R. Chelikowsky**, Institute of Technology Distinguished Professor at the University of Minnesota, Twin Cities, garnered the society's 2001 Turnbull Lecturer Award. He was cited for "contributions to the fundamental understanding of electronic, optical, mechanical, surface, and interface properties of bulk and nanostructured semiconductors, ceramics, and metals through ab initio calculations; and for excellence in teaching, lecturing, and writing."

After nearly 30 years with NSF, **Boris Kayser** joined the ranks of Fermilab in October as a Fermilab distinguished scientist. He previously was NSF's program director for theoretical physics, a position he had held since 1975.

In September, **Sukyoung Yi** joined the physics department at the University of Oxford as a lecturer. Yi previously was a staff scientist with Caltech.

On 1 June, **Thomas Henning** will take the position of director at the Max Planck Institute for Astronomy, located in Heidelberg, Germany. He currently is director of the Astrophysical Institute and University Observatory at the Friedrich Schiller University in Jena, Germany.

OBITUARIES

Ralph P. Shutt

Ralph P. Shutt, a leader in experimental particle physics at Brookhaven National Laboratory (BNL) for many years, died on 2 February 2001 in a hospital in Pt. Jefferson, New York. He had been in poor health after suffering a series of small strokes over the previous few years.

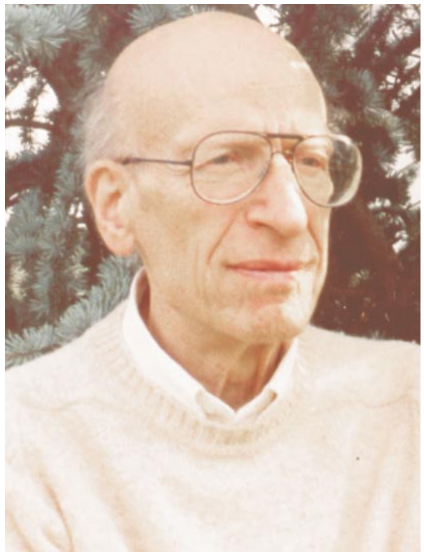
Shutt was born in St. Moritz, Switzerland, on 7 December 1913. He grew up and was educated in Berlin, receiving his BS in physics from the Technical University of Berlin in 1935. For a time, he was employed in engineering by the Siemens Co, but returned to school and received his doctorate of science in physics in 1938 from the Technical University of Berlin. His early work on cloud chambers won him a prize in recognition of his technical contributions to this new technique. He also trained as a classical pianist and faced a difficult career choice before deciding on a life in science.

Because of the threat of persecution due to his partial Jewish ancestry, Shutt left Germany and immigrated to the US in 1939. From 1939 to 1946, he worked at the Bartol Research Foundation of the Franklin Institute in Swarthmore, Pennsylvania, doing research on cosmic radiation using cloud chambers and war research on acoustics and ultrasonics. He also taught physics at Swarthmore College. From 1946 to 1947, he worked at the Aberdeen Proving Ground in Maryland, conducting research on cosmic radiation using high-pressure cloud chambers.

Shortly after its establishment in 1947, Shutt joined the new BNL to lead the design, building, and use, initially, of cloud chambers and then of bubble chambers, first at the Cosmotron and then at the Alternating Gradient Synchrotron (AGS). In 1953, Shutt and his colleagues were the first to verify the paired production of so-called strange particles and, therefore, the existence of strangeness. In their experiment, they used a high-pressure hydrogen diffusion cloud chamber, a new device for which the theory was developed by Shutt. The device was continuously sensitive, with no dead time, and therefore well matched to an accelerator with a one-second repetition rate. The chamber was placed in an 11-kilogauss magnetic field and exposed to a beam of 1.5-GeV π^- mesons produced by a 2.2-GeV proton beam in the Cosmotron. This discovery that the strange particles were produced in pairs in "associated production" was a first essential step on the road that led to the description of matter as constituted by quarks.

At the AGS, Shutt led the effort to exploit the physics potential of this new machine with bubble chambers. From 1958 to 1975, a series of ever larger and more productive bubble chambers were built, known as the 20-inch, 31-inch, 80-inch, and 7-foot chambers. More than 37 million pictures for the study of elementary particle physics were produced by these chambers. Their construction and safe operation were noteworthy accomplishments, requiring a staff of creative and competent physicists, engineers, and support personnel to invent and develop many new techniques and technical devices.

For the use of the chambers, beginning with the 20-inch chamber, Shutt pioneered a unique user mode that benefited a wide community of physicists. This mode was made possible by both Shutt's strong desire to share the benefits of this experimental technique and by the usefulness of photographic film as a viable distribution medium. Users from universities and



RALPH P. SHUTT

laboratories worldwide proposed and received approval for a variety of experiments using beams of pions, kaons, protons, antiprotons, and neutrinos at a variety of energies and with various bubble chamber liquids. Some 75% of the resulting film was distributed by BNL to these outside users. The remaining 25% was retained by the BNL groups that were responsible for building and maintaining the experimental equipment. This scheme bolstered productivity and resulted in a large physics output. Results included the discovery of a host of particles and resonances, among the more noteworthy being the ϕ, ρ, f^0, η', f', $\bar{\Xi}$, Ξ^*, and the Ω^-, Σ_c^{++}, and Λ_c^+. These resonances and the accompanying dynamical studies provided much of the data that led to the establishment of the now accepted standard model of particle physics.

In the 1970s, as electronic detectors gained prominence as particle accelerators, Shutt supported and encouraged their development, recognizing them as the natural evolution in detector technology. During this period, he collaborated on the design and construction of a cold-neutron spectrometer for the high-flux beam reactor at BNL. In 1980, he joined Robert Palmer and colleagues to develop an alternative superconducting magnet for the proposed Isabelle accelerator. The magnet proved successful and was the basis for the revised Isabelle, renamed the Colliding Beam Accelerator (CBA), in 1981. This project, however, was canceled by the US Department of Energy (DOE) in 1982 in favor of a much larger machine, the Superconducting Super Collider, for which BNL designed and built prototype superconducting dipole magnets in collaboration with the SSC central design group and the staff at Lawrence Berkeley National Laboratory in California and at Fermi National Accelerator Laboratory in Illinois. Some years later, the completed CBA infrastructure at BNL was adapted for BNL's now completed Relativistic Heavy Ion Collider, a machine for heavy-ion physics, built with superconducting magnets, and sponsored by the DOE's nuclear physics program.

Shutt contributed to all these projects in manifold ways. In particular, he focused on the thermodynamics of magnet cooling and heating, quench pressure buildup questions, stress analysis of magnet structures, analysis of bellows stability, and power lead designs. He invented the concept of cross-flow cooling for SSC magnets, which allowed the superconducting coils in those long magnets to remain adequately cool in the face of eddy-current and beam-energy-deposit heating. The stresses in metal bellows attracted his interest. With insightful analysis, he developed new and detailed formulas for their safe use. His designs for power-lead construction have been proven correct and efficient in practice. Shutt's thorough grounding in classical mathematics, especially in the use of partial differential equations, which he received in his early schooling in Germany, made it possible for him to do many of these calculations. In a related effort in the late 1980s, he took an active part in the design and analysis of the large superconducting magnet for the muon $(g-2)$ experiment that is currently under way at BNL (see PHYSICS TODAY, April 2001, page 18).

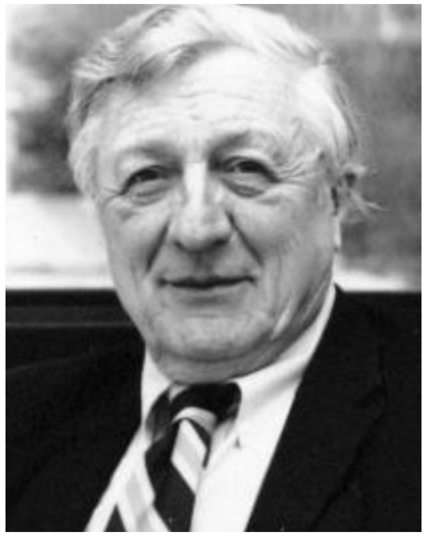
During his years at BNL, Shutt held various administrative posts, including bubble chamber group leader, from the first use of bubble chambers in the 1950s through 1971; deputy chairman of the accelerator department (1971–73); deputy chairman of the physics department (1974–75); and head of the superconducting magnet division (1982–84). And, in 1993, the American Physical Society awarded Shutt and his colleagues Nicholas Samios and Robert Palmer the 1993 W. K. H. Panofsky Prize for their discovery of the Ω^- hyperon.

But Shutt's preference was to be involved in projects at a technical level and to analyze and understand through calculations the thermodynamic performance of a device, or the forces in structures, and the limits they impose. He was technically demanding, and he was at his best in detecting subtle flaws in complicated designs and suggesting remedies that were at once comprehensive and practical.

Shutt was a shy person, preferring one-on-one or small group interactions. There his friendliness, natural wit, and perceptive nature were evident and engaging. He was generous with his time and knowledge in the mentoring of younger colleagues, continuing his valuable contributions in this way until a few years before his death. Perhaps his greatest strength was that he recognized talent and competence, and encouraged and made possible the start of many successful professional careers over the years. This generosity of spirit will be a lasting tribute to the memory of Ralph Shutt.

David Rahm
Nicholas Samios
Erich Willen
Brookhaven National Laboratory
Upton, New York

Fred David Rosi



Fred David Rosi

Fred David Rosi, a pioneer and leader in the field of materials science of semiconductors, died on 7 May 2001 in Richmond, Virginia, from complications following a yearlong battle with prostate cancer. He was a professor emeritus in the University of Virginia's department of materials science.

Fred was born in Meriden, Connecticut, on 13 January 1921, the son of Italian immigrants. He received a BE degree in metallurgy from Yale University in 1942, then served in the US Navy during World War II as an engineering and minesweeping officer in the Pacific. He completed his education at Yale, receiving an ME in metallurgy in 1947, an MS in physics in 1948, and a PhD in metallurgy in 1949. His thesis, carried out under Champion H. Mathewson, concerned the plastic behavior of high-purity aluminum single crystals.

During the 1950s, the revolution in semiconductors had begun, but the science of electronic materials had not really been born yet as a distinct and recognized field. No semiconductor society yet existed, and the few people in the field were mostly metallurgists. Fred had a significant role in the birth of this new science. He was a founder (in 1955) of the electronic materials committee of the American Institute of Metallurgical Engineers, perhaps the first group to focus on electronic materials and to hold annual meetings on the subject. He gave numerous talks to groups in the AIME, and also at universities, government agencies, and industrial laboratories, emphasizing the importance of materials aspects in semiconductors. He also championed the need to form interdisciplinary teams to achieve new and improved devices, a concept that is now widespread.

Fred's leadership in initiating and guiding research projects was remarkable. In 1953, he joined the RCA Laboratories in Princeton, New Jersey. His group at RCA grew and broadened, influencing a generation of scientists there. His early emphasis on III–V compounds led to a leadership position for the RCA scientists in this field, with key contributions to the materials aspects of gallium arsenide. For example, he led the team that defined many key properties of GaAs, including the discovery in 1958 that silicon impurities were the main donor in GaAs; that discovery had a significant effect on further work in the field. Later work by this group provided the first vapor-phase synthesis of aluminum nitride (AlN), paving the way to the present blue light-emitting diodes.

Following the discovery of the importance of silicon–germanium alloys for thermoelectric devices in 1960 at RCA, Fred initiated, inspired, and guided the interdisciplinary team to develop these alloys from a laboratory curiosity to a practical device. In just four years after he assumed leadership of the Si–Ge development program in 1961, the SNAP-10A system, which used these thermoelectric devices for power generation, was successfully launched. These generators are critical elements that later powered a generation of deep space probes culminating in Voyager I and II (1977).

From 1960 to 1965, when the Si–Ge alloys were being developed, Fred also initiated and led a multidisciplinary program on superconductors. In 1960, a new chemical vapor deposition system was introduced for the preparation of Nb_3Sn tape; this system was the program's first success. By 1964, Fred's team produced the world's largest superconducting solenoid, with a field of 107 kilogauss over a 1-inch bore. This technology was transferred to an RCA division, which, by 1966, was selling superconducting ribbon. Today such superconducting solenoids dominate nuclear magnetic resonance research tools and are the basis of a major development in medical tomography. In recognition of these achievements, in 1966, Fred was appointed vice president of materials and device research at RCA Laboratories.

In 1975, Fred moved to Richmond, Virginia, to accept the position of general director of R&D for the Reynolds Metals Co. Fred completed his career at the University of Virginia, where he was executive director of the Energy Policies Studies Center and a professor in the department of materials science and engineering until 1995.

Fred also served as consultant to NASA's Marshall Space Flight Center, the CIA, and several corporations. He was a member of numerous committees, including the National Academy of Science committee on electronic materials and devices and the National Materials Advisory Board. He served as chairman of the Board of Trustees of Trenton State College and on the New Jersey Board of Higher Education. Fred also held 12 issued US patents and, in 1962, received the David Sarnoff Gold Medal for Team Achievement in Science from RCA.

Fred epitomized an industrial research leader: He not only recognized the importance of the research itself, but also emphasized the importance of achieving practical applications. His leadership included the ability to inspire and encourage both those who worked for him and with him. He was loyal and sensitive, and exciting to interact with.

The now flourishing field of materials science has lost an outstanding leader, pioneer, and innovator. For all of us who worked or interacted with Fred, his charisma, enthusiasm, intelligence, and personal kindness will not be forgotten.

Leonard R. Weisberg
Alexandria, Virginia
George D. Cody
Princeton, New Jersey ■