Founders Award to **Chang-Lin Tien**, university professor emeritus and NEC Distinguished Professor of Engineering at the University of California, Berkeley. He was recognized for "his pioneering contributions in gas thermal radiation, thermal insulation, and microscale heat transfer, as well as his leadership in education for youth around the world."

In August, **David W. Tank** accepted a joint appointment as a professor in the departments of physics and molecular biology at Princeton University. He previously was the director of the biological computation research department at Bell Labs in Murray Hill, New Jersey.

At a ceremony in his home on the Stanford University campus this past summer, **Edward Teller** was honored with the Hungarian Corvin Medal, which was revived this year, having been last awarded in 1930. Teller is a director emeritus of Lawrence Livermore National Laboratory and a senior research fellow at Stanford's Hoover Institution on War, Revolution and Peace. The Hungarian government, which bestowed the award, recognized him for having "helped end the Cold War without bloodshed." Teller, a native of Hungary who has won numerous awards, said that he believes this to be his greatest achievement. He also was cited for his accomplishments as a poet and pianist.

The Accademia Nazionale dei Lincei (National Academy of Lincei) in Rome presented **Morton Gurtin** with this year's Cataldo e Angiola Agostinelli International Prize in Pure and Applied Mathematics and Mathematical Physics at the academy's annual meeting this past June. Gurtin, Alumni Professor of Mathematical Science at Carnegie Mellon University in Pittsburgh, was recognized for his work as an active collaborator with the Italian school of continuum mechanics. His main contributions have been in the field of crystalline plasticity. The prize included a cash award of 30 million liras (about $14 000).

In August, **Ann F. Whitaker** was named the new director of the science directorate at NASA's Marshall Space Flight Center in Huntsville, Alabama. Whitaker replaces **M. Franklin Rose**, who is now vice president for research at Radiance Technologies in Huntsville.

Next April, the American Chemical Society will present the 2002 Award in Analytical Chemistry to **Alan G. Marshall** at the society's national meeting to be held in Orlando, Florida. Marshall is being recognized for his "pioneering comprehensive development of theory, instrumentation, and analytical applications of Fourier transform ion cyclotron resonance ultrahigh-resolution mass spectrometry." He is the Kasha Professor of Chemistry at Florida State University and director of the ion cyclotron resonance program at the National High Magnetic Field Laboratory in Tallahassee.

The 2001 Arthur C. Cope Scholar Award from the American Chemical Society was awarded to **Jean M. J. Frechet** at the society's national meeting in Chicago, in August. A professor of chemistry at the University of California, Berkeley, Frechet was honored for his "design of functional polymer materials and his creative work in organic polymer synthesis." The award included a $5000 cash prize and a $40 000 research grant.

The American Society for Engineering Education, at its annual conference and exposition in Albuquerque, New Mexico, this past June, presented the 2001 Glenn Murphy Award to **Yassin A. Hassan**, a professor of nuclear engineering and coordinator of the nuclear engineering graduate program at Texas A&M University. Hassan was honored in part for being "an effective mentor of students and for his emphasis on the professional development of students through invaluable international experiences." The award is given annually to a distinguished nuclear educator to recognize notable professional contributions to the teaching of undergraduate or graduate nuclear engineering students.

Fusion Power Associates has named the recipients of its 2001 awards. The winners of the 2001 Leadership Awards are **Robert J. Goldston**, director of the Princeton Plasma Physics Laboratory in Princeton, New Jersey, and **Ron Parker**, a professor in the electrical and nuclear engineering departments at MIT. FPA's Distinguished Career Award winners are **Roger O. Bangerter** and **Edward A. Frieman**. Bangerter recently retired as the director of the Heavy-Ion Fusion Virtual National Laboratory, a collaborative venture of Lawrence Berkeley National Laboratory and the Princeton Plasma Physics Laboratory. Frieman is a director emeritus of the Scripps Institute of Oceanography at the University of California, San Diego.

Lance L. Snead was named by Fusion Power Associates as the winner of this year's Excellence in Fusion Engineering Award. Snead is a senior research scientist with Oak Ridge National Laboratory. **Mark Haynes** is the recipient of a Special Award. He is the vice president of Washington Operations at General Atomics in San Diego, California.

OBITUARIES

Vitalii Iosifovich Goldanskii

Vitalii Iosifovich Goldanskii, general director of the Joint Institute of Chemical Physics of the Russian Academy of Sciences (RAS), died of heart failure in Moscow on 14 January 2001.

Goldanskii was born on 18 June 1923, in Vitebsk (now Belarus). His parents were schoolteachers. Later, the family moved to Leningrad (now St. Petersburg), where, in 1939, Goldanskii entered Leningrad State University to study chemistry. His learning, however, was interrupted by World War II. Goldanskii was wounded while participating in the defense of Leningrad. He survived the hunger and cold of the winter blockade, and

VITALII IOSIFOVICH GOLDANSKII

was evacuated to Kazan in 1942.

He continued his education in chemistry at Kazan State University and simultaneously worked as a lab technician in one of the institutes of the Soviet Academy of Sciences (now the RAS). Goldanskii moved to Moscow in 1943 to continue his education in chemistry at Moscow State University. He graduated from there in 1944. He was a postdoc at the Institute of Chemical Physics, which was headed by the Nobel Prize winner Nikolai Semenov, who became Goldanskii's teacher and friend. (Later they would become relatives when Goldanskii married Semenov's daughter Lyudmila.) In 1947, Goldanskii defended his thesis for his PhD. His dissertation was entitled "Ion Catalysis in Polymolecular Layers." Because the Institute of Chemical Physics, like many other scientific centers of the former Soviet Union, participated in the Soviet atomic weapons program during the 1940s, Goldanskii started to work in the field of nuclear physics.

During the period 1944–50, Goldanskii worked in Dubna with a group of other physicists at the synchrocyclotron (later the Joint Institute for Nuclear Research). They studied the process of high-energy neutron absorption and multiplication, which led to the discovery of multiple secondary neutron production during bombardment of heavy-element targets. This discovery showed that it was possible to obtain plutonium from uranium-238 by the so-called electronuclear breeding previously predicted by Semenov and Ernest Lawrence. It was on these results that Goldanskii based his DSc dissertation entitled "The Absorption and Multiplication of High-Energy Neutrons," which he defended in 1954.

From 1952 to 1961, Goldanskii worked at the Lebedev Physical Institute, where he conducted a series of investigations into the fission of heavy nuclei. During that period, he was also very much interested in the physics of elementary particles. He subsequently produced a number of publications devoted to π^0-meson photoproduction on hydrogen, scattering of gamma rays on protons, detection of the electromagnetic polarization of hadrons, and determination of the proton and π^+-meson polarizability constants. Also widely known are Goldanskii's papers on the nuclei of elements far from the β-stability region, the so-called neutron-rich and neutron-deficient isotopes. Goldanskii, together with Yakob Zeldovich, predicted the existence of a number of such isotopes, including superheavy helium-8. He also predicted a new, fourth type of radioactive decay—two-nucleon radioactivity—which was experimentally observed in the mid-1980s.

In 1961, Goldanskii returned to the Institute of Chemical Physics to organize the laboratory of nuclear and radiation chemistry (now the department of matter structure). However, chemistry, as it was understood by Goldanskii, was essentially a new science based on physical concepts and the development and implementation of nuclear physics methods. Goldanskii's investigations during that period included the well-known study of the chemical properties of positronium, which has a lifetime of 10^{-7} to 10^{-9} seconds. Goldanskii, with his colleagues, wrote a new chapter in the science of radiochemistry: They created the radiochemistry of positronium.

Goldanskii was among the first to understand the broad possibilities of applying the Mössbauer effect to chemical problems. The first publication (1961) on the Mössbauer effect in polymers containing tin was followed by a series of papers that established a new direction of research—chemical Mössbauer spectroscopy or gamma-resonance spectroscopy (GRS). To date, the GRS method, as well as positron spectroscopy, is among the arsenal of methods widely used for studying the structure of materials. GRS significantly contributed to solving a number of tasks, not only in chemistry but in molecular biology. GRS provided clear evidence that intramolecular mobility is a very important factor in the functioning of biopolymers.

The change in the chemical state of elements as a result of their nuclear transformations led to the development of a new field in nuclear chemistry: hot atoms chemistry. Results gained during many years of research created the impression that everything possible in this field had already been done and the problem had been exhausted. However, Goldanskii and his coworkers managed to find a new and unexpected aspect. Investigations of how the cross sections of chemical reactions involving hot hydrogen atoms depend on particles' kinetic energies led to an original approach to the study of the spatial structure of biopolymers, called the tritium planigraphy method. This technique is now widely used to study the structures of proteins and more complicated objects such as ribosomes, viruses, and whole cells.

After Semenov died in 1986, Goldanskii became the director of the Institute of Chemical Physics and subsequently created the N. N. Semenov Joint Institute of Chemical Physics in 1991. This new organization united all scientific institutes that were part of the Semenov Institute of Chemical Physics. Until his last day, Goldanskii was the general director and scientific leader of this institute.

For many years Goldanskii was a professor of nuclear physics at the Moscow Engineering Physics Institute. He also was an excellent popularizer of science; he wrote a series of books and articles in popular journals and cooperated for many years with the Znanie (Knowledge) scientific society. In 1967, he created the journal *High-Energy Chemistry*, and he was editor-in-chief of the journal *Chemical Physics Reports* from 1987 to 2001.

Goldanskii's diverse scientific activity brought him recognition among physicists, chemists, and biologists. Numerous prizes and medals recognized Goldanskii's work. He won the Lenin (1980) and Russian Federation state (2000) prizes, administered by the government, and the Karpinsky Foundation Award (1983) from the Hamburg Foundation, located in Germany. Goldanskii was a member of the National Academy of Sciences in the US. He understood well the possible consequences of a nuclear war, and actively participated in the Pugwash Movement, heading the Russian committee of this organization.

Goldanskii, who shared the political and social ideals of his friend Mikhail Gorbachev, entered politics. He was elected a deputy for the first meeting of People's Deputies of the USSR ("Gorbachev's Meeting") and was a member of the Russian parliament until the USSR collapsed. In television broadcasts and the print media, he frequently called for freedom and democracy.

An excellent scientist, research organizer, teacher, and public politician, Goldanskii was by no means devoid of simple human joy. He was fond of classical and modern music, including jazz, and possessed a large record collection. He liked theater, cinema, and the arts. He was a talented author himself; in particular, many of his splendid aphorisms were published in the famous *Literaturnaya Gazeta (Newspaper of Literature)*.

Handsomely rewarding Goldanskii with talents, Nature was not so generous with his health. He suffered heart disorders, which probably were a consequence of the war years. Even his health challenges he approached with humor: A conventional greeting of "You

look well" was always answered with "I've no complaints about my looks." A bright and hearty man, Goldanskii will remain in the memories of his friends, colleagues, and everyone who had the luck of meeting and working with him. With the death of this academician, Russian and world science has suffered a heavy loss.

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William Edward Caswell

WILLIAM EDWARD CASWELL

William Edward Caswell, a physicist who made important contributions to both theoretical physics and national defense technology, died tragically on 11 September 2001. He was aboard the hijacked airplane that was crashed into the Pentagon. At the time of his death, Bill was a senior scientist for the US Navy.

Bill was born on 22 June 1947 in Boston. He received both of his degrees in physics: his BS from the University of Maryland, College Park, in 1968 and his PhD from Princeton University in 1975. Bill's thesis, for which one of us (Callan) was the adviser, contained the first calculation of higher-order renormalization group quantities in non-abelian gauge theory. He was a third-generation physicist: His grandfather, Albert, received one of the first PhDs in physics from Stanford University, and his father, Randall, held an MIT physics PhD.

Bill's graduate career coincided with the synthesis of gauge symmetry and renormalization group ideas. He made several major, path-breaking contributions to that synthesis. Perhaps their apex was his calculation, in 1974, of the beta function to two-loop accuracy. As Bill's thesis adviser (Callan), and graduate student colleague and office mate (Wilczek), we observed firsthand the evolution of this work. Bill focused on his goal even before the basic one-loop result had stabilized. At the time, this effort required unusual courage and determination, since the calculation simultaneously features all the notorious subtleties of gauge invariance, overlapping divergences, and renormalization.

Bill quickly saw his way through the conceptual difficulties, but dealing with dozens of Feynman graphs, each expanding into many algebraic terms, was challenging in the extreme. Bill soon realized that a pure hand calculation would be both excruciating to perform and impractical to check. He ventured into the then-uncivilized realm of machine symbolic calculation (this was the age of punch cards, FORTRAN, and paper output), and was finally able to adapt Tony Hearn's REDUCE program to his needs. Still, each graph was a project in itself, and there were an awful lot of them. Bill kept a master list on his blackboard, and we remember his increasingly broad smile as he ticked them off one by one and closed in on the goal. Champagne was served when all consistency checks fell into place and a reliable result could be reported.

A few weeks after Bill got his final result, two other groups reported independent calculations of the same quantity, with different answers. Bill was momentarily shaken, but after poring over his calculations once more, serenely initiated correspondence with his competitors. As things developed, his confidence was justified, and all converged on Bill's original result, which was published in a 1974 *Physical Review Letters* article.

The impact of Bill's calculation was enormous. His result convincingly showcased both the consistency of quantum gauge field theories and the potential of computer algebra. It has, of course, also played a central role in physics. Today the interpretation of many experiments in high-energy physics requires multiloop quantum chromodynamics calculations, and Bill's result is a prime ingredient in every such calculation. It is also a critical ingredient in calculating the running of the coupling constants of the Standard Model's supersymmetric extensions, calculations that are interpreted these days as evidence for both grand unification and low-energy supersymmetry. Thus Bill's work is also crucial to our thinking about physics beyond the Standard Model. As Bill emphasized in his original paper, his calculation indicated the possibility of a qualitatively new behavior in relativistic quantum field theory, featuring conformal symmetry at large distances due to a "reliable" zero of the beta function. Such theories have been the subject of many recent investigations.

Bill made many other contributions to particle physics after his thesis, working as a postdoc at SLAC (1975–77), as an assistant professor of physics at Brown University (1977–79), and as an assistant professor of physics at Maryland (1979–83). His development, in 1978 with Peter Lepage, of new and powerful tools for dealing with higher-order effects in bound states (such as positronium and charmonium) was a particularly valuable and influential contribution.

In 1983, Bill's career took an abrupt turn when he moved to the Naval Surface Weapons Center in Silver Spring, Maryland, to work on applying artificial intelligence and nonlinear dynamics to signal processing problems. In 1985, he was invited by the navy to work as a civilian scientist on a major classified defense technology project. Bill rose rapidly to a position of overall technical responsibility for this project, ultimately directing a team of more than 100 scientists working on one of the navy's most challenging problems. His technical skills and hands-on management style won the respect of his colleagues at the same time as his kindness, good humor, and thoughtfulness won their affection. Although the classified nature of the project meant that he could not discuss it with outsiders, those who knew it well tell us that Bill made many important contributions, grounded in his skills as a theoretical physicist, to its success. Indeed, he received several navy commendations on his work, one of which cites his role in a "highly successful top priority Chief of Naval operations project of unprecedented technological complexity . . . developing a profoundly new capability for the US Navy." A long way from the two-loop beta function and a remarkable career in physics!