ser plasma theory group at the Max Planck Institute for Quantum Optics in Garching, Germany; **Guillermo Velarde**, director of the Institute of Nuclear Fusion at the Polytechnic University of Madrid; and **George Zimmerman**, a group leader at Lawrence Livermore National Laboratory.

Adolf Goetzberger was awarded the 1997 Karl W. Böer Solar Energy Medal of Merit by the University of Delaware at a ceremony in May. Goetzberger was the founder of the Fraunhofer Institute for Solar Energy Systems in Freiburg, Germany, and is a professor at the University of Freiburg.

OBITUARIES

Victor Amazasp Ambartsumian

Victor Amazasp Ambartsumian, a leading Armenian theoretical astrophysicist who predicted stellar associations and the activity of galactic nuclei, passed away in Byurakan, Armenia, on 12 August 1996.

Ambartsumian was born on 18 September 1908 in Tbilisi, Georgia. During his student years at Leningrad (now St. Petersburg) State University, he published his first scientific papers, in mathematics, astrophysics and physics. After his graduation from Leningrad University in 1928 and postgraduate studies at nearby Pulkovo Observatory in 1928–31, he returned to the university, where he founded the first department of astrophysics in the Soviet Union and became a professor in 1934.

In 1943, Ambartsumian was one of the founding members and the first vice president of the Armenian Academy of Sciences. From 1947 to 1993, he was the academy's president, and after 1993 he was its honorary president.

In 1946, Ambartsumian founded the academy's Byurakan Astrophysical Observatory, northwest of Yerevan, the capital of Armenia, and remained its director until 1988. Under his leadership, it became one of the best well-known observatories in the world.

Ambartsumian explored many topics in astrophysics, and in nearly every case his work led the field in a new direction. His classic studies of the physics of gaseous nebulae and radiation transfer theory played an important role in the theory of multiple light scattering. The invariance principle, which he formulated in these works, found wide application in mathematical physics, radiophysics, geophysics and nuclear physics. While studying interstellar absorbing matter in the Milky Way, Ambartsumian put forward an idea about its ragged structure and worked out the theory of fluctuations of light in the Galaxy. In stellar dynamics, he established the base for a new statistical mechanics of stellar systems. The application of this statistical method to binary stars and star clusters led to fundamental conclusions about the age of the Galaxy, the most efficient mechanisms for the decay of star clusters and so forth.

VICTOR AMAZASP AMBARTSUMIAN

Ambartsumian's investigations of the problem of stellar evolution, begun in 1937, led in 1947 to the conclusion that some star groups, which he called stellar associations, were younger than most other stars. The existence of stellar associations—dynamically nonstable and disintegrating systems—was the first observational evidence in favor of continuing star formation within our Galaxy. Ambartsumian put forward a hypothesis about the joint origin of the diffuse matter and stars of dense matter of unknown nature—protostars. In connection with this new hypothesis, Ambartsumian, together with Gourgen S. Sahakian, worked out a theory of superdense matter, or matter as dense as the atomic nucleus.

Ambartsumian got fundamental results in the study of the early stages of evolution of stars and stellar systems. He showed that, in the early stages of evolution, the instability of the state reveals itself as a regular phase of the cosmogonic processes. Ambartsumian's contributions also included the existence of stellar systems of positive total energy in the Galaxy, the nonthermal nature of ultraviolet stellar radiation of T Tauri type and flare stars and the establishment of the evolutionary status of the flare stars.

Working on the evolution of galaxies, Ambartsumian showed that the central regions of galaxies play a decisive role in the mighty phenomena of instability. Besides the stars and diffuse matter, they must contain dense, massive bodies of unknown nature. The activity of galactic nuclei defines their evolution. Ambartsumian's 1958 concept of the idea of galactic nuclei was accepted skeptically and only after many years, under the pressure of new observational results.

In the opinion of the late prominent Dutch astrophysicist Jan Oort, Ambartsumian's studies on the activity of galactic nuclei and the process of star formation in the expanding stellar associations are the "most important contribution" in astronomy of any of the scientists of the former Soviet Union.

Ambartsumian attracted to astrophysics numerous groups of students, working in many universities and observatories. All have had a significant impact on astrophysics.

An outstanding organizer of science, Ambartsumian promoted international scientific cooperation. He served as vice president (1948–55) and president (1961–64) of the International Astronomical Union, and he was elected twice to the presidency of the International Council of Scientific Unions.

Ambartsumian always appreciated new ideas, even about well-known phenomena. He was very considerate and thoughtful with his friends and students, and especially valued those who were devoted to the search for scientific truth. He will remain forever as one of the most outstanding scientists of the 20th century.

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Henry Herman Barschall

Henry Herman Barschall, the Emeritus John Bascom Professor of Physics, Nuclear Engineering and Medical Physics at the University of Wisconsin—Madison, died on 4 February 1997 after a brief illness. In addition to achieving a distinguished record in systematic measurements of fast-neutron cross sections and in applications of neutrons to medical uses

HENRY HERMAN BARSCHALL

and materials damage, he made major contributions to scientific publishing as a journal editor and author of a study on journal pricing.

Barschall—"Heinz" to his friends—was born in Berlin on 29 April 1915. In 1933, he matriculated at the Humboldt University of Berlin. His registration book (now on display at the US Holocaust Museum in Washington, DC) marked him as a "non-Aryan" under Nazi laws, making it impossible for him to find a thesis adviser there. He transferred to the University of Marburg, which provided temporary protection, but he soon took refuge in the US, where he enrolled at Princeton University. He immediately started research under Rudolf Ladenburg, setting up a 400 kV accelerator to produce fast neutrons by deuteron bombardment of a D_2O ice target.

Barschall's thesis on the interaction of fast neutrons with the lightest nuclei led to a paper with John A. Wheeler in which they reported the discovery of the large spin–orbit coupling in neutron scattering by helium.

While visiting Princeton early in 1939, Niels Bohr was eager to see fission demonstrated. Within days, Barschall and Morton H. Kanner reported the first observation of fission by fast neutrons and determined the cross section for thorium and uranium.

Barschall received an AM (1939) and a PhD (1940) in physics from Princeton. He then became an instructor, first at Princeton (1940–41) and then at the University of Kansas (1941–43). In 1943, Barschall became a US citizen and joined the Manhattan Project at Los Alamos. After the war, in 1946, he accepted a faculty position at the University of Wisconsin to continue his work with fast neutrons. During the next 25 years, Barschall

and his students carried out an extremely successful program of fast-neutron cross-section measurements, which led to important new insights. These included the discovery of fast-neutron resonances in intermediate-weight elements. He also performed studies of polarization phenomena with fast neutrons, as well as systematic studies of neutron total cross sections as a function of energy and mass number, which revealed a periodic structure at odds with Bohr's compound nucleus model and which led to the formulation of the optical model of the nucleus by Herman Feshbach, Charles E. Porter and Victor F. Weisskopf. In addition, Barschall was the person responsible for an international sign convention for polarized particles from nuclear reactions. His work earned him many honors, including election to the National Academy of Sciences.

Barschall's research was severely affected in 1970 when his laboratory was destroyed by a terrorist's bomb aimed at the US Army Mathematics Research Center located in the same building. Deeply disturbed by the death (the blast killed a postdoctoral fellow in physics), destruction and lack of response by the departmental administration, Barschall took a leave of absence at Lawrence Livermore National Laboratory, where he worked on the development of intense neutron sources for medical applications and on studies of neutron damage to fusion reactor materials. After two years, he returned to Wisconsin, where he continued to teach and stay actively involved with undergraduates. But his research turned to medical applications of neutrons for cancer therapy.

Scientific publishing was a major interest for Heinz Barschall. He was the editor of *Physical Review C* from 1972 to 1987 and served as chairman of the American Physical Society's publications committee and the American Institute of Physics's information technology committee. After his retirement in 1986, his concern about the increasing cost of scientific journals led him to conduct a survey of the pricing of physics journals. His findings, published in PHYSICS TODAY, aroused the ire of a commercial publisher, who filed lawsuits against Barschall, AIP and APS in four countries. However, Barschall's thorough analysis and his determination to resist intimidation made him a hero to a generation of research librarians whose budgets continued to be threatened by the rising cost of scholarly journals.

Heinz Barschall was an exemplary mentor to the tens of PhD students whose work he directed and the thousands of undergraduates on whom he had a lifelong influence. He was a man of integrity—forthright, thoughtful and generous. We will miss his advice and his friendship.

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Włodzimierz Kołos

Włodzimierz Kołos, a pioneer of accurate quantum mechanical calculations for molecules, passed away in Warsaw on 3 June 1996, after a year-long struggle with cancer.

Born in 1928 in Pinsk (then in Poland, now in Belorussia), Włodek received his MS in chemistry from the Adam Mickiewicz University in Poznań in 1951 and his PhD in physics from the University of Warsaw (under the supervision of Leopold Infeld) in 1953. In 1962, he joined the department of chemistry at Warsaw University and remained there until his untimely death.

WŁODZIMIERZ KOŁOS

He is best known for his accurate calculations of energy levels and properties of the hydrogen molecule. He started this work in collaboration with Clemens Roothaan at the University of Chicago in the late 1950s. Włodek developed the first computer program to solve to very high accuracy the electronic Schrödinger equation for the hydrogen molecule. This program applied a basis set explicitly involving the interelectronic distance. Later, this basis set was improved by Włodek and Lutosław Wolniewicz and it is now known as the Kołos–Wolniewicz basis. In the early 1960s, Włodek (with Wolniewicz) computed several corrections to his previous result including adiabatic, nonadiabatic and relativistic effects. Those were truly novel developments, never before attempted for any molecule. This work resulted in theoretically predicted spectra and properties of hydrogen molecule whose accuracy was comparable to that of the experimental data.

In a famous development, Gerhard Herzberg revised his experimental value of the dissociation energy of H_2 after learning that the original value was significantly different from the theoretical value published by Kołos and Wolniewicz. This case demonstrated that theorists could obtain solutions to the Schrödinger equation for a molecule that could challenge highly precise spectroscopic measurements.

In addition to his theoretical work on the hydrogen molecule, Włodek also worked on many other problems. He made important theoretical contributions to the theory of intermolecular forces. He studied molecular effects in the β-decay of the tritium molecule, obtaining data critically needed to extract the electron neutrino mass from molecular tritium β-decay. These data are still utilized in all current neutrino-mass experiments. His research on muon-catalyzed fusion established important theoretical limits on the possible yield of muonic catalysis and contributed significantly to our understanding of this phenomenon.

In addition to research, Włodek devoted much effort to various educational and administrative activities. Known as a charismatic speaker, he delivered lectures on quantum chemistry that prompted Warsaw students—despite their dread of the subject—to vote for them on numerous occasions as being the chemistry department's best lectures. Włodek's enthusiasm about research attracted many students, and he created a strong research group at the university. In the years of communist power in Poland, Włodek never compromised his political and moral standards. Neither Włodek nor anyone in his group was ever a member of the Communist party, an unusual situation in those years. In 1980, he became the first democratically elected secretary of the Polish Academy of Sciences.

Although he was one of Poland's most prominent scientists, Włodek resisted any attempts to celebrate his achievements. Always encouraging but never pressing, patiently waiting for results and giving full credit for them to others, he guided his students and coworkers by his own example. He will be missed very much not only as a scientific and