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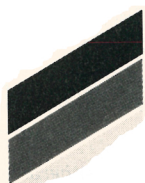
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War II. He received an ScD in meteorology from MIT in 1948. He then joined the staff of the meteorology department there, and in 1955 he became a professor of meteorology. From 1977 to 1981 he headed the department, which by then had become the department of meteorology and physical oceanography. He became professor emeritus in 1987, and he is still a senior lecturer at MIT.

ZAPAS RECEIVES 1991 BINGHAM MEDAL FROM SOR

Louis J. Zapas of the National Institute of Standards and Technology, in Gaithersburg, Maryland, is the 1991 recipient of the Bingham Medal, presented by the Society of Rheology. Zapas was selected for his "extraordinary contributions to the field of rheology, especially in the development and experimental testing of the BKZ constitutive equation."

In 1963 at the National Bureau of Standards (now NIST), Zapas, Barry Bernstein and Elliot A. Kearsley formulated a phenomenological model of nonlinear viscoelastic behavior based on physical principles. This model came to be known as the BKZ model. In subsequent work he has tested the model's validity for a wide range of materials, from fluid polymer solutions to solid-like cross-linked rubbers. Zapas also has developed numerous experimental methods and practices that have benefited rheology, the award citation said.

After receiving an MS in chemical engineering from the University of Pittsburgh in 1949, Zapas worked at the Mellon Institute (now a part of

Louis Zapas



Carnegie-Mellon University). From 1957 to 1961 he was at the Washington Research Center of W. R. Grace and Co. In 1961 he joined NIST, from which he retired this past January.

OBITUARIES

Valentine Bargmann

Valentine Bargmann, professor emeritus of mathematical physics at Princeton University, died of heart failure on 20 July 1989. Together with his other expatriate colleagues at Princeton—including Hermann Weyl, John von Neumann and Eugene Wigner—Bargmann exemplified the great European tradition in mathematical physics.

Born in Berlin on 6 April 1908, Bargmann studied at the University of Berlin from 1926 to 1933. When Hitler rose to power he moved to Zürich, where he wrote his doctoral thesis under Gregor Wentzel at the University of Zürich. When he completed his degree, Bargmann still held the German passport issued to him in 1931. The German government under Hitler had since withdrawn the citizenship of persons of the "wrong race" and thus would have invalidated Bargmann's passport if he had been found. But Bargmann managed to use the document to reach the US in 1937, two days before its stated expiration.

In the US Bargmann was hired as an assistant at the Institute for Advanced Study in Princeton. For several years he worked, along with Peter Bergmann, as a scientific assistant to Albert Einstein in his study of unified field theories of gravitation and electromagnetism. In 1943 Bargmann undertook war work on shockwaves with John von Neumann. After the war he joined von Neumann's computer project and worked with von Neumann and Dean Montgomery on the inversion of matrices of large dimension. On the nearby Princeton campus Bargmann lectured, and worked with Wigner on relativistic wave equations. In 1948 their work culminated in the well-known Bargmann-Wigner equations for elementary particles of arbitrary spin. In 1946 Bargmann finally received an appointment as a visiting lecturer at Princeton University.

He remained a member of the Princeton faculty until his death. Generations of undergraduate and graduate students benefited from his lectures, which were noted for their clarity and polish. But the real gems were the sets of specialized lectures he

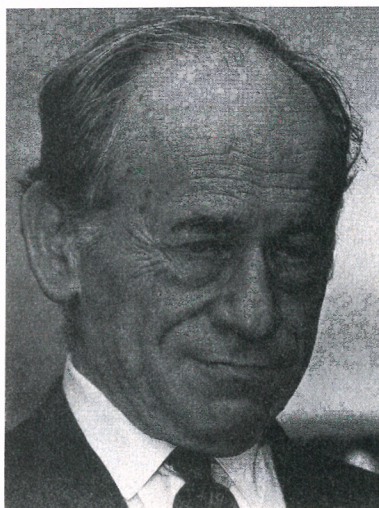
WE HEAR THAT

delivered about his own research. Especially memorable were talks given in 1946 on second quantizations, those in 1948 and 1949 on the Lorentz group and its representations and those in 1953-54 on ray representations of Lie groups. In his student days in Berlin Bargmann already evinced an interest in the philosophical problems of the foundations of physics. He and fellow student Carl Hempel shared this interest with Hans Reichenbach, then a professor at Berlin. Their conversations left their mark on Reichenbach's book *Philosophic Foundations of Quantum Mechanics* (University of California Press, 1944). Typically, Bargmann helped to sharpen and clarify ideas by constructing examples and counterexamples.

Bargmann contributed to quantum mechanics in several notable ways. He demonstrated to everyone's surprise that the one-dimensional Schrödinger equation with two different potentials can have identical phase shifts; scattering data does not suffice to determine a potential. This was one of the starting points of the inverse scattering method. Bargmann also discovered upper bounds on the number of bound states in a spherically symmetric potential. He and Irving Segal contributed to the understanding of coherent states by demonstrating that they can be viewed as unitary transformations from the ordinary space of square-integrable functions on the line to a space of analytic functions on the complex plane.

In mathematics Bargmann's most influential paper was no doubt the 1947 article in which he found all of the irreducible unitary representations of the Lorentz group. This work

Valentine Bargmann



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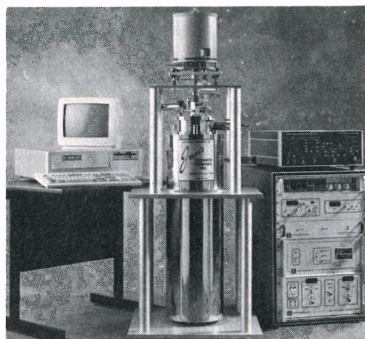
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became the paradigm for four decades of effort in representation theory. Not only did he classify the representations infinitesimally but he constructed them globally and explicitly, dividing them into three classes, which are known today as the principal series, discrete series and complementary series. As a result of additional studies of these representations, he essentially deduced the "Plancherel formula" for the group.

Although Bargmann received numerous awards, this modest man drew his greatest satisfaction from his science, his friendships and his music. He was sufficiently talented as a pianist that he once contemplated a career as a professional musician.

Although Bargmann's writings were influential, his personal influence was even greater. He and Sonja were pillars of the Princeton intellectual community. Our lives will not be the same without them.

ELLIOTT LIEB
ELIAS STEIN
ARTHUR WIGHTMAN
*Princeton University
Princeton, New Jersey*

Serge Alexander Korff

Serge Alexander Korff, professor emeritus of physics at New York University, died on 1 December 1989, at the age of 83. In a career that spanned the youth and flowering of cosmic-ray physics, Korff was a leader in international cosmic-ray research and, toward the end of his life, an elder statesman of the cosmic-ray community.

Beginning in the 1930s, when electronics and electrical discharge in gases were hot topics in physics, Korff, in his words, "did the definitive experiments on the fundamental processes in radiation detection devices, especially proportional and Geiger and neutron counters." Korff's book *Electron and Nuclear Counters* (1946) was translated into six languages. A second book, *Electron and Nuclear Physics* (1948), by J. B. Hoag and Korff, taught a generation of students the rudiments of nuclear science.

Korff's major research undertaking was the study of the production and propagation of cosmic-ray-generated neutrons in the atmosphere. This work had exciting peripheral applications, such as radiocarbon dating, geochronology, health physics, solar physics and the study of the modulation of cosmic-ray intensity by the solar wind.

Born in Finland in 1906 Korff came to the US when he was 11 years old. He entered Princeton in 1924 and

received his PhD from there in 1931. In his PhD thesis, Korff applied the new quantum physics to the old mystery of the stellar atmospheres. This work led to the seminal paper, "Optical Dispersion," which Korff published with Gregory Breit in *Reviews of Modern Physics* (1932) after becoming a National Research fellow at the Mount Wilson Observatory.

Excited by the cosmic-ray research at Caltech, Korff joined Robert Millikan's group there in 1933. He started out building Geiger counters and used them to detect radiation in the thyroid of a woman who had been painting radium on watch dials.

In 1934-35 Korff traveled to Peru, near geomagnetic latitude 0°, where he measured the east-west effect in cosmic rays to determine the sign of their charge from the $qv \times B$ force. In measurements at the peak of El Misti and in unpressurized airplanes flying as high as 30 000 feet (then an altitude record), Korff found that the incident cosmic rays were positively charged (much to Millikan's displeasure). Korff also placed detectors on shipboard to reexplore the latitude effect, missed earlier by Millikan. Characteristically, Korff ended his trip with an unscheduled journey, to map uncharted regions of Peru, Brazil and British Guiana.

In 1936 at the Carnegie Institution in Washington, DC, Korff joined Leon F. Curtiss and A. V. Astin in developing the technique of radiosondeing, which Korff used to telemeter cosmic-ray data from balloon-borne instruments back to Earth. Later at the Bartol Research Foundation (now located in Delaware), Korff wrote on the theory of proportional counters. This work included a collaboration with M. E. Rose. In 1939 Korff developed and flew a counter filled with BF_3 to detect slow neutrons in the cosmic radiation. The device exploited the (n, α) reaction in ^{10}B . Balloon flights using this counter inspired the article that Korff wrote in 1940 with Hans Bethe and George Placzek on the production and propagation of atmospheric neutrons. Bethe, Korff and Placzek pointed out that most of the neutrons formed in the atmosphere produce ^{14}C via the (n, p) reaction on nitrogen. Willard Libby, who used this information to investigate radiocarbon as a dating tool for archaeological artifacts, mentioned his debt to Korff in his Nobel Prize speech. The research Korff and his students did on atmospheric neutrons helped establish the nature of the variations in radiocarbon production in the atmosphere due to solar activity and to changes in the Earth's magnetic field.

In 1941 Korff came to NYU. Throughout his tenure at NYU and in his capacity as scientific adviser to the United Nations, he encouraged and helped find support for science and scientists in other countries, particularly in Central and South America.

At NYU Korff helped train at least three generations of students. Although many of them had never before left home, they found themselves on expeditions to strange and remote places—hauling hydrogen tanks to the top of Mount Wrangell in Alaska or launching neutron detectors from Thule to Guam in giant balloons 24 miles above the Earth.

In his lectures and in conversation, Korff had that rare gift of making physics and astronomy exciting and clear at all levels. It helped that he was a man of phenomenal memory, of sharp insights and of ecumenical tastes. In 1965 Korff organized the Rockwell Scientific Round-the-World flight from pole to pole. He and William Sandie manned the slow and fast neutron detectors and ionization chambers as the plane broke speed records and opened up a new route for aircraft.

Korff compiled the report of the Joint Commission on High-Altitude Research for ICSU-UNESCO. He met with government officials and scientists of South America for the International Geophysical Year. Korff scouted Mount Wrangell from an airplane and established a high-altitude station there, at 14 000 feet above sea level. He also initiated the international expedition to Hyderabad in 1965, during a sunspot minimum.

Korff was president of the Explorers' Club (1955-58, 1961-63), the American Geographical Society (1966-71) and the New York Academy

Serge Korff

