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 "Plancheral 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 $q\mathbf{v}\times\mathbf{B}$ 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 radiosonding, 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

of Sciences (1971). He remained active in the governance and educational programs of all of these organizations until two years before his death.

The NYU Cosmic-Ray Project's contribution to science extended beyond the study of the cosmic-ray population in the atmosphere. The project produced a body of data that was essential for evaluating radiocarbon production over the ages (it is not constant), for exploring the possibility of radiation hazards in supersonic transport (they exist) and for studying the effect of solar emissions on the primary cosmic rays that generate the neutrons.

And after all this, did Serge Korff get some of the message that he was seeking in cosmic rays? As Ed Light, one of his students, was wont to say, "Of Korff!"

ROSALIND B. MENDELL
Department of Physics
New York University

John Henry Manley

John Henry Manley, deputy administrator to J. Robert Oppenheimer during the "Manhattan District" years and a pioneer in nuclear physics, died in Los Alamos, New Mexico, on 11 June 1990, at the age of 82.

Manley was born in Harvard, Illinois. He graduated from the University of Illinois in 1929 and received his PhD from the University of Michigan in 1934. For the following three years he was a lecturer at Columbia University. At Columbia Manley worked on ion excitation and molecular beams before turning to the emerging field of neutron physics. His research covered such topics as spin-dependence of nuclear forces, resonance absorption of neutrons and characteristics of nuclear states. In 1937 Manley returned to Illinois as a faculty member, to help develp a program in nuclear physics. His wide range of interests led to collaborations with many of the pioneers of nuclear physics.

At the urging of Leo Szilard, Manley joined the Manhattan Project. By January 1942, less than a month after Pearl Harbor, he was immersed in the chain-reaction effort underway at the University of Chicago. Before long, Manley was working closely with Oppenheimer. This task involved a supervisory connection with research projects that had been "farmed out" to scientists at various universities. Always meticulously objective, Manley was quick to distinguish important developments from superficial ones.

Manley was closely involved with the plans to establish a coordinated experimental effort to develop a nu-