

final evaporation stages (as evidenced by the insensitivity of isobaric product-yield ratios to target nucleus and bombarding energy). This led him to undertake detailed studies of low-energy reactions in order to test the so-called "independence hypothesis" of Niels Bohr's compound-nucleus theory and to establish experimental criteria for distinguishing between compound-nuclear and direct reactions. Recognizing the important role of angular momentum in determining the course of reactions, Miller turned his attention to heavy-ion reactions during the last decade of his life. In a series of careful studies, Miller and his students were able to elucidate how complete fusion and fission probabilities both depend on the angular momentum in the entrance channel. At the time of his untimely death he and his co-workers were engaged in coincidence experiments at the Berkeley SuperHILAC, which were designed to gain a deeper understanding of the deep inelastic interactions of heavy ions.

Miller had an enormous enthusiasm for research that infected and inspired his students and colleagues. He was never content with superficial answers or fuzzy explanations, and therefore he always searched and worked for complete clarity and understanding. Science was of central importance in his life and, with his death, nuclear science has lost one of its leaders. Those of us who had the privilege of knowing him well will miss him not only as a stimulating colleague, but also as a warm, sensitive, witty and charming person.

GERHART FRIEDLANDER
Brookhaven National Laboratory

Victor A. Erma

Victor A. Erma, principal scientist of KMS Technology Center (Van Nuys and San Diego, Calif.), died 24 December 1976. He was 42 years old.

Erma studied mathematics and chemistry at the University of Texas and earned his PhD in theoretical physics at the California Institute of Technology in 1961.

From 1959 to 1963, Erma worked on electromagnetic radiation theory at Aeronutronic, Newport Beach, Calif. During the next few years he held staff positions with various California research corporations, such as Plasmadyne Corp (Santa Ana) where he studied magnetohydrodynamic power generation. He was also assistant professor of physics at San Fernando Valley State College, from 1965 to 1968—this academic position was concurrent with Erma's appointment as senior staff scientist of the Astrophysics Research Corp (Los Angeles). In 1969 he joined KMS Technology Center.

Erma's most recent work had been theoretical research in plasma instabilities and the interaction of high-energy elec-

tron beams with hot plasmas. In addition, he had been a consultant in the areas of electromagnetic scattering and the electromagnetic pulse due to nuclear explosions.

Oskar Klein

Oskar Klein died in Stockholm 5 February at the age of 82. Klein began his scientific work in Svante A. Arrhenius's laboratory and published his first paper on inorganic chemistry at the age of 16. After completing his studies at Stockholm University, he went to Copenhagen to work with Niels Bohr in 1918. He stayed there as Bohr's assistant and collaborator until 1931 and much of his pioneering work in quantum theory was carried out there. His enduring friendships with Hendrik A. Kramers, Wolfgang Pauli and many others of that heroic generation were formed at Bohr's Institute. Like many physicists after him, Klein also found a Danish wife.



KLEIN

Klein's name is most closely linked with the progress of relativistic quantum theory: the Klein paradox, Klein-Gordon equation, Klein-Nishina formula, and of course the second quantization paper of Jordan-Klein of 1927. It is perhaps less known that he discovered the Schrödinger equation independently but was prevented from publishing it at the time by a long illness. He was also one of the first who seriously considered general relativity in connection with quantum theory, an interest that remained with him from the time of the formulation of the Klein-Kaluza theory in 1926. He actively maintained also his early interest in statistical physics from the Arrhenius period. Like his contemporaries, he reaped his share of the nonrelativistic quantum-mechanical harvest, including the asymmetric-top quantization and determination of molecular potentials

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from their spectra. In the 1930's he began working on the new particles. His accomplishments during this period included a formulation of the non-abelian vector field interactions in 1938 and the Klein transformation, as well as research on meson theories and even later attempts at particle systematics.

The son of Sweden's first rabbi, Klein grew up in an intellectual and humanistic home, which imbued him with a lifelong interest in biblical and historical studies.

In addition to his scientific work and his professorship (since 1931) at Stockholm, Klein was active in the cultural and political debates of his country and was selflessly and effectively involved in fighting Nazism and helping refugees.

The honors Klein received included membership in the Swedish, Danish and Norwegian Academies and the Nobel committee in physics. He held honorary degrees from the Universities of Copenhagen and Oslo, and was awarded the Max Planck Medal in 1959. He had many friends in the US, which he first visited as an assistant professor at the University of Michigan, 1923-25.

Shyness often made contacts difficult for Klein, but when at ease among friends, he would stand out as a deeply learned and gentle scholar. An old letter of Hendrik A. Lorentz to Albert Einstein speaks of Klein's modesty and promise; he always remained modest while fulfilling that promise.

STANLEY DESER
Brandeis University

Hari Keshab Sen

Hari Keshab Sen, retired senior scientist of the Air Force Cambridge Research Laboratories (Bedford, Mass.), died on 1 September 1976 at the age of 71. He was known for the Sen-Wyller magneto-ionic theory, which is a generalization of the standard Appleton-Hartree formula for radiowave propagation through a weakly ionized gas in a magnetic field. His theory explains the measured refraction, absorption and reflection properties of radio waves in and from the ionospheric D layers.

Sen received his doctorate in astrophysics from Allahabad University (India) in 1943 and came to the US in 1947 on an Aggasiz Research Fellowship to Harvard University. Prior to joining the Air Force Cambridge Research Labs in 1955, Sen was lecturer in astronomy at the Harvard College Observatory, 1948-51, where he worked with Donald H. Menzel on astrophysical problems.

Sen served as a physicist at the National Bureau of Standards in Boulder, 1951-54, and as a senior scientist of Hughes Aircraft Co, 1954-55. He became a research associate at the Harvard College Observatory in 1959. □

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