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ries in 1960 and later became head of the physical chemistry research and development department at Bell Labs. He was adjunct professor of chemistry at the University of Pennsylvania and visiting professor of chemistry at the University of Tel Aviv and at MIT.

Rentzepis, a pioneer in studies of picosecond chemical phenomena, has applied his techniques to chemistry, biology and communications technology.

Fisher, who is Horace White Professor of Chemistry, Physics and Mathematics at Cornell University, won his award, which also consists of a citation certificate and $1500, in recognition of his work in the area of the statistical mechanics of phase transitions.

Fisher received his PhD at Kings College, London (1957). He has lectured and served as guest researcher at The Rockefeller Institute, the Institut des Hautes Etudes in Paris and Stanford University. Fisher has been affiliated with Cornell since 1966. He was named Horace White professor in 1973.

Fisher developed the mathematical tools necessary to analyze the statistical mechanics of the phase transitions in matter.

### Physicist climbs Annapurna mountain

IBM physicist Irene B. Miller was among the first Americans to scale the 26 500-foot mountain Annapurna in Central Nepal last fall. Miller, who climbed with nine other climbers, many of whom were also scientists, and a photographic crew, said that although the peak had been climbed four times before, it had never been climbed by an American. The climb took seven weeks. Miller is a research staff member working in computer modeling of magnetic recording physics at IBM in San Jose, California.

### Nambu wins Japanese Order of Culture Award

The Order of Culture Award of the Emperor of Japan was presented to Yoichiro Nambu, Harry Pratt Judson Distinguished Service Professor at the University of Chicago, in recognition of his outstanding contributions in theoretical physics. The award was instituted in 1937 and is conferred upon individuals in the arts and sciences who have helped promote culture in Japan. Nambu was one of five recipients of the award in 1978.

After receiving the DSc degree from Tokyo University in 1952, Nambu served as a professor at Osaka City University and was a member of the Institute for Advanced Study in Princeton. In 1954 he became a research associate at the Enrico Fermi Institute at The University of Chicago. He was promoted to associate professor in 1956, professor in 1958 and Distinguished Service Professor in 1971. He also served as chairman of the Department of Physics from 1974 to 1977.

"Particularly noteworthy," according to Nambu's citation, "is his theory of elementary particles based on an analogy to superconductivity. The concept of spontaneous breakdown of symmetry which he introduced in this work broke new ground in particle physics." Nambu was also cited for his work in quark binding forces, crystal statistics, quantum electrodynamics, models of elementary particles and scattering theory.

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Among the scientists elected to the Australian Academy of Science in 1978 were **L. M. Clarebrough,** CSIRO Division of Chemical Physics, Melbourne, and **B. W. Ninham,** Australian National University, Canberra.

**R. N. Manchester,** of the CSIRO Division of Radiophysics, was presented the Pawsey Medal of the Australian Academy of Science for distinguished research in experimental physics. Manchester is best known for his work on pulsars.

Joining the physics department at Montana State University as research professors are **Recep Avci** (University of Illinois), **Franco Cerrina** (University of Rome), **Bill Crummett** (University of West Virginia), **Cornelius Hoensalaers** (Hiroshima University) and **Jacob Pipman** (Technion).

**Rameshwar N. Bhargava** has been appointed group director of exploratory research at Philips Laboratories in Briarcliff Manor, New York.

**Frederick D. Tappert** has joined the faculty of the University of Miami as professor in the division of ocean engineering at the Rosenstiel School of Marine and Atmospheric Science, with a joint appointment in the department of physics. Tappert was at New York University's Courant Institute of Mathematical Sciences.

**Irving Sacks,** former director of the Massachusetts Science and Technology Foundation, has been named President of the newly-created Massachusetts Technology Development Corporation.

**J. Paul Wild** has been named to a seven-year appointment as chairman of the Australian Commonwealth Scientific and Industrial Research Organization.

**J. H. Carver,** Elder Professor of Physics at the University of Adelaide in Australia, has been appointed director of Australia National University's Research School of Physical Sciences.

**Jacob Bigeleisen,** formerly Tracy H. Harris Professor of Natural Philosophy and professor of chemistry at the University of Rochester, is now vice president for research, dean of graduate studies and Leading Professor of chemistry at SUNY, Stony Brook.

**J. Lawrence Katz** was recently elected the fifth president of the Society for Biomaterials.

**Alvin W. Trivelpiece** was named a special assistant to the president of Science Applications, Inc. in LaJolla, California.

**Joel L. Lebowitz,** professor of mathematics and physics and director of the Center for Mathematical Sciences Research at

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Rutgers University, has become president of the New York Academy of Sciences.

**James L. Elliot** has been appointed director of the George R. Wallace Astrophysical Observatory and associate professor in the department of earth and planetary sciences at MIT.

**Stanley J. Shepherd** and **Peter D. Georgopulos**, both physics professors at Pennsylvania State University, have received AMOCO Foundation Outstanding Teaching Awards. The awards of $1000 each are given to recognize excellence in teaching performance by senior faculty in the undergraduate program.

**James K. Tison** has joined the staff of Balzers Corporation as high vacuum equipment product manager, leaving his previous position at CVC Products, Inc.

# obituaries

## Manne Siegbahn

Karl Manne George Siegbahn, one of the great pioneers of atomic physics, died on 25 September at the age of 91. He was born in Örebro in Sweden and received his academic education in the University of Lund, where he obtained his doctor's degree in 1911. He taught at Lund and eventually became the head of the physics department, succeeding Johannes R. Rydberg. He moved to the University of Uppsala in 1923 and from 1937 until his retirement in 1964 he was Director of the Nobel Institute of Physics of the Royal Swedish Academy of Sciences.

When Siegbahn started his scientific work the wave nature of x rays had just been recognized and Henry Moseley had done his famous work establishing the shift of the K and L series with atomic number. While this early work was done with an accuracy of only about 1%, Siegbahn, by a brilliant sequence of improvements in methods and design of x-ray spectrometers, had by 1924 increased the accuracy by a factor of almost 1000, that is, down to 0.001%.

Apart from studying the structures of the K and L radiations and finding many new components in them, Siegbahn discovered M radiation in 1916. Subsequently he and his students produced a great deal of new knowledge about x-ray spectra covering almost all the elements from sodium to uranium. They also studied absorption spectra of x rays and established for the first time that corresponding to the K, L and M series there are one, three and five absorption edges respectively. The shell structure of atoms with two electrons in the K shell, eight in the L shell and eighteen in the M shell, with which we are so familiar today, was largely based on Siegbahn's work.

Because of the high accuracy that Siegbahn developed in x-ray spectroscopy it soon became apparent that the Bragg equation had to be slightly corrected on account of the finer details of crystal diffraction that was developed by P. P. Ewald and C. G. Darwin.

In addition to his work with crystals Siegbahn was also a pioneer in the use of

SIEGBAHN

ruled gratings for the study of x-ray spectra, particularly at longer wavelengths. He built ruling engines that allowed him to produce gratings of the high quality required for x-ray studies and in this way, independently of the American workers, he established the small discrepancy between x-ray wavelengths measured by crystals and measured by ruled gratings, which was later resolved by recognizing an error in the determination of the viscosity of air on which Millikan's value for the electronic charge was based. In 1924 Siegbahn published his well-known book *Spectroscopy of X-rays*, which remained for many years the Bible of x-ray spectroscopists. Another outstanding result obtained by Siegbahn and his co-workers was the first clear demonstration of the reflection, refraction and interference of monochromatic x-rays.

After becoming (in 1937) the first director of the physics department of the Nobel Institute Siegbahn built there the first accelerator in Sweden and established a laboratory that made many important contributions to the study of nuclear energy levels. A large number of foreign students, postdoctoral fellows and other visiting scientists passed through this Institute, which attained an extremely high international reputation.

Siegbahn was not only a great physicist; he was also a great engineer. It was through his ability as an instrument builder that, as mentioned earlier, he was able to increase the wavelength accuracy of x-rays a thousandfold, and it was also through the same engineering ability that he was able to produce ruled gratings of the necessary precision and later to build accelerators, beta-ray spectrometers and other equipment for the work at the Nobel Institute. Anyone who has visited the Nobel Institute will have been impressed, as I was, by the high level of perfection of instruments designed at the Institute. I had the privilege of meeting Siegbahn on several occasions. Each time I came away with a strong impression of his warm and unpretentious personality, his genuine interest in his visitor and his obvious pleasure in showing the remarkable instruments he had built. He left with me the memory of a great scientist.

Siegbahn was awarded the Nobel Prize in Physics in 1924 "for his discoveries and research in the field of x-ray spectroscopy." In 1934 he received the Hughes Medal and in 1940 the Rumford Medal of the Royal Society of London and in 1948 the Duddell Medal of the Physical Society of London. Even after his retirement in 1964 he continued to work actively and diligently in the Institute that he had founded. His pioneering work forms an essential experimental basis of modern atomic theory and will be remembered by generations of physicists to come.

GERHARD HERZBERG
*National Research Council*
*Ottawa, Canada*

## Joseph H. Weis

Joseph H. Weis was killed at age 35 in a sudden storm that swept the French Alps on 30 August while he was climbing the Shroud on the Grand Jurasse near Chamonix. His climbing partner, Frank Sacherer of CERN also perished (see following obituary).

Born in Coulee Dam, Washington, in 1942, Weis received a BS degree in physics at Caltech and obtained his PhD in physics at the University of California at Berkeley in 1970 under the direction of Stanley Mandelstam. After postdoctoral work at the Massachusetts Institute of Technology, he joined the faculty at the University of Washington in 1972 where he remained until his death. He was also a visitor at the Theory Division of CERN in Geneva on several occasions.

A theoretical high-energy physicist, Weis was well known for his tenacious pursuit of difficult and challenging problems—in particular, for his demonstration of the necessity of multi-Regge cuts to avoid conflicts with decoupling theorems, for his formulation of a consistent set of Feynman rules for Reggeon