

Five scientists win E. O. Lawrence Awards



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RICHTER



ELDERKIN



LOKKE



APPELMAN

The Energy Research and Development Administration has presented the 1975 E. O. Lawrence Awards to Evan H. Appelman of Argonne National Laboratory, Charles E. Elderkin of Batelle Pacific Northwest Laboratories, William A. Lokke of Lawrence Livermore Laboratory, Burton Richter of SLAC and Samuel C. C. Ting of the Massachusetts Institute of Technology. The Lawrence Award is given for contributions to the field of atomic energy and the individual winners receive a citation and \$5000.

The awards for Richter and Ting cited their work that led to the discovery of the "psi" or "J" elementary particle. Richter, who has been with SLAC since 1967, served as the leader of a joint SLAC/Lawrence Berkeley Laboratory team that discovered the particle, which they named "psi," in 1974. One of his major accomplishments was the conception and design of the colliding-beam storage-ring facility—the device

that produced the "psi" particle. Richter received his doctorate from MIT (1956) and has held positions at Brookhaven National Laboratory and the high-energy physics laboratory at Stanford University.

Working independently of Richter, a Brookhaven/MIT research group headed by Ting also discovered the particle, naming it "J". Ting received his doctorate from the University of Michigan in 1962 and has had a continuing interest in quantum electrodynamics and its applications to subatomic particles. He currently heads research groups at CERN in Switzerland, the Deutsches Electron Synchrotron in Germany and Brookhaven National Laboratory.

Charles E. Elderkin was cited for his investigation of the environmental impact of energy generation and his research on atmospheric turbulence, including the diffusion and deposition of pollutants. Elderkin has been involved

in atmospheric research since he joined Batelle in 1959. He received his doctorate from the University of Washington in 1966.

The Lawrence Award honored Lokke for his investigations of nuclear-weapon output and his leadership in nuclear-weapon design. He joined the Lawrence Livermore Laboratory in 1957 as a junior physicist and 10 years later was appointed head of the SPARTAN antiballistic missile program. He is presently a division leader of a large nuclear-weapon design group.

Appelman's award was given for basic contributions to the theory of chemical structure through the preparation of perbromates and hypofluorous acid, previously believed to be non-existent. He holds a doctorate in chemistry from the University of Chicago (1960) and has done work in the areas of radiochemistry, and the kinetics and equilibria of aqueous inorganic solutions.

Weisskopf is new president of AAAS

Victor F. Weisskopf, theoretical physicist and institute professor emeritus of the Massachusetts Institute of Technology, has been elected president of the American Academy of Arts and Sciences; he succeeds Harvey Brooks of Harvard University.

Among his accomplishments in nuclear physics, Weisskopf joined the Manhattan Project at Los Alamos in 1943 and was director-general of the European Center for Nuclear Research (CERN) in Geneva from 1960 to 1965.

He taught at MIT for 28 years, retiring from the institute in 1974. He has remained active there as a senior lecturer in the department of physics.

In recognition of solar-energy research and development, the Lyndon Baines Johnson Foundation has presented its 1975 Award to **George O. G. Lof**, professor of engineering and director of the solar-energy applications laboratory at Colorado State University. Established in 1973, the \$25 000 annual award honors an American who has

contributed to the betterment of mankind—the 1975 Award is the first given by the Foundation for work in science.

Harry L. Tuller, formerly of the physics department at the Technion in Israel, has joined the MIT faculty as an assistant professor of ceramics in the department of materials science and engineering.

The new director of Notre Dame University's radiation laboratory is **Robert H. Schuler**, currently the director of the radiation-research laboratories at Carnegie-Mellon University.

we hear that

Among six scientists inducted into the National Inventors Hall of Fame 11 February, **Enrico Fermi** was honored for his neutron reactor (1955) and **Charles H. Townes** was honored for his maser (1948), the forerunner of the laser. The National Inventors Hall of Fame, located in Arlington, Virginia, was established in 1973 by the National Council of Patent Law Associations.

Frederick J. Milford, a physicist with interests in solid-state theory and low-temperature physics, has been named associate director for research at Battelle's Columbus Laboratories. He joined Battelle in 1959 and was formerly manager of the physics, electronics and nuclear technology department.

At Princeton University, **Val L. Fitch**, chairman-designate of the physics department, has been appointed to the endowed Cyrus Fogg Brackett Professorship of Physics, and **Roman Smoluchowski**, a professor of solid-state science, has been honored with the 1975 Award in Science of the Alfred Jurzykowski Foundation. Smoluchowski received \$2500 and a citation for "work on defects in ionic crystals" and "condensed-matter problems in astrophysics."

Sava I. Sherr, who has been director of standards of the Institute of Electrical and Electronics Engineers since 1970, has been appointed deputy managing director of energy programs at the American National Standards Institute.

At the Lawrence Berkeley Laboratory, **David Shirley** has been appointed associate director of LBL and head of the materials and molecular-research division; **Glenn Seaborg** and **Luis Alvarez** have been named LBL associate directors-at-large.

At ERDA's New Brunswick Laboratory **James M. Scarborough** has been appointed assistant director for development and evaluation, **Charles E. Pietri** is the new assistant director for operations and **Kenneth Lewis** has become chief of the standards and evaluation branch.

Recently named director of the 15-nation NATO Advisory Group for Aerospace Research and Development (AGARD) is **Robert H. Korkegi**, a senior scientist with the aero-propulsion laboratory at Wright-Patterson Air Force Base in Ohio.

David V. Stallard has been named a consulting engineer at the Raytheon Co's missile-systems division, Bedford, Massachusetts.

William H. Layman has joined the Electric Power Research Institute as program manager for water reactors in the nuclear-power division's engineering and operations department.

At Oak Ridge National Laboratory, **John W. Michel** has been appointed coordinator for geothermal-energy research under Murray K. Rosenthal, associate director for advanced-energy systems; Michel will also serve as manager of the low-temperature heat-utilization program in the energy division.

John D. Anderson, acting head of the physics department of Lawrence Livermore Laboratory, has been appointed head of the department. Anderson, a nuclear physicist and recipient of the 1972 APS Bonner Prize, joined the staff of LLL in 1956.

In the department of physics and astronomy at the University of Nebraska in Lincoln, **Joel Gerber** and **Leif Larsson** have been appointed research associates, **David J. Sellmyer** has been promoted to professor and **Anthony F. Starace** to associate professor.

The research library in the department of applied mathematics and theoretical physics, University of Liverpool, was named the "Fröhlich Library" on 15 January to commemorate the seventieth birthday of emeritus professor **Herbert Fröhlich**.

Martin J. Cooper, formerly at the National Bureau of Standards, has been appointed physicist in the office of the assistant administrator for solar, geothermal and advanced energy systems at ERDA.

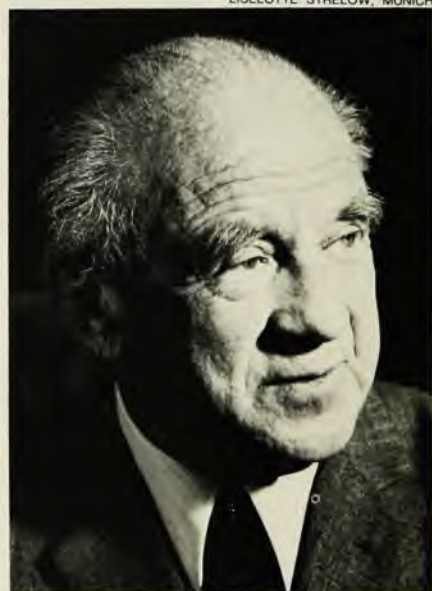
obituaries

Werner K. Heisenberg

The news of Werner Heisenberg's death on 1 February came as a great shock to his many friends and admirers. There is no living theoretical physicist who has contributed more to our subject than he did. At the same time, he was friendly to all, devoid of haughtiness, and pleasant company.

Heisenberg was born in 1901. He studied physics at the University of Munich in Arnold Sommerfeld's institute, which was at that time the most popular place of study for prospective theoretical physicists. Sommerfeld, an excellent teacher with a wonderful overall knowledge of his discipline, maintained close contact with the students of the institute. Although Heisenberg was apparently not one of Sommerfeld's favorite students, he received his doctorate in 1923 at the age of 22. He then went to Max Born's institute in Göttingen for one year and to Copenhagen for three years where Niels Bohr taught.

The article that induced Born and Pascual Jordan to establish the basic equations of matrix mechanics was written by Heisenberg during the Göttingen period. It starts with the sentence, "As is well known, the formal rules which quantum theory uses to calculate its observable quantities (such as the energy of the hydrogen atom) are subject to the serious objection that they are based on relations between quantities which are not observable, not even in principle (such as the position, or the period of revolution, of the electron) . . ." However, this remark, and several other incisive observations of a general nature, are followed by a rather



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concrete proposal for the modification of the equations of classical mechanics. It replaces the Fourier expansion of the time dependence of the coordinate, as furnished by classical mechanics, by a set of amplitudes that correspond to transitions between two quantum-mechanical energy levels. The same applies to all other physical quantities. If $a, b, c, \dots$ designate energy levels, the $a \rightarrow c$ amplitude of the product of two quantities then consists of the sum, for all b , of the products of the $a \rightarrow b$ and $b \rightarrow c$ amplitudes of the factors, since the transition from a to c can occur via any of the intermediates b . This prescription was then recognized by Born and Jordan as the multiplication of matrices, leading them to a formulation of

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