

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.

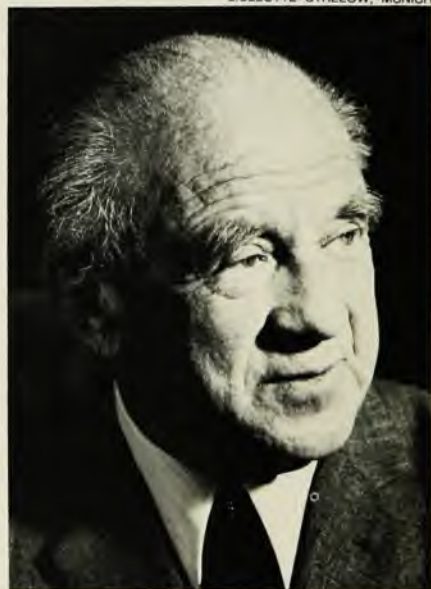
obituaries

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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the basis of quantum mechanics. The second sentence of their article says that the ideas of Heisenberg "represent an attempt to describe the novel phenomena (the quantum phenomena) by creating truly new and appropriate concepts, rather than by using somewhat artificial modifications of the traditional, well known concepts."

I have reviewed Heisenberg's article that created the foundation for quantum mechanics in some detail because, in spite of its importance, it tends to be overlooked in modern books. This is not true of his later articles and books, and these will be referred to more briefly. The next article, which is remembered by all, sets up the uncertainty principle; the following one, written during his professorship at the University of Leipzig, was the first application of quantum mechanics to nuclear physics. However, there is hardly any area of theoretical physics to which Heisenberg did not contribute, and he also inspired several excellent students during his professorship at Leipzig (1927-41). He organized annual visits between Leipzig and Berlin, and I became more closely acquainted with him as a result of these visits.

In later years Heisenberg became director of the Kaiser Wilhelm Institute for Physics in Berlin, and subsequently he directed the successors of this institute, named after Max Planck, in Göttingen and Munich. He held these directorships jointly with professorships at the local universities. As the years went by, his interest shifted increasingly towards philosophy—*Physics and Philosophy* (1958) and *A Physicist's Conception of Nature* (1955) will long be remembered, *Physics and Beyond* (1971), and *Across the Frontiers* (1974), perhaps even longer.

It would be impossible to review all the honors that were bestowed upon Heisenberg—the Nobel Prize was awarded to him in 1932. One hopes that not only the fruits of his thinking but also the memory of his personality will long survive.

EUGENE P. WIGNER
*Professor Emeritus
 Princeton University*

Simon Pasternack

The death of Simon Pasternack on 26 January has deprived the physics community of one of its most dedicated and effective editors. He began his editorial duties on the staff of the *Physical Review* in 1951. From that time on his aim was to maintain high standards for the contents as well as the production of the journal. He read every paper and often discussed with authors possible ways to make their papers more useful to the readers. Sometimes he discov-

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