

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
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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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obituaries

ered serious errors and did not hesitate to argue with even the most prominent authors about corrections. Many physicists appreciated his efforts on their behalf, but it is doubtful he received all the credit he deserved.

When the growth of the journal made it necessary to divide the editorial tasks, Pasternack was reluctant to give up some of his duties. He kept for himself the editing of a difficult section—the physics of particles and fields. The problems in this area were caused by its rapid development and the competitive



PASTERNAK

spirit of the practitioners. This often led to the submission of hastily-written papers, but Pasternack was adamant in imposing his standards. He set an example for those who edited other parts of the *Physical Review* as well as editors of various journals to whom he was always ready to give guidance and advice.

With respect to refereeing, he was completely impartial. He insisted that each paper be reviewed by the best-qualified referee, no matter who the author was.

Pasternack was aware that his enforcing of high standards for the appearance of the journal was an uphill battle. He initially opposed the introduction of typewriter composition, but when he saw that it offered advantages, he changed his mind and made sure that it was fully incorporated. He was also an expert on notations and was an influential member of the Symbols, Units and Nomenclature Commission of the International Union of Pure and Applied Physics. In spite of this background, he had to allow some notations and new expressions that were not to his liking; but his continuous opposition to any-

thing below the standards he had set has had a beneficial long-term effect.

Pasternack's success as an editor was possible because he was also an accomplished mathematical physicist—he earned his doctorate in physics from the California Institute of Technology in 1939, held teaching positions at San Bernadino Valley Junior College and the University of Pennsylvania and was a staff member of Brookhaven National Laboratory from 1947 to 1951. At the *Physical Review* he kept up with modern advances and consequently was able to appreciate most of the papers submitted to him.

His own work goes back to 1937. His best-known publication dealt with the fine structure of hydrogen-like spectra (*Phys. Rev.* **54**, 1113, 1938). He noticed that a small discrepancy between theory and spectroscopic measurements could be explained by assuming a displacement of certain levels—ten years later, modern techniques used in an experiment by Willis E. Lamb and R. Curtis Retherford confirmed Pasternack's assumption. Work on neutron and radiation scattering are among his other contributions. His last publication in 1963, was a short paper with Rudolph M. Sternheimer about hydrogen-like eigenfunctions (*J. Math. Phys.* **3**, 128, 1963). Afterwards, the growth of the journals and his devotion to editorial tasks kept him from doing independent research.

Pasternack's humor was evident from his office blackboard, part of which was filled with the unintentionally amusing expressions and mistakes that he found in submitted papers; perhaps these should have been left in the published versions.

There is no doubt that his guidance will now be lacking in the editorial profession. Physicists owe him a great debt, which can be repaid perhaps by trying to adhere to his standards of fairness and excellence.

SAMUEL A. GOUDSMIT
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George J. Schulz

George J. Schulz, who died on 15 January at the age of 50, will long be remembered for his contributions to the field of atomic-collision physics—not only for his pioneering research, but also for his definitive review papers and his efforts towards more effective information exchange at conferences.

Schulz was born in Czechoslovakia and in 1947, emigrated to the United States to complete his war-interrupted studies. He studied first at the Pennsylvania State University (BS 1949), and then at the Massachusetts Institute of Technology, where he earned his doctorate in 1954.

He then joined the atomic-physics group at Westinghouse Research Laboratories, where his first research involved improved, quantitative determinations of the cross sections for excitation of atoms by electron impact. He developed methods of creating low-energy electron beams of narrower and narrower energy spread, which enabled him to investigate the effect of sharp energy "resonances" (associated with compound-state formation) on the scattering of electrons by atoms and molecules. He announced the discovery of the now-famous helium resonance at 19.3 eV in 1963. Schulz traced the spectacular increases in the cross sec-



SCHULZ

tions for vibrational excitations of molecules (such as N_2) to the effect of the compound-state resonances—an effect that found practical application in the N_2 - CO_2 laser. He followed these initial findings with numerous discoveries of resonances in a host of atoms and molecules. It was appropriate that for this pioneering work he was awarded the first Davison-Germer Prize, established by the division of electron and atomic physics of The American Physical Society in 1965. His most recent work had been the investigation of electron collisions with larger molecules, which has shed new light on their structure and reactivity.

During his twelve-year association with the Gaseous Electronics Conference in successive roles as executive committee member, secretary and chairman, Schulz was greatly concerned about the shortcomings of conventional paper sessions in providing an effective information exchange for the participants. The adoption of the successful small workshops on various topics within the framework of the conference is largely a result of his efforts.

In 1966, he joined the Yale University