

ics-Uspekhi (1969), and G. Turrell's *Infrared and Raman Spectra of Crystals* (1972).

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## Memoirs of a Physicist in the Atomic Age

W. M. Elsasser

216 pp. Science History (Neale Watson),  
New York, 1978. \$15.00

The period between the world wars evoked strong passions and creative impulses in physics as in society at large. In Germany, quantum mechanics emerged in 1926 amid acrimonious debate over its meaning but provided much of the long-sought explanation of atomic and molecular processes. Nuclear physics was born, at almost the same time as the Third Reich, out of discovery of the neutron. Perhaps surprisingly, in this complex and troubled environment, many physicists thrived in research, at least before Hitler's seizure of power in 1933. Among them were individuals like Werner Heisenberg, Max Born, Erwin Schrödinger, and Arnold Sommerfeld, whom we now revere as the founders of modern physics.

Some who are less well-known contributed important works also. One was Walter Elsasser, quantum theorist, meteorologist and pioneering geophysicist. His life story might have been a significant chronicle of the times in physics, for he studied at some of the most fertile centers of physical research in Europe and migrated to the United States in 1936, even if, according to his account, his achievement was much in spite of the social and physics environments in which he worked. But Elsasser's memoirs are disappointing, for they reveal little new about his chosen major theme—the make-up and achievements of his fellow scientists.

His is a curious autobiography indeed. While it is not really unconventional in form, it is an unusually personal, sometimes psychological reconstruction of the seventy years since his birth in 1904. His view of the world bears the imprint of his youth and especially of a hard six years of emotional instability in the late nineteen-twenties and early thirties. Through the book he draws several dozen sketches of fellow students, professors and major influences, most only a page or two of summary, by way of telling us who accompanied him on the difficult path of life. Now and again he stops to speculate on philosophical issues that have arisen along the way: on "reductionism" in chemistry and biology, on "conceptual" versus "mathematical" thought, on the



ELSASSER (summer 1932)

relationship of basic science to technology, on the need for the irrational in studying life, on the Mormon religion. Sketches and speculations both seem disconcertingly superficial, less analytical, given his approach, then we might expect of his highly personal memoir.

Seven of ten chapters are devoted to Elsasser's first thirty years, and though they embrace the most exhilarating and important period in physics since the seventeenth century (the implicit reason for his dwelling on those years, after all), we cannot sense the excitement of the time nor can we draw out a salient thread of achievement. Elsasser remembers Paul Ehrenfest for his "psychological problems whose exact nature was unintelligible to me," as it is also to the reader. He presents a sordid and unenlightening anecdote in lieu of explanation. But his unwillingness (or inability) to develop and interpret his character is no singular aberration. We learn little of Sommerfeld's character in a second-hand account of his work. Even Elsasser's one-time adviser James Franck appears as a shadowy, almost mythical figure, remembered emptily as "extremely restrained," with "no detectable personal vanity" (for suppressing celebration of his Nobel prize) and with "a certain gentle humility that he never seemed to lose even under provocation." Here and in others of these cursory sketches Elsasser displays meager effort to comprehend the character, motives and achievements of the persons whom he has chosen to cite. The stories usually reveal weaknesses of their subjects. It is almost as if he had set about to demean all around him in order better to debase himself, for there is manifold evidence of self-contempt.

The book fails, I think, because its author has not given us enough of himself, much less of his associates. He has spoken repeatedly of his experiences with psychoanalysis, "depth psychology," and the profound influence they exerted on him. But in truth we cannot tell how or

why they influenced him, even though an entire chapter is devoted to his psychological musings. We fail to learn the nature, as he speaks in passing, of his emotional problems, which evidently were so severe that they prevented him from gaining an academic appointment until he was almost thirty, though nine years before he had published a work of some significance in quantum theory. Nor do we discover why, after difficulty holding jobs through the 1930's, he began to rise in academic rank.

Elsasser has not even told us how his scientific achievement added to the fields in which he studied. He remarks that from 1937 through 1941 he was engaged in analyzing the properties of far-infrared atmospheric radiation. But of the methods he used there is the barest outline, and of the importance of his work to him and to his colleagues there is no substantial judgment. He relates a sort of reason why he refused to embrace aeronautical theory around 1940 in a celebrated tiff with Theodore van Karman ("I felt no desire to give up everything I knew by then about modern physics . . ."), but he gives no hint of why this did not prevent him from undertaking in 1946 the study of magnetism of the earth, which involved no "modern physics" either. Apparently his major accomplishment after the war, even this study he seems driven to deprecate as he compares it to the work of his "competitor," the Swede Hannes Alfvén.

If a writer of autobiography cannot advance his own achievements—to show that he at least, if no one else, understands his motives and values—can he deal on a psychological level, as Elsasser tries to, with the events and people that inform his world? It is our misfortune that this book is evidence, in its self-defeating defensiveness, that he cannot.

PAUL HANLE

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## A Shell Model Description of Light Nuclei

I. S. Towner

383 pp. Clarendon (Oxford U.P.), New York,  
1977. \$24.50

Given the diversity of nuclear ground-state properties throughout the periodic table, the richness of nuclear excitation spectra, and the variety and precision of electromagnetic, leptonic and hadronic probes presently available, finite nuclei pose one of the most challenging problems in many-body theory known to theoretical physics. In his book, Ian S. Towner undertakes the formidable task of tracing the steps from the interactions between



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nucleons to the properties of finite nuclei at a level, according to the cover jacket, appropriate to graduate students commencing experimental research.

If he is serious about addressing the stated audience, Towner's selection of topics is rather unfortunate: technical minutiae are consistently overemphasized relative to fundamentals. No explanation is given, for example, as to why it is sensible to describe nuclear interactions in terms of static potentials. Instead, a two-body potential is simply assumed to have come from the Almighty, or at least Roderick Reid, without even a reference to the significant progress during the past decade in deriving potentials from meson exchange. The inevitable questions that a keen student will raise concerning the convergence of perturbation theory are not anticipated or addressed. In spite of the fact that convincing evidence for convergence of hole-line expansions in dense matter exists from extensive comparisons of Brueckner theory, Jastrow variational bounds and exact Green's-function Monte Carlo calculations in infinite systems, no reference is made to this crucial issue. Whereas the foundations of many-body theory are treated very superficially, with such basics on Wick's theorem and the Goldstone expansion being stated instead of derived, certain technical details are expounded at length. It is hard to believe that a student who doesn't know where Goldstone diagrams come from will really appreciate the details of generalized time ordering, the expansion of core interaction terms out of the Bloch-Horowitz expansion, or the introduction of folded diagrams to obtain a non-Hermitian but energy-independent model-space Hamiltonian. Similarly, it is not clear that the newly initiated student will see his way through the tedious technology of Racah algebra and decomposition by coefficients of fractional parentage in the last two chapters to the underlying physics without more explicit guidance.

The omission of references to important recent developments may be partially explained by the fact that this book is an outgrowth of a series of lectures delivered in Oxford in 1970. In addition to the unreferenced advances in understanding the nuclear interaction and nuclear matter mentioned above, there are other significant oversights. Whereas the chapter on the random phase approximation repeats familiar material available in standard texts, the impressive recent advances by George Bertsch and S. F. Tsai are completely ignored. Perhaps the most significant omission in a book that claims to chronicle the progress in the microscopic theory of nuclear structure is the neglect of the coupled-cluster or  $e^s$  expansion of Fritz Coester and H. Kummel as implemented by John Zabolitzky. Not only have the most fundamental calculations in light spherical nuclei been

performed with this formalism, but it has also been applied to open-shell nuclei. Given the fact that the application to open-shell nuclei was first reported at an international conference in Trieste in 1975 and published in *Nuclear Physics* in 1976, one cannot help but be somewhat concerned by the author's admission in the preface that he is unaware of any attempt to use a realistic G-matrix for open-shell nuclei.

Finally, it is perhaps not inappropriate to lament publicly the trend toward publishing photo-offset versions of typed manuscripts at prices that are indistinguishable from those of real books. If my anachronistic tastes are at all representative of the community at large, publishers would be well advised to restrict their scientific endeavors to inexpensive paperback reproductions of typed copy for appropriate timely topics, and to high-quality typeset books for work of enduring value.

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## Cosmic Catastrophes

G. Verschuur

185 pp. Addison-Wesley, Reading, Mass.,  
1978. \$9.95 clothbound, \$5.95 paperbound

## Scientists Confront Velikovsky

D. Goldsmith, ed.

183 pp. Cornell U.P., Ithaca, N. Y., 1977.  
\$8.95

These two books deal with terrestrial catastrophes of astronomical origin. The first, by Gerrit Verschuur, Director of the Fiske Planetarium and professor of astrophysics at the University of Colorado, concerns events that could actually take place. The second, edited by Donald Goldsmith, Director of Interstellar Media in San Francisco, concerns the hypothesis of Immanuel Velikovsky that cosmic catastrophes have occurred on earth.

In the late 1940's Velikovsky, a Russian physician and psychoanalyst, invented an astronomical theory with which he hoped to account for certain Biblical stories and many ancient legends in terms of catastrophic encounters between Earth and other celestial bodies.

Briefly, Velikovsky's astronomical hypothesis is that a great comet was ejected from the planet Jupiter about the middle of the second millennium BC. Over the next several hundred years, the comet passed twice near Earth causing great upheaval, and at various times it rained insects and manna upon Earth. The comet also passed near Mars, diverting that planet from its orbit, so that Mars also passed near Earth causing additional