

one of its members.

The decision made by Kapitza to negotiate directly with the Soviet government, to start from scratch, to reach beyond Soviet and British academia, paid off. The book leaves Kapitza at this upswing in his career, which lasted another 50 years, with further dramatic ups and downs in his relationship with the Soviet regime.

Not all of our questions are answered. Why was Kapitza detained in

the USSR? What did the Soviet government need him for? What was the personal role of Stalin in all this? But Badash builds a solid case concerning the relation between a regimented society and an independent scientist: Forced transplantation of a scientist into such a society is possible if the regime shows enough flexibility and responsiveness and the scientist in question has enough confidence in the regime's future. "I am sincerely fond

of our idiots [the Soviet people] and they do wonderful things, and it will all make history," wrote Peter Kapitza in one of his letters to Anna (24 July 1935), many years before Stalingrad, the Soviet atomic bomb and Sputnik.

MARK KUCHMENT  
Harvard University

## The Ideas of Particle Physics: An Introduction for Scientists

James E. Dodd

202 pp. Cambridge U.P., New York, 1984.  
\$44.50 hardcover, \$17.95 paper

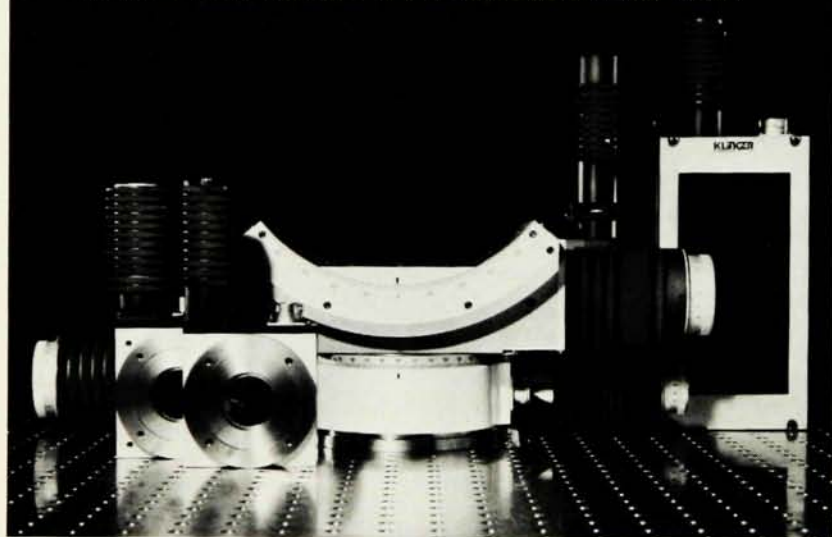
Our understanding of the nature of matter now rests firmly on a coherent conceptual scheme, the so-called standard model of particle physics. This is likely to remain the case for some time to come, so it is now fitting to spread the word to scientists in other disciplines. The title of this book implies that James Dodd set out to do just this. He did not arrive at his goal, however, but produced instead a work unlikely to reach anyone further from the field than, say, a theoretical chemist, but one that is insufficiently complete to please this narrower audience.

Dodd often shows excessive regard for the formal structure of a theory, and seems unsure as to which topics do and which do not require explication. His treatment of quantum electrodynamics, for example, starts from a skeleton Lagrangian with an otherwise-undefined "interaction term," gives transition amplitudes in Dirac notation as if they were self-explanatory and mentions (but does not state) the Feynman rules. It is also hard to imagine what he expects the uninitiated reader to make of the news that in the Higgs mechanism a Goldstone boson is "absorbed into the gauge particle in such a way as to lose its physical significance." Yet this same text contains one of the more lucid explanations of "intrinsic parity" available in print.

Even deeper problems arise from Dodd's extensive use of history—ordinarily a wise choice when trying to reach a broad audience. But in the case of particle physics, historical accuracy and sound pedagogy can be difficult to reconcile, especially when dealing with the 1960s.

The multiplets of what we now call "flavor SU(3)" provided particle physics with its periodic table and pointed the way to the quark model. Any serious treatment of the subject must at least mention them. The same cannot be said, however, of current algebras or Regge poles. Dodd treats these and many other historical relics much as they were understood in their heyday, detracting from the coherence

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of the picture that finally emerges.

This book might be useful to a young particle physicist familiar with the modern view but curious about how it came to be. It might also serve as a *Baedeker* for a historian hoping to move into the field. It is not suitable as an introductory textbook in particle physics.

Above all, Dodd fails to convey the wonder and stark simplicity of this new world view: the one-to-one correspondence between fields and structureless particles that are devoid of any qualities other than their couplings to fields. This is the splendor worthy of the attention of our peers in other disciplines, and it is one they are fully capable of appreciating. It is easy to imagine that Democritus himself would have marveled at the beauty of it.

ROBERT MARCH

University of Wisconsin—Madison

## book notes

### Chaos

#### Hao Bai-Lin

586 pp. World Scientific, Singapore (US dist. Taylor and Francis, Philadelphia), 1984. \$56.00 hardcover, \$26.00 paper

Although the study of chaos is a relatively new field of physics—textbooks started to appear only recently—the field is already represented by a large number of papers. The editor of this collection of papers and author of its 75-page introduction to the study of chaos points out that “it is absolutely impossible to include all important publications on chaos in a single volume.”

The book is divided into three parts. Part One consists of the 10-chapter introduction; each chapter ends with a list of references, some of which are reprinted in this volume. Part Two contains 41 papers by theorists and experimenters, grouped according to topic. Part Three contains two detailed bibliographies, a listing of books and conference proceedings, and a listing of papers, including reviews.

Hao identifies in the introduction some of the papers that were important in the development of the field: the 1963 paper by Edward N. Lorenz in which he discussed the simplified mathematical model of thermal convection that now is named after him; a paper by David Ruelle and Floris Takens published in 1971, in which they coined the term “strange attractors”; and Robert May’s comprehensive review of the field, published in 1976 in *Nature* and identified by Hao as “a good starting point for a first acquaintance with chaos.” The volume includes a paper by Lev Landau, “On the problem of turbulence,” originally published in Russian in 1944 and an excerpt of “A

mathematical example displaying features of turbulence,” published by Eberhard Hopf in 1948, showing that the field is not that young after all.

—ALEXANDER HELLEMANS

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**Elementary Particles.** Second edition. I. S. Hughes. 349 pp. Cambridge U.P., 1985. \$49.50. Text

**Fundamental Problems in Heavy-Ion Collisions.** Proc. 5th Adriatic Int. Conf. Nuclear Physics, Hvar, Yugoslavia, September 1984. N. Cindro, W. Greiner, R. Caplar, eds. 588 pp. World Scientific, Singapore (US dist. Taylor and Francis, Philadelphia), 1985. \$72.00

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