hard enough to manipulate without having to search for its meaning in an elaborate analogy. In brief, the chapter on the First Law answers a question the student does not want asked.

On the other hand, the treatment of reversibility in a subsequent chapter is a gem; and here the book answers questions that the student has asked, and that most texts avoid (as do their instructors). The treatment of the Second Law in later chapters is uneven, in that the virtue of pointing out the fatuousness of several traditional statements about this law is counterbalanced by the contrived treatment of entropy. An unexpected and refreshing aspect is the illustration of the fundamental properties of heat engines in describing a nuclear-power plant; it should help in motivating the student who may wonder whether thermodynamics has anything to do with the real world.

In any event, most teachers of introductory thermodynamics will find here useful approaches and viewpoints for students first meeting high levels of technical abstraction.

The author has striven hard to produce a useful and appealing work. His devotion and his skill are apparent, and instructors will find themselves recommending it to their aspiring students.

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Mathematical Methods In Kinetic Theory

By Carlo Cercignani
227 pp. Plenum, New York, 1969. $15.00

The kinetic theory referred to in the title of this book is restricted to the solution of the Boltzmann equation for inert, monatomic gases under all degrees of rarefaction. This problem has been of interest to aerodynamicists only recently, but is a classical one in physics. Many applied mathematicians and theoretical physicists have contributed greatly to the progress made and Carlo Cercignani is one of them.

Another well known worker in the field, Harold Grad, has said, "In trying to project from the past, we can distinguish three qualitatively different eras: transport coefficients, ad hoc polynomial and moment methods, and the blossoming of more precise mathematical investigations." It is with the last that Cercignani is concerned. As the author says, he is primarily interested in methods not results. Since Kogan's book, *Rarefied Gas Dynamics*, has recently been translated into English and is mostly concerned with results and their application as well as other topics (such as polyatomic gases and mixtures) Cer-

cignani rightly feels that his book and Kogan's are complementary.

A short concluding chapter on results has some very good correlation between theory and experiment, but his book is mostly devoted to the boundary value problems in the Boltzmann equation. He starts with the basic principles of kinetic theory, derives the Boltzmann equation carefully and rigorously, and discusses its basic properties. The linearized collision operator is introduced and studied in detail, and model equations and solutions are given. There is a brief discussion of the Hilbert and Chapman–Enskog theories together with a more extended treatment of the linearized Boltzmann equation. Most of the author's own work is embodied in the treatment of these topics. The book is an excellent summary of recent research in the mathematical theory, and should be of great value to those physicists interested in the mathematical problem.

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Elements of Advanced Quantum Theory

By J. M. Ziman
269 pp. Cambridge U. P., New York, 1969. $9.50

Although there are few physics graduate schools where a second year of quantum mechanics is not taught, there is remarkably little consensus about the content of such a course, and very often the personal preferences of the lecturer dominate. In this useful little book, John Ziman states his case in his usual eloquent way. The book's main emphasis is on the methods of nonrelativistic many-body theory, with examples culled principally from the physics of solids. The final two chapters discuss relativistic quantum mechanics and the theory of symmetry operations.

A great deal of physics is crammed into these pages at the expense of most of the intermediate steps in the algebra and a few uncrossed "t's" and undotted "i's". One tends to be referred to "the proper books" when the going gets rough, although there is no bibliography to say which books are proper. The more experienced reader will recognize some of the material and will compliment Ziman on brewing a happy mixture of the difficult parts of his own previous books with the easy parts of some other people's writings. Perhaps the quotation at the start of the book should have been the Bellman's—"I have said it thrice: What I tell you three times is true."

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Astrophysics and Stellar Astronomy

By Thomas L. Swihart
229 pp. Wiley, New York, 1969. $9.95

The subject of astrophysics, as the name implies, is based on the methods of physics. Among the branches of physics that are especially useful are those concerned with radiation, and the introductory chapter of this book outlines the basic ideas of radiation. It touches also on nuclear reactions, to the extent that these supply the energy that keeps the stars radiating. In subsequent chapters the author describes the measurement of distance, brightness and motion of ordinary stars and additional information from observation of binary and variable stars.

Up to this point the presentation is intended to furnish the background material for understanding the two major chapters. The first of these is titled "Astrophysics" and deals with several topics. Two sections investigate the physical makeup of stars by comparing them with model stars and adjusting the model parameters so that the calculated brightness, spectra and other properties match those that are observed. As a star uses up its nuclear fuel, it gradually changes its appearance. The section on stellar evolution discusses this "aging" and how it fits into the observed grouping of stars in the Hertzsprung–Russell diagram. Another section deals with various types of interstellar matter and their effect on traversing starlight. The final chapter describes what is known about the structure of our own galaxy as well as others and presents some current ideas on the nature of the universe as a whole.

The book is intended for science majors and is the result of Swihart's teaching the second semester of a general-astronomy course at the University of Arizona. His own research is in radiative transfer in stellar atmospheres.

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Dispersion Relation Dynamics

By Hugh Burkhardt
289 pp. Interscience, New York, 1969. $18.50

Hugh Burkhardt's intention is to provide "a lowbrow exposition of S-matrix theory." He thus attempts to solve an exceedingly difficult pedagogic problem, that is, to present in a coherent manner a large body of phenomenological material in the absence of applicable physical theory. The problem is analogous to writing an introduction to modern physics without having wave me-