snooty in any respect in my own experience. With some variations, the Lorentz theory still survives.

In a third article Stanley Goldberg gives a remarkably clear picture of Einstein's special relativity theory and the response of the British, French, and Germans to the theory. Starting with two simple postulates, videlicet the constancy of the velocity of light and the impossibility of determining an absolute motion of any kind, Einstein was able to derive the Lorentz transformation with ease as well as many other relations of a kinematical nature. The "ether" was dismissed in a short sentence. The German physicists understood the theory, but not all agreed with it. The British stuck with the ether and didn't even try to understand special relativity. The French were not much interested in the theory either; even Poincaré failed to mention it in his writings on electrodynamics. Americans ridiculed the theory for the most part, but G. N. Lewis and R. C. Tolman at Berkeley took it seriously and made some interesting applications of the theory. Contrary to what Goldberg says, both theoretical and practical applications are essential for the health of any physical theory; otherwise, the theory merely becomes a nice exercise in algebra.

The fourth article by Romualdas Sviedrys gives a readable account of how James Clerk Maxwell managed to introduce physics into Cambridge University (England). It wasn't easy. It seems that Cambridge was established to teach students how to be gentlemen and spend money. I suppose they succeeded in this, though Sviedrys presents no evidence in this direction. It goes without saying that Maxwell changed the course of Cambridge, and to everyone's advantage.

The fifth and sixth articles by Paul Forman and Yehuda Elkana are on Landé and Helmholtz, respectively. These articles are too long for me to review effectively; suffice to say that Landé managed to unravel the anomalous Zeeman effect, and Helmholz was finally persuaded that his conservation of "Kraft" really meant conservation of energy.

Elizabeth Wolfe Garber, in the seventh article, writes on the kinetic theory of gases as developed by Clausius and Maxwell. The two approached the matter from different directions: they helped each other but they never managed to come together. In the end Maxwell prevailed, but it required the talents of Boltzmann (and Gibbs) to place the theory on a firm statistical basis. If one has studied the kinetic theory of gases and statistical mechanics, he or she will understand Elizabeth's article; otherwise it will be a dead loss. She doesn't define a number of words that really require a definition, such as distribution function, Ergodic hypothesis, Boltzmann's H theorem, and others. She does put her formulas in readable form. And she does seem to understand that scholarly, and sometimes withering, polemics have the purpose of clarifying concepts, theories, and facts which often initially are not completely clear to to the originators of same. The purpose of war, according to an old Spanish saw, is to serve God and get rich; polemics are meant to clarify ideas.

Finally we come to the eighth article by Edward Daub (of Kansas) on Entropy, or more properly, thermodynamics. The beginning student of thermodynamics should by all means read Daub's article. He will find, to his great relief, that some of the great minds of the last century didn't understand entropy either; these included Thomson, Maxwell, Tait, and others. Apparently only Clausius and Gibbs were clear on the matter at the time, but considerable fur flew before the controversial dust finally settled. I may say that I first learned that Peter Guthrie Tait was a Scottish physicist from Daub's article; I had only known of him as a writer on quaternions. On checking in my 1911 Britannica and Willard Gibbs' collected works, I found that he was both a good physicist and mathematician; he was also noteworthy for his heated polemics. He attacked Gibbs' vector analysis and dyadics; he quarreled with almost everybody about entropy. Eventually quaternions gave way to vector analysis, dyadics to matrices, and entropy is now a well defined and curvy matron. Daub's article would have been improved if he had included at the start the present statements of the laws of thermodynamics.

G. N. Lewis once compared the development of science to the building of a lovely cathedral; there is first a collection of stones, then scaffolds, the bandied jests and curses of the workmen, but finally all these are cleared away to reveal a beautiful structure dedicated to a noble prupose. The present book gives some indication of greater monuments while under construction. The laws of nature don't die or fade away.

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December 22, 1971

About the Reviewer: We again welcome Professor Yost's words to these columns. To our readers of long standing he needs no introduction; readers recently come aboard we remind of our reviewer's position as Professor Emeritus of Chemistry at California Institute of Technology and refer them to his writings in earlier issues of Nuclear Science and Engineering.

Professor Yost acknowledges discussion with Pancho P. Gomez, of Boise, Idaho, and assistance in preparation of the manuscript from Mrs. Yost and Ruth Hanson, Secretary to the Division of Chemistry and Chemical Engineering, California Institute of Technology.

Enrico Fermi, Physicist. By Emilio Segrè. University of Chicago Press (1970). $6.95.

This book will be of special interest to physicists and other scientists. In it is a systematic account of Fermi's family background, his early schooling, his doctoral studies at the University of Pisa, his appointment to a professorship at Rome at the age of 26, and subsequent professional growth to a preeminent position in physics.

Professor Segrè has presented a carefully documented and critical account of the career of an extremely gifted person, largely self taught, proud, ambitious, and personally cautious and reserved. Since Fermi possessed a remarkably retentive memory, the books that he studied early in his career made a lasting imprint upon him, and many of these are cited by title.

Fermi almost single handedly brought modern physics to Italy, and the methods whereby he attracted colleagues and students of physics to Rome are described. The high points of Fermi's professional achievements, his statistics, his contributions to beta-ray theory, and his work on slow neutron properties are set forth in an orderly way.

Fermi, through his work and personal contacts with colleagues and students, had an important influence upon the development of physics, worldwide. He played a major role in the successful conclusion of the chain reacting uranium pile experiments, and in the development of the nuclear bomb. These contributions are described in some detail. In this part of the book attention is understandably focused on the research aspects of the release of nuclear energy, to which Fermi contributed much. However, the broader features of this development, including the financial, managerial, and engineering contributions to the Manhattan Project are somewhat deemphasized. The reader not familiar with these aspects may gain a somewhat distorted view of the remarkable achievements made by the Manhattan Project in such a short period of time.

It should be kept in mind that for the success of this project

1. Vast sums of money were required at a time when mobilization was taking place for the invasion of Europe, and when the war with Japan made great demands upon our resources.
2. Engineering process design, construction, and management on an unprecedented scale and tight time schedules were required.

In the first category, Lindemann, through Churchill, played an important part in keeping Roosevelt reassured of the high priority that should be attached to the Manhattan Project. During an information exchange visit that I made to England during the winter of 1944, Lindemann told me of some aspects of this problem.

In the second category, the chemical and petroleum process industry had reached a high degree of proficiency in the United States during the period before World War II. Many individuals in this industry possessed a high degree of competence and qualities of leadership that enabled them to approach these novel problems with skill and effectiveness. Without the able contributions of men from such companies as DuPont, Union Carbide, Kellex, and others, the ideas of nuclear fission would have remained for many additional years in the laboratory stage.

These comments are not made as a criticism of this book by Professor Segrè, which understandably has as its primary scope the impact of the works of Fermi upon physics and scientific thought. The book is carefully prepared and can be recommended highly.

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December 13, 1971

About the Reviewer: Gene Booth is now director of research at Stevens Institute of Technology and dean of the Graduate School following a period in industry (American Optical Company) and civilian service for the military (scientific director for the Supreme Allied Commander). In the interval 1937-1959 Professor Booth was associated with Columbia University where, during the war years, he made outstanding contributions to the science and technology of the Manhattan Project, especially the gaseous diffusion process for separation of the uranium isotopes. Professor Booth's undergraduate and early graduate studies were at the University of Georgia. He completed his formal studies in physics at Oxford.

Principles of Activation Analysis. By Paul Kruger. Wiley-Interscience Publishers (1971). 522 pp. $25.

This is a difficult book to review. It has many good features and it has many poor features. It is stated to have been designed as a textbook for college students, but it reads rather more like a reference book. Almost everything that should be said about activation analysis is there (along with an excessive amount of extraneous material), but it is unfortunately all said in a monotone. Subjects of very slight importance, such as second-order minor complications, receive the same amount of treatment as subjects of paramount importance. A student with no previous experience in the field of activation analysis would very likely be quite confused if this book were his only source of information on the subject. He would probably never be able to see the forest for the prodigious number of trees. There are too many side excursions into irrelevant areas, making the book excessively long and expensive. The style is rather pedantic and uninspiring. It reads too much like a conglomeration of extracts from the literature put together in some logical order by a trained scientist—but unfortunately one with only little actual personal experience in the field of activation analysis. The book contains an unusually large number of errors—typographical and otherwise.

On the brighter side, this book contains a great deal of factual information on the subject of activation analysis, with a large number of excerpts (photographs, figures, graphs, and tables) from the literature. It thus appears to be a good reference book for the library, but not a very useful textbook. In nine chapters, occupying 511 pages of text, the author treats the subjects of

1. stable and radioactive nuclides
2. radioactivation
3. irradiation sources
4. radionuclides
5. radiation detectors
6. radiochemistry and radioactivity measurement
7. activation analysis practices
8. activation analysis limitations
9. activation analysis applications.

At the end of each chapter, a number of problems are given (averaging about 1.5 pages per chapter), and a collection of bibliographical references is given (averaging about 2 pages per chapter). The book is well indexed.

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December 2, 1971

About the Reviewer: Vincent Guinn is professor of chemistry on the Irvine campus of the University of California. Professor Guinn received his early academic training at Southern California and completed his graduate studies at Harvard. He has had wide experience in industry, most recently with Gulf General Atomic. His principal interests are in radiochemistry, radioactive tracers, and activation analysis.

The Foundations of Neutron Transport Theory. By Richard K. Osborn and Sidney Yip, Gordon and Breach Science Publishers, Inc., New York (1966). 126 pp. $8.75

This monograph was a pleasure to review. From their collection of "bits and pieces" the authors have assembled