ions and atoms are considered. This amounts to treating them as points, and transitions associated with the changes in the internal structure of the ions and atoms are omitted entirely.

An intermediate course in electromagnetic theory and a course in advanced calculus are sufficient background for understanding this book. Familiarity with the material in Lyman Spitzer's little classic, *Physics of Fully Ionized Gases*, while not imperative, would be very helpful. No knowledge of quantum mechanics is necessary because only classical plasmas are studied. In fact, the principal model is that of an electron gas moving through a uniform, smeared-out positive background, assumed immobile.

Plasma physics has been derisively called the discipline rich in theoretical concepts of dubious applicability. The author has admirably attempted to overcome this stigma by frequent comparisons between experimental results and the theory. The ten chapters are devoted to transport of radiation, Kirchhoff's radiation law, emission and absorption from binary encounters, fluctuations, collective emission phenomena, cyclotron emission waves from density fluctuations, microinstabilities and experimental methods. A useful list of references and an author and subject index are provided.

Other reviewers have given very high grades to this book. (See for instance the rhapsodic review by T. Boyd that appeared in the 1 July 1967 issue of *Nature*, page 104.) The book is reasonably well written and will undoubtedly be widely used in the second semester of courses in plasma physics. In spite of its rather high price, it can be recommended as a good buy with the following caveats:

Readers who prefer a more advanced mathematical treatment using Green's functions will like *Electromagnetic Fluctuations in a Plasma* by A. Sitenko, Academic Press, New York, 1967. Sitenko also treats an electron-ion plasma, and his chapters on fluctuations are much more complete and detailed.

A more readable account of the transport of radiation and Kirchhoff's radiation law is given in *Physics of Shock Waves* by Ya. Zel'dovich and Yu. Raizer, Academic Press, New York, 1966, or in *Theoretical Astrophysics* by V. Ambartsumian, Pergamon Press, Oxford, 1958.

Formulas are frequently simply written down, with the reader being referred to a book where the details are given. However, Bekefi does not give the exact page, and he sometimes propagates the errors of the authors he quotes.

Bekefi, who is at MIT, often attributes results to MIT physicists when, in fact, the results were obtained much earlier by others. This is sloppy scholarship and inexcusable parochialism.

There are no problems. With problems, the scope of the book could have been considerably widened and the value of the book greatly enhanced.

These grumbles are further proof of the truisms that life is short and that an author never finishes a book, he merely abandons it.

* * *

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On continental drifts

DEBATE ABOUT THE EARTH: APPROACH TO GEOPHYSICS THROUGH ANALYSIS OF CONTINENTAL DRIFT. By H. Takeuchi, S. Uyeda, H. Kanamori. Trans. from Japanese. 253 pp. Freeman, Cooper, San Francisco, 1967. $4.50

by Owen W. Williams

An extremely well translated version of a Japanese book published in 1964, this book is a timely addition to the continuing debate on the subject of continental drift. Although the authors attempt to convey a neutral position and objective approach as to the existence of continental drift, they appear in reality to be firm proponents of such a position.

The book is written in an exciting, lively and most readable style. It is prepared with sufficient detail to satisfy the scientist and with balance in pertinent generalizations desirable to the layman. If supplemented in some places, it would make a desirable text for an introductory survey course in geophysics. The authors use an ideal set of attractive and meaningful figures and hand-lettered drawings to complement their book.

The first portion of the book offers a clear account of the continental-drift controversy historically from Wegener to the special 1928 American Association of Petroleum Geologists Symposium on the subject, to Du Toits's movement theory, to the hibernation and almost the demise of the drift theorem during the 1940's and thence to its rekindling by paleomagnetic specialists. Every avenue of each theory and concept is covered; however, an occasional tie-in to the drift theory demands some unsubstantiated imagination from the reader. It is one of the few books in which one can find resumés of the evolution of both continental-drift theory and paleomagnetic theory. The second part of the book deals with contributions of the earth's magnetism and terrestrial heat flow while the final section deals with contributions of marine geophysics and geology.

Although the book is not perfectly balanced, and although it obviously reflects the personal interests of the authors, its validity is still sound. A drawback of any such book is that it becomes dated in a rapidly moving field. For example, no mention is made of evidence supporting the Vine–Matthews sea-floor-spreading hypothesis, advances in recognizing and dating geomagnetic field reversals, recent support of J. T. Wilson's theory and plans for space scientists (geodesists) to use artificial earth satellites to detect continental drift directly over a decade in time.

Internationalism of science is stressed with personalities such as P. M. S. Blackett, Sir Edward Bullard, Jeffries, Louis, Neel, Walter Elsasser and Stanley Runcorn. The need to communicate in science plus the appreciation of having to advance new ideas is recognized by the authors throughout this fine book. This well written book should attract considerable attention among earth scientists.

* * *

Owen W. Williams is director of the terrestrial sciences laboratory at Air Force Cambridge Research Laboratories.

A consensus of experts

PROGRESS IN LOW TEMPERATURE PHYSICS, Vol. 5. C. J. Gorter, ed. 332 pp. North-Holland, Amsterdam (Interscience, New York), 1967. $15.50

by Garrison Sposito

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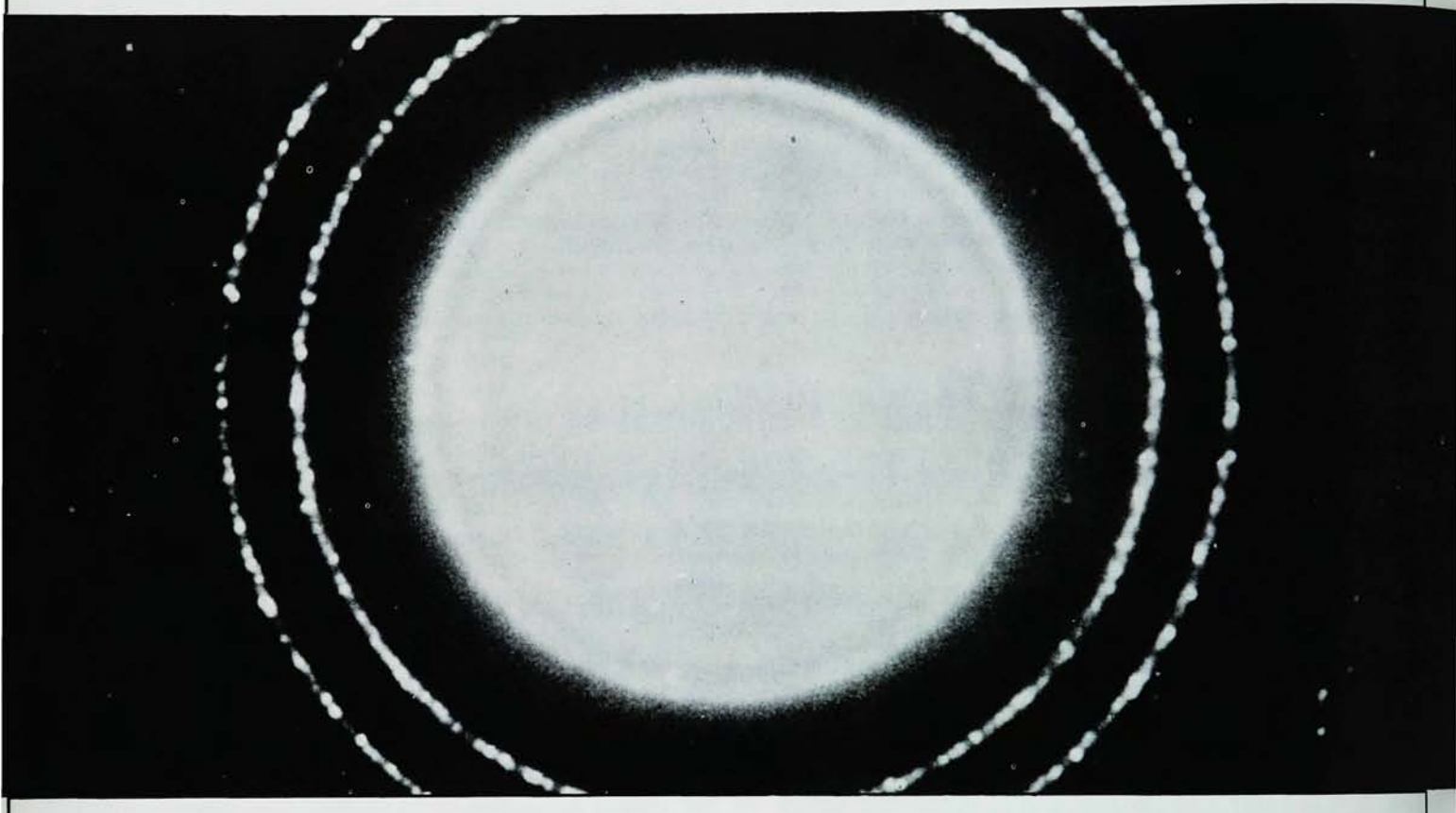

Thoroughly revised, the second edition of INTRODUCTION TO MODERN PHYSICS reflects the most recent concepts in modern physics.

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ward fewer, but longer, chapters. In the present tome there are seven chapters, each of which has approximately 50 pages and deals with an aspect of low-temperature physics rather different in character from those discussed in its companions. This eclectic arrangement and the consistent clarity and accuracy of the chapters are a fresh reflection of the excellent taste of the editor, to whom low-temperature physicists are beginning to owe a substantial debt of gratitude.

The longest and, in many ways, most significant chapter in the volume is by E. L. Andronikashvili and Yu. G. Mamaladze on the subject of rotating superfluid helium. This review, like several of the others, is nearly self contained and represents an exciting account of the experimental progress in the field as seen in terms of the quantized-vortex hypothesis of Lars Onsager and Richard Feynman. As with any review of the progress in a rapidly developing area, certain conclusions are to be regarded as tentative, and points in question still remain open to further experimentation. The most important of these are the rather basic assumption that the normal component in helium II is subject to classical hydrodynamics and the notion that the phase transition in rotating helium is of lower order than that in the resting fluid.

Philip W. Anderson has contributed an enlightening, but most certainly not introductory, summary of the Josephson effect and its unintentional progeny, macroscopic quantum-interference phenomena. Anderson points out correctly that the tunneling of supercurrents through thin, nonsuperconductive barriers (the Josephson effect) has no essential connection with the interference of supercurrents in applied magnetic fields and should, in principle, be distinguished from the latter. The rest of the article occupies itself with the analysis of experiments on the dc and ac Josephson effects and especially with the elegant studies employing Mercereau interferometers. As Anderson suggests, it has become quite evident that the Josephson effect is not a quantum-physical sport but, in fact, a remarkably simple manifestation of superconductivity in a form compatible with our present notions of this phenomenon. In future volumes of *Progress in Low Temperature Physics* one would hope to hear more of the Josephson effect and the way it has influenced scientific instrumentation and the measurement of fundamental constants.

R. De Bruyn Ouboter, K. W. Taconis, and W. M. Van Alphen have written a chapter, based mainly on their own recent work, on superfluid transport through narrow and ultranarrow pores. In a similar way, D. Cribier, B. Jacrot, L. Madhav Rao and B. Farnoux discuss their experimental verification of the existence of quantized vortices in the superconductive mixed state, and J. J. M. Beenakker and H. F. P. Knaap extend the discussion, begun in the fourth volume, of fluid mixtures at low temperatures to hydrogenic and nitrogen molecules and certain noble gas atoms.

Two of the chapters represent a broadening of the scope of the series in that they deal with phenomena whose investigations, rather than natures, require low temperature. V. F. Gantmakher's article on the detection of size-dependent skin-effect anomalies in a magnetic field and R. W. Stark's and L. M. Falicov's article on magnetic breakdown in metals are thus welcome extensions of the term "low-temperature physics."

There is sufficient depth and breadth in this volume to recommend it most heartily to anyone interested in low-temperature phenomena, especially those seeking the consensus of the experts or a source of references to experimental papers.

* * *

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Beginning and advanced measurement

EXPERIMENTAL MEASUREMENTS: PRECISION, ERROR AND TRUTH. By N. C. Barford. 143 pp. Addison-Wesley, Reading, Mass., 1967. $2.95

INTERPRETATION OF TECHNICAL DATA. By J. W. Richards. 195 pp. Van Nostrand, Princeton, N.J., 1967. $7.00

by James B. Kelley

These two books fit together very well and could be used with profit as part of a course in measurements. At the outset of such a course, several brief lectures could be given to acquaint the students with the philosophy and approach to measurements, and the books then used throughout the course as guides in the interpretation of results, the presentation of data and the drawing of conclusions.

The Barford book is the more sophisticated in presentation of the two, while Richards's would work very well as the beginner's handbook. This is especially true of the first three chapters of the Richards book. Such things as limits of error, significant figures, accuracy and precision, abbreviation errors, and so forth are not discussed often enough, nor, at least, in my experience, too well understood by even supposedly experienced experimentalists. More than once I have seen an experimentalist, who certainly knew better himself, allow a technician whose knowledge of errors and accuracy was certainly no better than minimal, hand him "final" data that contained serious mistakes. For example, the cancellation of a positive and negative deviation to give a zero deviation, when the magnitude of each of these deviations was such as to give rise to serious doubt about either the validity of the measurement or the experiment itself.

The Barford book has a rather interesting approach with a personalized touch. N. C. Barford has two students, Jenkins and Robinson who are involved in an experiment measuring the oscillations of the same pendulum. With the aid of his two students, Barford is able to carry out all sorts of discussions involving errors, their causes, distribution and the like. As a possible text, Barford offers some advantages in that he has problems at the ends of the chapters. He also has a convenient group of appendices dealing with the Gaussion distribution function, Gaussion probability, Poisson distribution and the hypothesis test.

One chapter in the Richards book that everyone could stand reading is the last one on "The Hazards of Self-Deception." He also has several good appendices, especially the one on dimensions and the one on dimensionless groups. Recently the associate director of a large laboratory asked me if there was not something that could be done to teach both graduate and undergraduate students something about both dimension and dimensionless quantities. He maintained that the lack of clear understanding and the