

An interesting aspect of the Commission's recommendations for organization is the coupling of oceanography and meteorology. In this respect they are more conservative than the President's Science Advisory Committee panel, who recommended a three way coupling of oceanography, meteorology and solid-earth activities under one master agency.

Vice-President Agnew has recently indicated that we can expect five of the six recommendations to be soon implemented in some measure. The sixth recommendation, to establish a single large controlling agency, should not be anticipated for several years. US industries were warned that they could expect austerity in government support of marine activities.

The Commission advises that a small group of institutions should be designated "university-National laboratories," somewhat in the manner of the Atomic Energy Commission laboratories, with sustained support for broad gauge, basic science activities and commitment to serve scientific groups from other institutions. In addition, and somewhat different from AEC practice, the Commission recommends a network of smaller laboratories that would serve local areas for

mainly ecological "county agent" type of support.

The writers of the Commission's report have treated the important subject matter seriously but not pretentiously. From time to time they display a laudable irreverence that is most evident in the epilogue that begins, "It is worth remembering that America began, or rather almost did not begin, with a commission on marine science. In 1484, King John II of Portugal, intrigued by a project to sail west to the Indies and Japan proposed by a Genoese navigator named Christopher Columbus, appointed a commission of distinguished scientists to hear him and report on the worthiness of his proposal. One year later, this commission turned thumbs down on the whole idea; it considered a western route to the Indies to be too long and too hazardous to merit support."

Our Nation and the Sea is worthwhile reading for those who wish a perspective on the technical status of marine science or a perspective on the management directions that the US program is likely to follow. Complementary reading is contained in the three yearly reports titled *Marine Science Affairs*, produced by the Marine Council.² Detailed critiques of

the Commission's recommendations, and of the rapidly growing national position on a "wet NASA," can be found in nearly all recent ocean-oriented publications.^{4,5}

References

1. "Oceanography 1960-1970," National Academy of Sciences Committee on Oceanography (1959); "TENOC—Ten Year Program in Oceanography," Department of the Navy (13 March 1961).
2. "Marine Science Affairs—A Year of Broadened Participation," The Third Report of the President of the Congress on Marine Resources and Engineering Development. US Government Printing Office (January 1969).
3. Panel Reports of the Commission on Marine Science, Engineering and Resources. Vol. 1, "Science and Environment"; Vol. 2, "Industry and Technology"; Vol. 3, "Marine Resources and Legal-Political Arrangements for Their Development."
4. National Oceanography Association News, 3, 1 (Jan. 1969).
5. Gulf Universities Research Corporation Review, 3, 6 (Feb. 1969).

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Philosophy and quantum mechanics

PRINCIPES ESSENTIELS DE LA MÉCANIQUE QUANTIQUE. By D. I. Blokhintsev. Trans. from Russian. 192 pp. Dunod, Paris, 1968. 22 F

by R. BRUCE LINDSAY

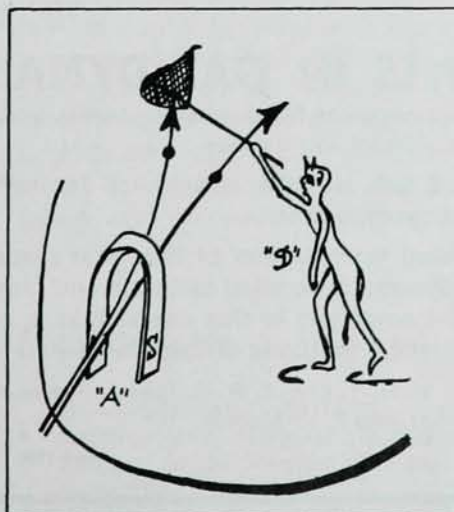
Books on quantum mechanics are now almost legion in number, testifying to the importance physicists attach to the instruction of this discipline to the rising generation. Most of these books put chief emphasis on the clear exposition of the techniques.

Blokhintsev's book is an exception to this mode of presentation. It is essentially a philosophical examination of the fundamental principles of quantum mechanics. The author in his preface insists that the work is a small treatise on theoretical physics, and this is correct, but the emphasis is decidedly philosophical and not utilitarian.

The book is a French translation of a small monograph by the well known Russian physicist who is director of the laboratory of theoretical physics in the Institute for Nuclear Physics in

Dubna. The monograph is based on a larger Russian work on quantum mechanics by the author.

Blokhintsev's approach is that quantum mechanics is a statistical discipline and fundamentally indeterministic in character. Indeed he seems to dismiss



LITTLE DEMON "... at work in the name of quantum mechanics."

determinism entirely from physics, even considering that its role in classical physics is illusory. He develops the theory of quantum mechanics from the standpoint of statistical ensembles, beginning with the Gibbsian ensemble and then modifying it to meet quantum requirements. Among the topics discussed are causality and measurement in quantum mechanics, the role of the observer and the question of the "completeness" of the theory and the problem of hidden variables.

Blokhintsev is convinced that quantum mechanics is causal in character. He believes that the role of the observer in the usual presentations of the subject is much overrated (presumably here disagreeing with Neils Bohr). On the other hand, he disagrees with Albert Einstein in feeling that quantum mechanics is indeed a complete theory. With regard to hidden variables, his attitude is that there is nothing bad about this idea as long as the variables are unobservable.

The book is entertaining reading

AN INTRODUCTION TO NONLINEAR OPTICS

By **George C. Baldwin**, *Department of Nuclear Engineering and Science, Rensselaer Polytechnic Institute, Troy, New York*

The only book for the non-specialist on the subject, this text describes recent optical discoveries which will play important roles in future applications of lasers.

CONTENTS: Introduction. Background of non-linear optics. Properties of optical media. Non-linear phenomena in passive media. Non-linear optical phenomena in active media. Appendix. Bibliography.

166 pages

April 1969

\$9.50

ELEMENTARY EXCITATIONS IN SOLIDS

Proceedings of the Cortina Lectures and 4 Lectures from the Conference on Localized Excitation, both held in Milan

Edited by **A. A. Maradudin**, *Department of Physics, University of California at Irvine* and **G. F. Nardelli**, *Gruppo Nazionale Struttura della Materia, C.N.R. and Physics Institute, University of Milan*

Of particular interest to solid-state physicists and crystallographers, these papers report the latest advances in the field. The volume covers spin waves, interactions of phonons, excited states of the F center and free and bound excitations.

CONTRIBUTORS: W. Ludwig, M. Balkanski, M. F. Collins, R. O. Pohl, A. J. Sievers, R. J. Elliott, P. Resibois, E. Burstein, G. Baldini, G. Chiarotti, J. J. Hopfield, J. Callaway, A. A. Maradudin, G. F. Nardelli, I. P. Ipatova, A. A. Klochikhin, and R. F. Wallis.

515 pages

August 1969

\$35.00

CRYOGENIC LABORATORY EQUIPMENT

By **A. J. Croft**, *Clarendon Laboratory, University of Oxford*

This profusely illustrated book explores the practicalities of creating an environment for small scale experimental work at temperatures down to 4°K. Taking a practical approach to the subject, the author reviews the various hazards involved in cryogenics and gives quantitative treatment to physical principles.

CONTENTS: Liquid refrigerants. Storage and handling of liquid refrigerants. Liquifiers and refrigerators. Room temperature machinery. Helium gas recovery systems. Instrumentation. Materials and jointing methods. Cryostat dewars. Hazards. Bibliography. Appendix. Index.

165 pages

1967

\$11.50

MODERN DEVELOPMENTS IN GAS DYNAMICS

Based upon a short course on Modern Developments in Fluid Mechanics and Heat Transfer, given at the University of California, Los Angeles

Edited by **W. H. T. Loh**, *Manager, Science and Technology, Space Division, North American Rockwell Corporation, Downey, California*

The first integrated presentation of the most recent developments in hypersonic slender and blunt body dynamics, rarefied radiation and plasma gas dynamics by leading authorities in the field. The emphasis in this useful text is on fundamental principles and theories, including all analytical methods of solution to date.

CONTRIBUTORS: W. H. T. Loh, E. R. G. Eckert, A. Henderson, Jr., H. K. Chang, J. F. McCarthy, Jr., S. I. Pai, S. A. Schaaf, and F. K. Moore.

360 pages

Fall 1969

\$25.00

throughout, even if it is not always possible to agree with the author. The text is enlivened by numerous clever cartoon drawings, many involving little demons doing various humorous things in the name of the principles of quantum mechanics.

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Kinetics of liquids

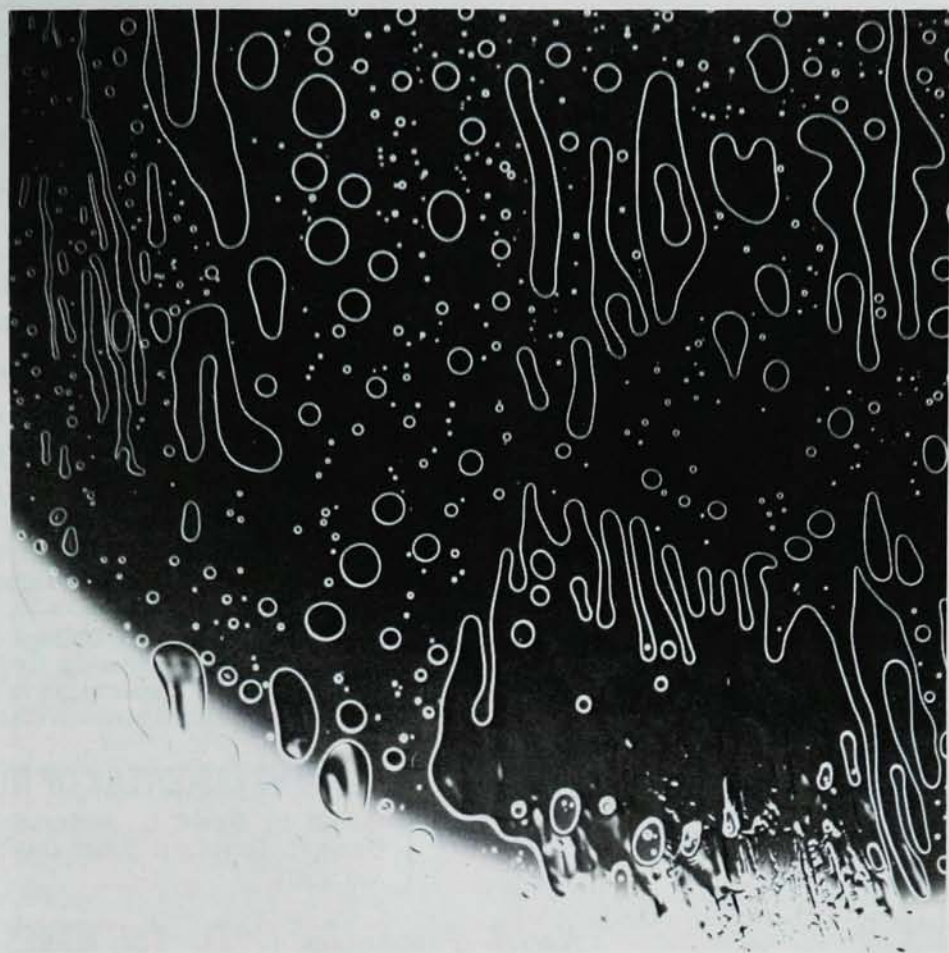
THE PHENOMENA OF FLUID MOTIONS. By Robert S. Brodkey. 737 pp. Addison-Wesley, Reading, Mass., 1967. \$22.50

by LAWRENCE TALBOT

Texts on fluid mechanics make their appearance on the publishers' lists with almost predictable regularity. Authors of such texts are generally aware, sometimes to the point of self-consciousness, of their roles in the proliferation of material on the subject. They will often explain in a preface the rationale behind their entry into the lists: a new approach to the standard material, a new selection or arrangement of the material, a new projected audience and so on. Frequently such explanations are far from convincing. However, the present instance is a happy exception. The author's aim is to provide a first-year graduate text on fluid mechanics for chemical engineers, and to this end he has brought together many topics of technical importance to the chemical engineer that are not found in fluid mechanics textbooks.

The book is divided into three main sections. The first is intended to give a theoretical background to fluid flow, starting with some vector and tensor preliminaries. It then introduces the equations of change and the various flux vectors of transport theory and culminates in the derivation of the Navier-Stokes equations.

The second part of the book is devoted to the standard applications of the flow equations such as are found in most texts: inviscid flows, exact and boundary-layer solutions of the laminar-flow equations, integral methods, dimensional analysis and one-dimensional compressible flow. These topics are treated generally in a selective and introductory fashion. Each



FORMATION AND MOTION of drops and bubbles. (An artist's impression reproduced on the jacket of *The Phenomena of Fluid Motions* by Robert S. Brodkey.)

by itself could form the subject of a complete volume (as indeed they have).

The third part of the book really justifies its being. This portion, which accounts for two thirds of the volume, covers phenomenological and statistical theories of turbulence, non-Newtonian phenomena and multiphase flow. The approach is very well balanced. Theory is given where it exists, and comparisons with experiments are made. But important technical problems are not avoided simply because they are messy and not amenable to neat analysis. If the only approach is an empirical one, that approach is presented and argued

through on its physical basis.

The bibliography is exhaustive and up to date. I know of no other book in which the subjects of non-Newtonian and multiphase flow are treated in as organized, clear and complete fashion as they are here. For this reason, this book will surely be of value not only for what it was intended, a graduate text for chemical engineers, but also as a source book for all engineers concerned with real-life fluid flow problems.

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A quasar guide

QUASI-STELLAR OBJECTS. By Geoffrey and Margaret Burbidge. 235 pp. W. H. Freeman, San Francisco, 1967. \$7.50

by HONG-YEE CHIU

Eight years have passed since the discovery of quasars, but the origin and

nature of these incredibly bright and bizarre objects remain a mystery. Theory after theory has been compounded to explain their existence, only to be abandoned when the next set of data came in.

In this well written book, Geoffrey