

the recent work on kinetic theory of polyatomic molecules in the gas phase and the spectroscopic study of molecular collisions. Nevertheless, it is reasonable to hope for even more general interest in molecular forces.

The book is valuable for several reasons. The author presents, in an introductory fashion, some topics that are of interest but do not usually appear in the curriculum for physics (or for that matter chemistry) departments. This book can serve as a concise review and reference for those who are working in the field.

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The reviewer is with the Mound Laboratory, Monsanto Research Corporation, and he is working on experimental and theoretical investigations of intermolecular forces in gases.

Relativity for freshmen

SPECIAL RELATIVITY: THE MIT INTRODUCTORY PHYSICS SERIES. By A. P. French. 286 pp. W. W. Norton, New York, 1968. \$3.25 Cloth, \$1.95 paper

by PETER G. BERGMANN

This book represents one in a series of relatively short works that is to span the whole of physics and serve as principal or collateral texts in the first two years of college physics. Special relativity might be taught in the second semester of a freshman course if the first semester includes classical mechanics.

This book's long suit is the evident care in writing and editing. There are many fine illustrations, both line drawings and photographic reproductions. Rare in a book intended for this level are numerous references to the literature, ranging from quotations from Newton's and Einstein's works to journal references extending well into the present decade. Experiments bearing on the special theory of relativity are described with considerable thoroughness.

The author has deviated from tradition by placing relativistic dynamics at the beginning. In justification of this arrangement, we should note the role played in contemporary physics by extreme-relativistic particles, by high-energy photons and by collisions and transmutations between them; compared to these, the minute effects exhibited (or rather, missed) in the Michelson-Morley experiment, for in-

stance, may not appear impressive. It remains true, though, that the extreme-relativistic situations were not experimentally accessible until long after the formulation of the theory of relativity, and without that theory much of the associated technology could not have been developed. Perhaps it is well that French's approach will now be tested in class instruction, so that a pedagogical judgment may be formed on the strength of experimental evidence.

In other respects, I found the discussion of the relativity of simultaneity, and its crucial importance in the establishment of relativistic concepts of space and time, not quite as trenchant as I should have expected, considering the transparency of most of the presentation. Perhaps, if students can be persuaded to peruse more than one text, a combination of French's book and one like David Bohm's *The Special Theory of Relativity* will bring out the best in both books.

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The reviewer is professor of physics at Syracuse University. Relativity is his principal research interest, and his non-technical introduction to general relativity, The Riddle of Gravitation, has recently been published by Scribner's, New York, 1968.

Social aspects of science

WASHINGTON COLLOQUIUM ON SCIENCE AND SOCIETY. (First Series) Conf. proc. (American University, Washington, DC, 1964-65) S. Frederick Seymour, ed. 181 pp. Mono Book, Baltimore, 1967. \$6.50

WASHINGTON COLLOQUIUM ON SCIENCE AND SOCIETY. (Second Series) Conf. proc. (Georgetown University, Washington, DC, 1965-66) Morton Leeds, ed. 201 pp. Mono Book, Baltimore, 1967. \$6.50

by M. W. FRIEDLANDER

In recent years the ever-widening effects of science on man and his society have been the subject of innumerable discussions, seminars and recriminations. Little agreement has been produced on the extrapolations and their implications, but that fact must not deter us from continuing to have these discussions. The support that science draws from society depends not only on the ability of scientists to present a persuasive case for their immediate projects and for the longer range basic

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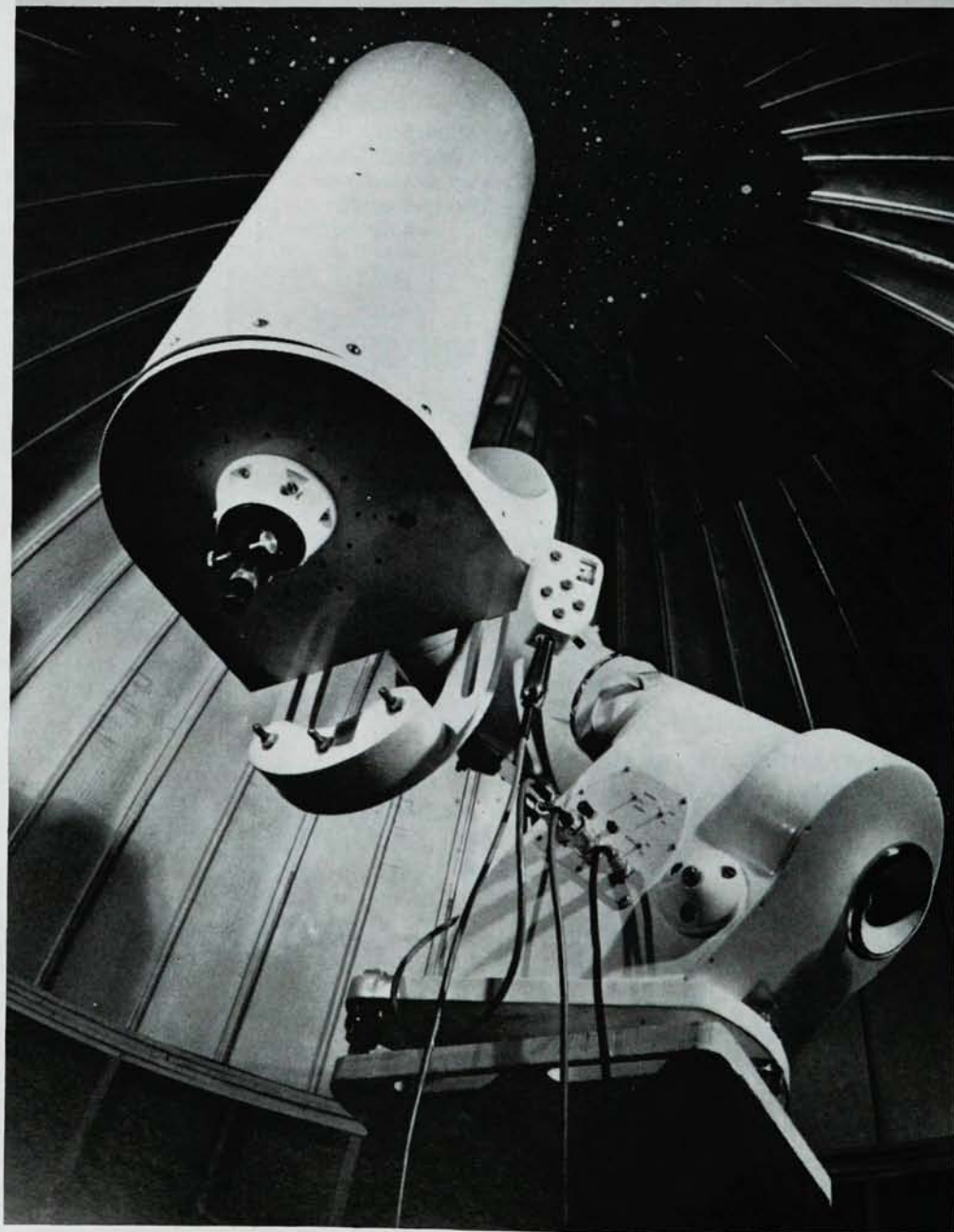
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research but also on a demonstration of sympathetic awareness of the possible social consequences.

The two volumes under review contain the transcripts of the 1964-65 and 1965-66 sessions of the Washington Colloquium on Science and Society held at the American University and Georgetown University, respectively. Given the wide range of topics covered, a review can simply represent the personal preferences of the reviewer—which is to say that there should be several essays of interest for most readers, but some potentially interesting topics have been dulled by their presentation. The format consists of the invited papers, then discussion from two invited respondents for each paper, then (sometimes) a rebuttal and finally discussion from the floor. The text appears to be a verbatim transcript and could well have stood some tightening through judicious editing; some of the discussions seem to ramble and scarcely merit placement in the archives.

To make a sweeping generalization I would say that the first volume is less concerned with science than with the response of society, whereas the second volume has presentations by scientists in which the scientific aspects are generally primary. So, for example, in the 1964-65 series W. H. Ferry makes many good points in discussing the consequences of what he calls the Triple Revolution (cybernetics, weaponry and human rights). Howard Taubenfeld shows how international law has been left far behind as science and technology have progressed (for instance, in international fishing agreements). Hans Morgenthau points out that the control of sophisticated systems is understood by only a relatively small group; consequently we need better information made available to nonexperts who have to make the political decisions—and this means the public, quite generally.

In the second volume Frederick Seitz discusses the growth of support for science; Roger Revelle has an interesting survey of population and food problems, and Peter Drucker presents interesting views on world economy. The longest and liveliest floor discussions followed the presentations by Philip Hauser on the population explosion and by Representative Emilio Q. Daddario on science and Congress.

Reading these volumes provided plenty of food for thought—and irritation at some of the views expressed!

I especially liked Wallace Brode's tactful comment: "As a scientist, I find this paper a little difficult to discuss or analyze."

* * *

The reviewer is a professor of physics at Washington University. Through his association with the St. Louis Committee for Environmental Information, he has been concerned with the effects of science and technology on society and the need for presenting scientific information in an understandable form to the general public.

Two-part photons

ONDES ELECTROMAGNETIQUES ET PHOTONS. By Louis de Broglie. 99 pp. Gauthier-Villars, Paris, 1968. 35 F

by R. BRUCE LINDSAY

It is no secret that Louis de Broglie, the distinguished pioneer in the development of wave mechanics through his epoch-making doctoral thesis of 1924, has never been happy with the Copenhagen interpretation of quantum mechanics. In particular he has felt that the probabilistic interpretation of the state function deprives the theory of the physical attributes that he had in mind in his earliest work. In this attitude he effectively sides with Albert Einstein and Erwin Schrödinger in the opposition they maintained to the views of Max Born and Niels Bohr.

It will be recalled that de Broglie sought to solve the puzzling wave-particle duality for particles like electrons by associating the motion of the particle with an actual "matter" wave whose purpose is to guide the particle on its path through space. When the particle is a light quantum or photon the guiding wave will presumably have some connection with the Maxwellian electromagnetic wave through which classical physics has long explained the propagation of light.

The advent of the coherent radiation produced by masers and lasers has stimulated de Broglie to reexamine the problem of the relation between photons and electromagnetic waves. This is the theme of the book under review. In tackling the problem the author once more invokes his theory of the double solution that he has often used lately in quantum-mechanical situations. According to this theory the solution of the fundamental state equation of the photon is divided into two parts, one of which is the standard Ψ function of quantum mechanics, a

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