mentary course in analysis a prerequisite, and dispense with the mathematical introduction entirely.)

The shortcomings of the work are thus essentially of omission. Although it contains the basic material for a first year graduate course, and presents this quite readably for most physics and engineering students, it needs applications, problem lists, references, and an account of the more recent work to make it a complete text on electromagnetic waves.

Une Tentative d'Interprétation Causale et non Linéaire de la Mécanique Ondulatoire. By Louis de Broglie. 297 pp. Gauthier-Villars, Paris, France, 1956. Paperbound 3.500 fr. *Reviewed by L. Marton, National Bureau of Standards.*

When I received de Broglie's book in the mail, my first reaction was that I made a mistake in accepting this book from *Physics Today* for review. Nevertheless, a sense of duty prevailed and I opened it before making my decision to send it back to the editor for reassignment to another reviewer. After opening it, I read part of a page and my curiosity was aroused. Immediately, I took my pocketknife and started cutting some of the pages (you know, practically all French books come paper-bound with uncut pages). That was my undoing—as I went along, I became more and more fascinated by the book until I could hardly put it down. Now, after having gone through it I can't claim I know all about the book, but I can assure you that it is something very worthwhile looking into.

The main idea of the book is very clearly described in de Broglie's own foreword. His original conception of wave mechanics was that of a pilot wave where the wave accompanied the particle and guided it along its path. Very early in the days of wave mechanics, that view was, however, supplanted by the more statistical interpretation of wave mechanics as advocated by the great school of theoretical physicists—Bohr, Born, Heisenberg, Pauli, and many others. In recent years, a new interpretation is growing up, and it was more or less started by Bohm; or it happens that de Broglie, himself, has been considering for almost thirty years a different interpretation of wave mechanics which he now calls the theory of the double solution. This theory has lain dormant for a number of years, and apparently it was only in the last few years that he saw a revival of his earlier thoughts in this direction. In this theory, there are two coupled solutions of the wave equation—one is the ψ-wave which because of the continuous character of its amplitude has only a statistical and subjective significance. The other solution is the u-wave which has the same phase as the ψ-wave, but with very wide variations of the amplitude, particularly in a region in space corresponding to the singularity called the corpuscle. This dual solution of the equation satisfies, therefore, almost all descriptions of the physical reality in the sense that the u-wave in the region of singularity describes the particle, whereas outside of that region both waves describe the wavelike behavior

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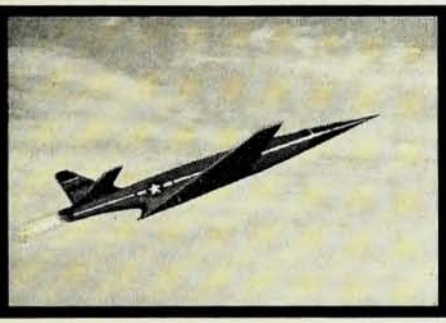

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of the system. Thus the particle can be "diffracted". In the present book de Broglie not only revives the theory, but works out its details and presents it in a compact fashion. For a very interesting and enlightening comparison of de Broglie's views with a number of others, I would like to refer the reader to W. Heisenberg's contribution to the book *Niels Bohr* (Niels Bohr and the Development of Physics), Pergamon Press, London, 1955.

Toward the end of the book there are several chapters giving a kind of résumé in which propositions are made about possible experimental proof for the distinction between the proposed theory of double solution as compared to the older interpretations. Whether these experimental tests are easily made or not, remains to be seen. Most of the propositions seem to be rather of the order which would be pretty hard to carry out at present.

Another and quite different aspect of the book is the psychology of the author. I was rather interested in seeing how such a great scientist like Louis de Broglie can be influenced by the opposition of a group of other physicists. He outlines, both in his foreword as well as in later parts of the book, how his original interpretation of the pilot wave guiding the particle was put in the background as a consequence of opposition on the part of his peers. The statistical interpretation prevailed for many years and apparently de Broglie, who had teaching obligations, felt that he could not pursue these views when such prominent physicists felt otherwise. It was not until David Bohm came forth with a revised intepretation in terms of hidden variables, that he felt that he should revitalize his ideas. That dependence on the opinion of his peers is rather a touching aspect of the whole book, and if for nothing else, I would recommend reading this very interesting document.

Progress in Cosmic Ray Physics. Vol. III. Edited by J. G. Wilson. 420 pp. (North-Holland, Holland) Interscience Publishers, Inc., New York, 1956. $10.50. *Reviewed by Serge A. Korff, New York University.*

Volume III of *Progress in Cosmic Ray Physics* follows the general arrangement of the previous volumes. Rather than being, as one might suppose from the title, a report on all of the important recent developments in the subject, it is a set of four specialized articles on particular phases of cosmic-ray investigation. It is written on a level intended for advanced students familiar with the field. Only if taken in conjunction with previous and subsequent volumes will it live up to the implications in its title.

Four topics are treated in this volume. These start with Chapter I on Extensive Air Showers, by K. Greisen. In this chapter he goes through the analysis of the cascade calculations, discusses the various approximations, the effects of fluctuations and scattering, and then describes the experiments and shows how the ob-