Elements of Classical Thermodynamics for Advanced Students of Physics. By A. B. Pippard. 165 pp. Cambridge U. Press, New York, 1958. Clothbound \$4.75; paperbound \$2.75. *Reviewed by C. Kittel, University of California.*

This is an excellently written and well-organized little book. The author has accomplished his announced intention to write a short account of the fundamental ideas of thermodynamics, excluding details of experimental methods and a multiplicity of illustrative examples. One might wish for a fuller account of magnetic energy, with a comparison of the two common definitions of the magnetic energy of a system, but it is difficult to keep any discussion of magnetic energy within bounds.

The book appears to have been written to provide an adjunct to advanced undergraduate lectures at Cambridge. One may regret as a teacher that the objectives of the book are so severely detached from the illumination and physical insight provided by statistical mechanics.

La Théorie de la Mesure en Mécanique Ondulatoire: Interprétation usuelle et Interprétation causale. By M. Louis de Broglie. 130 pp. Gauthier-Villars, Paris, France, 1957. Paperbound \$7.42. *Reviewed by J. C. Polkinghorne, University of Edinburgh.*

M. de Broglie is the grandfather of wave mechanics. However he feels that the statistical interpretation of the wave function makes the associated waves play too metaphysical a part. This book is the latest in a series of researches extending over the past thirty years in which he has developed an alternative theory that seeks to restore causality to mechanics and to give a greater measure of objective reality to the wave function.

The first three chapters give a summary of the usual interpretation of wave mechanics. In particular he gives a critical account of von Neumann's celebrated proof that causality can not be restored to the theory by the introduction of hidden variables. This conclusion is to be avoided by drawing a distinction between the initial state of the system, which contains indeterminacies due to probability distributions over the hidden variables, and the final state of the system after the measurement of some dynamical variable. The probability distribution for the values obtained by measuring this variable arises causally from the probability distributions in the initial state but in a manner that depends on the nature of the appropriate measuring apparatus. It is argued that there is no inconsistency in the fact that not all dynamical variables are simultaneously free from dispersion, because their probability distributions in fact correspond to different final states. In short, these probability distributions are a property not of the unique initial state, as in conventional theory, but of the diverse final states.

His theory of the wave function is based on his discovery of *la double solution*, that is that to every regular solution, ν, of the Schrödinger equation there corresponds a solution u_0 having the same "lines of flow", along one of which moves a point singularity. The association of these two functions in a physical problem is thought to arise from $u_0 + \nu$ being the asymptotic form of the solution of an equation having nonlinear terms large in the neighborhood of the singularity of u_0. This singularity represents the position of the particle. On the other hand ν is to represent the probability distribution of the position of the particle. These two contradictory notions are to be reconciled by the introduction of small, frequent, arbitrary perturbations that displace the singularity to give the distribution. The discussion of this important point is the least satisfactory part of the book.

In the closing chapters M. de Broglie develops his theory of measurement. He stresses that all our measurements on elementary particles arise from some macroscopically observable localized phenomenon, e.g., a blob on a photographic plate. This enables him to assign a special place to probability distributions over positions as opposed to other dynamical variables. In his penultimate chapter he discusses the interaction of two particles. Since his theory preserves, of course, the uncertainty relations (though giving them a rather different metaphysical interpretation) it would have been interesting to see how he would discuss the Einstein, Rosen, and Podolsky paradox.

This is an engagingly written, stimulating book.

Angular Momentum in Quantum Mechanics. Vol. 4 of Investigations in Physics. By A. R. Edmonds. 146 pp. Princeton U. Press, Princeton, N. J., 1957. \$3.75. *Reviewed by H. Mendlowitz, National Bureau of Standards.*

So many problems in modern physics require for their solution a knowledge of the quantum mechanical properties of angular momentum that it should seemingly invite a more thorough treatment in the standard texts. However, most textbooks are written with certain space limitations and so an adequate treatment must be looked for elsewhere. Until recently, except for Condon and Shortley (*Theory of Atomic Spectra*, Cambridge University Press, 1935) there was no book which emphasized angular momentum in quantum mechanics. A few years ago, however, Feenberg and Pake published *Notes on the Quantum Theory of Angular Momentum* (Addison-Wesley Publishing Company, 1953). As the title implies, it was a short treatment, but still very nice to have in one's library. Another difficulty, in addition to the lack of pedagogical literature, was that many contributors to this field would use their own approaches and notations. The confusion of the novice would be compounded by learning of the existence of the Racah coefficient after having "mastered" the use of the Wigner coefficients and then find that the definitions would depend on the various authors.

The author attempts to present the quantum mechanical theory of angular momentum in a rather complete way. He begins with an elementary introduction