

waves with or without phase dependence. The quantum-statistical description of coherence had not been widely applied to various optical problems until about twelve years ago when the Twiss caused one to consider the concept on a broader and more fundamental basis.

The author has performed a very great service to the physics community by bridging the classical concepts of coherence of electromagnetic radiation with the quantum mechanical and statistical treatments. His words are few but well chosen. A student with a background in statistical mechanics and second quantization should have no difficulty in following the text. The format is such that one can go in a relatively short time from a basic knowledge of classical coherence to a fairly sophisticated understanding of the quantum-mechanical treatment. The major drawback for the US audience is that the book is written in French.

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Statistical Theory Of Signal Detection

By Carl W. Helstrom
(2nd edition) 467 pp. Pergamon,
New York, 1968. \$12.00

Almost any physical measurement is bound to include some kind of random error or unwanted information. Usually the unwanted information is in the form of random fluctuations or "noise." The detection and resolution of signals in this random noise, and the estimation of signal parameters, are what this book is all about.

The author, Carl W. Helstrom, professor of applied electrophysics at the University of California, San Diego, is well known to engineers involved in signal processing: His present book is revised and enlarged from the 1960 edition.

Much of it has been rewritten (including an updated bibliography), although the approach taken in the first edition was retained. However, the treatment of several topics has been modernized, simplified and made more efficient. In particular, the likelihood ratio, now prominently appearing in recent literature, has been used throughout the book instead of the repeated use of sampling theory.

New topics have also been included such as: digital communications, and the sequential, nonparametric and adaptive forms of detection. The treatment of the ambiguity function and the detection of stochastic signals have been expanded and brought up to date.

One need not be a radar specialist or a communications theorist to find this book extremely useful. Directed at the mathematical-minded engineer, the book consists of an elementary and heuristic treatment of those aspects of noise theory that are most useful in a study of the detection of electrical signals.

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Solid State Physics

By J. S. Blakemore
391 pp. Saunders,
Philadelphia, 1969. \$13.50

There is certainly no shortage today of books on solid-state physics of all levels of sophistication, detail of treatment and degree of pedagogical wisdom. Unfortunately, few, if any of them can be used as the only text for a particular undergraduate, not to speak of a graduate, course.

The newest of these is the present slender volume that is aimed at a one-semester senior course. Its main characteristic is the avoidance of mathematics and the resulting need for qualitative arguments and deductions. This is not always an easy task and the results are sometimes disappointing.

The author, who is professor at Florida Atlantic University, wisely did not attempt to cover the whole of the basic solid-state physics but chose several topics such as lattice dynamics, electrons in metals and so on, and treated them in some detail. The level of the various chapters is not even; some are done very well and others leave something to be desired. Particularly gratifying is the brief discussion of the Kronig-Penney model, which some authors consider unimportant. The sections dealing with thermal conduction, lattice dynamics and semiconductors are particularly well done.

This is also one of the rare books in which the recent Tosi and Fumi ionic radii are used instead of the dubious



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