

Applied Physics Letters

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I also found the treatment of the optical properties of cholesterics to be an insightful and humane approach to a subject with potential for mathematical complexity. I especially enjoyed the discussion of light scattering from cholesterics and comparison with C. G. Darwin's dynamical theory of x-ray diffraction and the anomalous increase in x-ray transmission near Bragg reflections (the Borrmann effect). The chapter on smectics contains even less than de Gennes's chapter in spite of being written three years later; however, this is an area of relatively little understanding and rapid progress so it is perhaps better saved for a second edition of the book.

Overall, Chandrasekhar's monograph is well written, remarkably free of typographical errors, and especially for the uninitiated, often easier to follow than de Gennes. I recommend that both books should be in institutional collections and the personal libraries of researchers interested in the fundamental physics of this interesting state of matter.

* * *

J. David Litster has been involved in light scattering and x-ray scattering studies of liquid crystals for about eight years. He is a professor of physics at the Massachusetts Institute of Technology.

Thermal Conduction in Solids

R. Berman

193 pp. Oxford U.P., New York, 1976.
\$20.50

Soon after World War II, the late Professor Sir Francis Simon initiated research at Oxford on the low-temperature thermal conductivity of insulators, in the hope that this property would yield information about defects in non-metals in the same way that electrical conductivity was being used to study defects in metals. Robert Berman has carried out such measurements at the Clarendon Laboratory for three decades. His studies and those of other groups, as well as the theoretical work to interpret these measurements, have yielded a rich harvest.

Berman, in this rather compact book, has described the microscopic physical processes involved and discussed the essential experimental results and their interpretation. A large part of the book is devoted to heat conduction by phonons in insulators, with special attention given to the role of normal three-phonon processes, and to the important defects that reduce the thermal conductivity. An extensive section on amorphous solids discusses this difficult subject in depth, as well as can be done at present. Electronic thermal conduction in metals is treated, including the role of electron-phonon

Umklass processes and the low-temperature Lorenz ratio. The lattice component of thermal conduction in metals and alloys is discussed, but there is only the briefest treatment of superconductors, and semiconductors are covered mainly with respect to some low-temperature properties.

Although ordinary and high temperatures are certainly mentioned, the emphasis is on low-temperature properties, and on the special solids that have played a large role as models to illustrate physical principles (solid helium, lithium fluoride and other alkali halides, monovalent metals, but diamond is surprisingly omitted). The technically important materials and higher temperatures receive less attention, and this is perhaps as it should be in this small volume, which emphasizes the basic interaction processes and their illustrations. The book would therefore be a good companion text in a basic solid-state physics course, covering in depth a field that requires a knowledge of many solid-state principles. Those interested in thermal conduction per se would find J. E. Parrott and Audrey D. Stuckes's *Thermal Conductivity of Solids* (Pion, London 1975) more relevant, since it covers more materials, particularly semiconductors and magnetic materials. Even though these books have much in common, a serious student of the field could read them both with profit. Berman's book will be of special value for his skillful exposition of the basic physical principles.

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Introduction to the Renormalization Group and to Critical Phenomena

P. Pfeuty, G. Toulouse
190 pp. Wiley-Interscience, New York,
1977. \$19.95

During the last seven years renormalization-group theory has made a strong impact on the thinking and methodology of theoretical physics. The area of most extensive applications of renormalization-group ideas is that of critical phenomena. This field witnessed quite an outburst of research activity, with many workers making original and innovative contributions.

Pierre Pfeuty and Gérard Toulouse, professors of physics at the Université de Paris Sud, Centre d'Orsay, have both done significant work in the field. Pfeuty's main contributions concern studies of quadratic anisotropy and mapping of classical models to quantum ones at lower dimensionality. Toulouse studied the

analytical continuation of the order-parameter dimensionality to the value $n = -2$ and considered the systematic variation of exponents in the (n, d) plane.

Although the field has produced a number of review articles, so far only a relatively small number of books has been published. Therefore one can only welcome the appearance of "a truly introductory book ... as thin as possible" containing a "clear outline of the simplest ideas."

The book is thin indeed. Its brevity, together with the clear and concise style, make for enjoyable reading. It covers a

wide range of topics and applications, including discussions of the dimensionality n of the order parameter and its relation to the excluded-volume problem, percolation and the spherical model, derivation and discussion of the Ginzburg criterion, and the characteristic dimensionality (above which exponents become classical) for various models. A brief and clear presentation of covariance under dilatations and its relation to scaling and homogeneity is followed by introduction of the renormalization-group ideas, with a strong emphasis on the topology of renormalization group trajectories, and a

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