drawing examples that illustrate important principles of statistical mechanics. For example, he devotes an entire chapter to echo phenomena, and another chapter on models with continuous symmetry presents a comprehensive overview of our present knowledge of the *XY* model and its realizations. Not all the "gems" pertain to such specialized topics. For example, Ma's chapter on phase equilibria presents the best picture of the growth of water droplets that I have read to date.

As remarked at the outset, this book is less a graduate text and more a supplement for the student well trained in quantum mechanics and condensed matter physics who wishes more challenge and more up-to-date topics than a typical graduate-level course affords. However, the instructor who adopts the book as a primary text will welcome the generous number of problems (some straightforward and others not) that appear at the end of each of the 30 chapters. Some of these problems are real beauties (such as "Show that in a collective model of carbon atoms, with a rigorous proof we can rule out the existence of diamond"), while others (such as "Derive all the results in Sec. 9.1") reflect the fact that the reader is asked to do a great deal of hard work to follow the text.

Instructors accustomed to including the dozen or so basic topics that fill the pages of most texts may be surprised to find some of those given rather brief treatment here. Not only are some traditional topics omitted, but so also are ones close to Ma's own fields of expertise. Thus critical phenomena and the renormalization group approach pioneered by Kenneth Wilson, Leo Kadanoff, Michael Fisher and others are almost entirely absent. Also left out are the connections with path integrals and the sort of connections between particle physics and statistical mechanics so nicely discussed in *Quarks, Gluons and Lattices* by Michael Creutz (Cambridge U. P., New York, 1983).

Moreover, some instructors may experience difficulty in adapting class lectures to the particular chapter ordering that Ma adopts; for example, a nice chapter on probability appears as chapter 10 in part III—not at the beginning, which is the traditional placement of this material in many classroom courses.

This book could potentially take a place alongside the classic monograph of Landau and Lifshitz as a valuable reference tool. With statistical mechanics playing an increasing role at the frontiers of condensed matter physics, Ma's book will almost certainly provide a challenge to the intellects of a growing number of active researchers.

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The Electrical Resistivity of Metals and Alloys

Paul L. Rossiter
Cambridge U. P., New York, 1987. 434 pp. $79.50 hc
ISBN 0-521-24947-3

Our knowledge and detailed understanding of the electrical resistivities of metals and alloys has expanded greatly in the past two decades, due both to careful new measurements on a wide variety of systems and to theoretical advances. In pure metals, the dominant electron–phonon contribution to the temperature-dependent resistivity of a simple metal such as potassium has been derived with no adjustable parameters and shown to be in excellent agreement with experimental data. Real progress has been made in understanding topics such as electron–electron scattering, electron–surface scattering and electron–dislocation scattering. In alloys, self-consistent coherent potential approximation calculations have been shown to reproduce the impurity resistivities of some disordered alloys (for example, Ag–Pd) over most of the impurity concentration range with input of only the atomic numbers and the alloy lattice parameters. Advances have also been made in understanding effects of such phenomena as short-range and long-range order, clustering and phase separation; and progress has been made in understanding the magnetic behavior of alloys. Much, however, still remains to be done.

Paul Rossiter, a theorist who has contributed to our understanding of the effects of microstructural deviations from perfection on the electrical resistivities of both magnetic and nonmagnetic alloys, has summarized the work of many people in his book, which is designed primarily for researchers studying the resistivities of alloys. A variety of books and review articles describe basic scattering theory and its applications to the resistivities of pure metals and to some properties of alloys, and data collections are available for both metals and alloys. However, no other text so thoroughly covers the range of theoretical approaches needed specifically for alloys, or applies them to so wide a variety of alloys: dilute and concentrated; atomically ordered and disordered; structurally homogeneous, spinodally decomposed and precipitated; magnetic and nonmagnetic; and so on.

Rossiter begins with a brief review of electronic states in metals and the Boltzmann transport equation, then more extensively reviews how to characterize the atomic configurations of ordered and disordered alloys and the structures of magnetic alloys. He concludes his background presentation with a discussion of scattering theory in simple metals and alloys, including the scattering matrix and pseudopotentials. The main portion of the text develops more specialized concepts and applies both these and the general concepts to the properties of simple and complex metals and their alloys, including magnetic and nearly magnetic alloys. The book concludes with reviews up to 1985 of three topics of active research interest: resistivity at the critical point, highly resistive materials and amorphous metals. The latter two reviews are good up to the date noted, but are no longer as current as the rest of the text, due to recent theoretical advances in topics such as localization and electron–electron interactions in highly disordered materials.

The text is written clearly and carefully, at a graduate level. The author has done a good job of explaining what he is doing at each stage, and why. Familiarity with quantum mechanics is essential, and a solid-state physics course at the level of Neil Ashcroft and David Mermin's *Solid State Physics* (Holt, Rinehart and Winston, New York, 1976) would be highly desirable as background. Those with even a peripheral interest in the resistivities of metals and alloys will want their libraries to own this book. Those of us with more specific interests will find it very useful for quickly learning about any one of the many complex phenomena present in alloys, for examples of applications of various theoretical approaches, and for a good collection of references to the original literature.

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Experimental Techniques in High Energy Physics

Thomas Ferbel
Addison–Wesley, Reading, Mass., 1987. 678 pp. $44.95 hc ISBN 0-201-11487-9

Progress in high-energy physics has been greatly boosted by the development over the years of a sophisticated and diverse arsenal of experimental