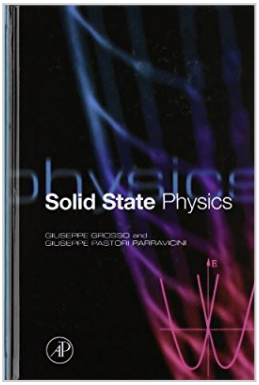

Solid State Physics

By Giuseppe Grosso, Giuseppe Pastori Parravicini

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Although there are many books published in solid state physics, there is a wide gap between the active field of research and the concepts
traditionally taught in solid state courses. This book fills that gap. The style is tutorial, simple, and completely self-contained.
Solid State Physicsexplains to readers the newest advances in the area of condensed matter physics with rigorous, but lucid mathematics. Examples are an integral part of the text, and they are carefully designed to apply the fundamental principles illustrated in the text to currently active topics of research.

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- Provides an in-depth treatment of current research topics
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Editorial Review

Review
"... A very nice book ... I would personally buy it"
- Professor Henry Ehrenreich, Harvard University

Preface:

This textbook has developed from the experience of the authors in teaching the course of Solid State Physics to students in physics at the Universities of Pavia and Pisa. The book is addressed to students at the graduate and advanced level, both oriented toward theoretical and experimental activity. No particular prerequisite is required, except for the ordinary working knowledge of wave mechanics. The degree of difficulty increases somewhat as the book progresses; however, the contents develop always in very gradual steps.

The material presented in the book has been assembled to make as economical as possible the didactical task of teaching, or learning, the various subjects. The general organization in chapters, and groups of chapters, is summarized in the synoptic table of contents. The first three chapters have a propaedeutic nature to the main entries of the book. Chapter IV starts with the analysis of the electronic structure of crystals, one of the most traditional subjects in solid state physics; chapters V and VI concern the band theory of solids and a number of specific applications; the concepts of excitons and plasmons are given in chapter VII. Then, in chapters VIII and IX, the adiabatic principle and the interdependence of electronic states and lattice dynamics are studied. Having established the electronic and vibrational structure of crystals, the successive chapters from X to XIV describe several investigative techniques of crystalline properties; these include scattering of particles, optical spectroscopy, and transport measurements. Chapters XV, XVI and XVII concern the electronic magnetism of tendentially delocalized or localized electronic systems, and cooperative magnetic effects. The final chapter is an introduction to the world of superconductivity.

From a didactical point of view, an effort is made to remain as rigorous as possible, while keeping the presentation at an accessible level. In this book, on one hand we aim to give a clear presentation of the basic physical facts, on the other hand we wish to describe them by rigorous theoretical and mathematical tools. The technical side is given the due attention and is never considered optional; in fact, a clear supporting theoretical formalism (without being pedantic) is essential to establish the limits of the physical models, and is basic enough to allow the reader eventually to move on his or her own legs, this being the ultimate purpose of a useful book.

The various chapters are organized in a self-contained way for the contents, appendixes (if any), references, and have their own progressive numeration for tables, figures and formulae (the chapter number is added when addressing items in chapters differing from the running one). With regards to the references, these are intended only as orientative, since it is impossible to mention, let alone to comment on, all the relevant contributions of the wide literature. Since the chapters are presented in a (reasonably) self-contained way, the lecturers and readers are not compelled to follow the order in which the various subjects are discussed; the chapters, or group of chapters, can be taken up with great flexibility, selecting those topics that best fit personal tastes or needs. We will be very interested and very pleased to receive (either directly or by correspondence) comments and suggestions from lecturers and readers.

The preparation of a textbook, although general in nature, requires also a great deal of specialized information. We consider ourselves fortunate for the generous help of the colleagues and friends at the Physics Departments of the University of Pavia, University of Pisa, and Scuola Normale Superiore of Pisa; they have contributed to making this textbook far better by sharing their expertise with us. Very special thanks are due to Emilio Doni, who survived the task of reading and commenting on the whole preview-manuscript. Several other colleagues helped with their critical reading of specific chapters; we are particularly grateful to Lucio Claudio Andreani, Antonio Barone, Pietro Carretta, Alberto Di Lieto, Giorgio Guizzetti, Franco Marabelli, Liana Martinelli, Attilio Rigamonti. Many heartfelt thanks are due to Saverio Moroni for his right-on-target comments.

Before closing, we wish to thank all contributors and publishers, who gave us permission to reproduce their illustrations; their names and references are indicated adjacent each figure. We wish also to express our gratitude to Gioia Ghezzi for her encouragement, to Serena Bureau, Manjula Goonawardena, Cordelia Sealy and Bridget Shine for their assistance in the preparation of the manuscript. Last, but always first, we thank our families for their never ending trust that the manuscript would eventually be completed and would be useful to somebody.

Pavia and Pisa, May 1999

Users Review

From reader reviews:

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