

RECENSIONES

BECKER—SAUTER: Theorie der Elektrizität

Band 1. Einführung in die Maxwellsche Theorie. Elektronentheorie. Relativitätstheorie
21. völlig neubearbeitete Auflage, B. G. Teubner, Stuttgart, 1973

Es ist schon fast ein Jahrhundert vergangen, seit die erste Fassung des Buches durch AUGUST FÖPPL erschien. In den Händen der würdigen und kompetenten Nachfolger — es seien nur ABRAHAM, und BECKER erwähnt — sind der Inhalt und die Methode immer auf neuesten Stand gebracht. Bewahrung der Traditionen — Berücksichtigung der Ergebnisse der neuesten Forschung: diese sind die kennzeichnenden Merkmale des Buches, die es zu einem Begriff machten.

Die vorliegende Auflage ist die 21-ste: allein diese Zahl spricht für sich. Sie ist gründlich überarbeitet, zum grössten Teil neu geschrieben. Alle Veränderungen sind nach meiner Meinung zu begrüssen — vielleicht mit der einzigen Ausnahme der “i-freien” Behandlung der speziellen Relativitätstheorie. Besonders halte ich die ausführlichere Darstellung der Energieverhältnisse, den Zusammenhang mit der Thermodynamik für nützlich, die trotz ihrer Wichtigkeit oft vernachlässigt wird. Methodisch möchte ich die Berücksichtigung der Vertiefung der mathematischen Kenntnisse der Leser als gelungen hervorheben.

Dieser erste Band behandelt auf 310 Seiten in 12 Kapiteln die Gesetze der Elektrostatik, des elektrischen Stromes, des magnetischen Feldes, der quasistationären Vorgänge der elektromagnetischen Wellen und der Relativitätstheorie. Dazu kommen noch ein Kapitel über Vektor- und Tensorrechnung in dreidimensionalem Raum, Formelzusammenstellung und ein Kapitel über die Lösung der Aufgaben. Hier möchte ich bemerken, dass die geschickte Auswahl der Aufgaben die Nutzbarkeit des Buches beträchtlich erhöht.

Es kann die Frage gestellt werden, und manchmal wird sie auch tatsächlich aufgeworfen, inwiefern die klassische Elektronentheorie in einer modernen Darstellung ihren Platz finden kann. Didaktisch halte ich die Heranziehung der bildhaften Beschreibung der Erscheinungen der Mikrophysik für fast unvermeidlich: unsere Kenntnisse der atomaren Welt führen, nicht nur historisch, sondern methodologisch gesehen, auch heute durch die klassischen Vorstellungen der Elektronentheorie. Durch das so begründete Wissensmaterial werden eben die in weiteren Bänden behandelten modernsten Theorien erst zugänglich.

Im Zusammenhang mit dem Inhalt der weiteren Bände möchte ich hier eine Schwierigkeit erwähnen. Es scheint nämlich fast unmöglich bei einem dreibändigen Buch alle Bände gleichzeitig zu überarbeiten und so Methode und Inhalt gegeneinander vollständig abzustimmen. Mit dem in 1963 erschienenen zweiten und im 1969 erschienenen dritten Band fand auch dieses Problem eine befriedigende Lösung.

Für jeden, der sich in die Grundlagen der klassischen Elektrodynamik vertiefen will, stellt das Buch einen vertrauenswerten Wegweiser dar.

K. SIMONYI

R. C. NEWMAN: Infra-red Studies of Crystal Defects

Taylor and Francis Monographs on Physics. Editor B. R. Coles, Consultant Editor: Sir Neville Mott, F. R. S., Taylor and Francis Ltd. London, 1973

The book deals with the basic problem of detecting and determining the presence and concentration of various impurities in alkaline earth fluorides, alkali halides, silicon, germanium and compound III-V semiconductors. Whereas the investigation of some particular impurities can be successfully carried out by well developed experimental techniques such as electrical conductivity or radioactive tracer methods, infra-red spectroscopy has become increasingly important to learn more about the interactions between various impurities and of impurities with intrinsic defects if more than one impurity is present. A relatively high concentration of impurities may give rise to complicated complexes, which can be revealed only spectroscopically. The purpose of this monograph is to show how infra-red absorption resulting from localized modes of vibration of defects may give useful informations, and enlarge our knowledge on the effects of heat treatment, diffusion, radiation damage and implantation in crystals.

The monograph consists of an introduction and eight chapters dealing with infra-red absorption from a lattice containing point defects, vibrations of an anharmonic oscillator, localized vibrations of hydrogen and deuterium in the alkaline earth fluorides, hydrogen ions in alkali halides, one-phonon infra-red absorption in silicon, radiation damage in silicon, one-phonon absorption in germanium and informations which can be gained of compound III-V semiconductors.

A detailed mathematical treatment of the theory of the vibrations of imperfect lattice is not included, nevertheless the symmetry relations of the oscillators (spherical, cubic, trigonal and tetragonal symmetry) are properly dealt with. The basic ideas of lattice dynamics are reviewed. In the referee's opinion this could have been omitted, since the monograph is apparently written for advanced readers, and lattice dynamics may be found in textbooks anyway.

Though the monograph is intended mainly for research workers, the theory is clearly presented and can be easily followed. The book is certainly stimulating for solid state physicists and chemists who wish to obtain a deeper insight into the lattice dynamics involved with the presence of impurities and complexes formed by them.

Z. MORLIN

P. J. GOODHEW: Electron Microscopy and Analysis

The Wykeham Science Series, General Editors: Sir Neville Mott, F. R. S. and G. R. Noakes
Wykeham Publications Ltd., London and Winchester, 1975

The book gives an introductory survey on the principles and experimental techniques of electron microscopy and microanalysis by means of electron optics. It is built up of six chapters, the first two dealing with the basic ideas of electron optics and the interaction of electrons with matter including electron diffraction. The second chapter also includes a description of the properties, generation and deflection of a beam of electrons. The third and fourth chapters describe transmission and scanning electronmicroscopy, the various methods of specimen preparation and examples of application. The fifth chapter discusses the analytical informations which can be obtained from an electron microscope by means of electron diffraction, secondary electrons and X-ray generation. Finally, electronoptical methods are compared with other techniques.

The book is written to give a summary in the field of up-to-date electronmicroscopy and can be easily understood with some basic background in electronphysics. The book is intelligible, and may be recommended also to chemists, biologists and medical researchers who apply or wish to apply electronoptical methods in their research. Extremely good electronmicrograms, diffraction patterns and drawings help the reader to get well acquainted with the subject.

Z. MORLIN

A. M. CAMPBELL and J. E. EVETTS: Critical Currents in Superconductors

Monographs on Physics No 4. Taylor and Francis Ltd. London

The authors give a wide range survey on the topic of the critical currents in type II superconductors, limiting the contents to those aspects of type II superconductivity which relate directly to flux vortex pinning and transport currents. So the question of flux jumps and instabilities, for instance, are not dealt with.

The nature of the mixed state, the properties of the flux vortex lattice, the driving force and its relation to the transport currents and flux flow are discussed first. The solution of the critical state equation and the distribution of the current are then studied in situations where the pinning force is known. The summation of pinning forces and the various types of vortex-defect interactions are investigated in the next sections.

Experimental methods and results are also treated, such as, for example, the measurement of the vortex structures and Ginzburg—Landau parameters, the experimental confirmation of the critical state model, the measurement of the critical current density and other pinning parameters. Finally a critical assessment of the current agreement between theory and experiment are given.

Some publications that have a direct bearing on subjects treated here are also listed as an addendum to references. These had been published before this book was ready but are not discussed in it any more.

The monograph can be recommended to graduates and researchers active in the field of superconductivity.

I. SKOPÁL

A. BOHR and B. R. MOTTELSON: Struktur der Atomkerne

Akademie-Verlag, Berlin, 1975

This brilliant piece of work of the 1976 Nobel-prize winners is the first volume of a large-scale undertaking, which is planned to cover the topics of single-particle motion in nuclei, nuclear deformations and nucleonic correlations.

The present volume deals with nuclear structure, but the authors also include a summary of the symmetry properties, relevant to nuclear systems. The main theme of the book is nuclear independent-particle motion, leading naturally to single-particle and single-hole configurations, providing detailed and quantitative evidence on independent-particle motion.

An important and valuable feature of the book is the division of the material into three parts: text, illustrative examples and appendices. The text gives a systematic development of the subject, while comparison to experiments and discussion of empirical data is usually placed in sections labelled "Illustrative Examples". The appendices, dealing among others with angular momentum algebra, elements of statistical mechanics, the formulation of electromagnetic and β -decay make the book reasonably self-contained.

The clarity of presentation and the pedagogical care of the authors will make this book extremely useful not only for experimental and theoretical nuclear physicists, but also for researchers of other fields of physics and for graduate students.

J. NÉMETH

J. M. BLAKELY: Introduction to the Properties of Crystal Surfaces

International Series on Materials Science and Technology, Volume 12.
Pergamon Press, Oxford, 1973

The properties of the surface always play a more or less important role in all phenomena occurring in materials. Thus the physics of surfaces is a very interesting part of physics, subject of many books and of many international symposia.

The Introduction to the Properties of Crystal Surfaces by Professor J. M. BLAKELY examines in detail the atomic and electronic structure in the surface region. The treatment

s suitable for senior undergraduates or postgraduates. For this reason the book offers only a general introduction to the subject. But exactly this generality is its high advantage, because the wide range of topics from the macroscopic thermodynamic aspects of the surfaces to the details of the surface electronic structure offers an easily accessible up-to-date knowledge on surface phenomena, such as adsorption, experimental measurements of surface tension in solids, surface relaxation, surface defects, surface atom vibrations, various experimental methods in surface studies and so on. Those who wish to go beyond the scope of this very useful book can study some of the books recommended in the general references.

G. TURCHÁNYI