



LECTURE NOTES IN PHYSICS – Vol. 48

ELECTRODYNAMICS OF HIGH-TEMPERATURE SUPERCONDUCTORS

Alan M Portis

World Scientific

Electrodynamics Of High Temperature Superconductors

A S Alexandrov, Nevill Mott



Electrodynamics Of High Temperature Superconductors:

Electrodynamics of High-temperature Superconductors Alan M. Portis, 1993 These lectures are concerned with the application of high temperature superconductors to both passive and active high frequency devices The central issue addressed is the electrodynamics of granular superconductors particularly where grain boundaries either natural or synthetic act as Josephson weak links Grain boundaries are responsible for residual dissipation and for unwanted dependence of the electromagnetic properties on ambient magnetic fields and on elevated power level Properly controlled similar weak links are the key to high sensitivity dc and rf SQUIDS at readily accessible temperatures and to modulators mixers and detectors Such structures may conveniently lead to superconductive electronic devices as well as coherent sources of radiation in the very far infrared Handbook of High -Temperature Superconductivity J. Robert Schrieffer, 2007-03-20 Since the 1980s a general theme in the study of high temperature superconductors has been to test the BCS theory and its predictions against new data At the same time this process has engendered new physics new materials and new theoretical frameworks Remarkable advances have occurred in sample quality and in single crystals in hole and electron doping in the development of sister compounds with lower transition temperatures and in instruments to probe structure and dynamics Handbook of High Temperature Superconductivity is a comprehensive and in depth treatment of both experimental and theoretical methodologies by the the world s top leaders in the field The Editor Nobel Laureate J Robert Schrieffer and Associate Editor James S Brooks have produced a unified coherent work providing a global view of high temperature superconductivity covering the materials the relationships with heavy fermion and organic systems and the many formidable challenges that remain **Electrodynamics of High Temperature Superconductors** Dandong Xu, 1995

High Temperature Superconductivity - Proceedings Of The International Seminar Victor L Aksenov, Nickolai N Bogolubov Jr, N M Plakida, 1990-01-01 This proceedings contains the works of both experimental and theoretical aspects of high temperature superconductivity with special emphasis on the results obtained by nuclear methods e g neutron scattering SR positron annihilation and Mossbauer spectroscopy Low Energy Electrodynamics of High Temperature Superconductors Seyed Iman Mirzaei, 2013 Electrodynamic Theory of Superconductors Shu-Ang Zhou, 1991 This book presents a unified and comprehensive theoretical treatment of electromagnetic thermal and mechanical phenomena in superconductors Introduces basic concepts and principles with particular emphasis on general methodology

Electrodynamics of Solids and Microwave Superconductivity Shu-Ang Zhou, 1999-07-23 Die Elektrodynamik von Festkörpern ist ein interdisziplinäres angelegtes Thema zu dem elektromagnetische Phänomene mechanische Bewegungen und Verformungen sowie Wärmeleitungen in festen Stoffen gleichermaßen beitragen Dieses einführende und dennoch umfassende Lehrbuch zur Theorie der Elektrodynamik und Halbleitertechnik richtet sich an Physiker ebenso wie an Elektrotechniker Maschinenbauer und Studenten der einschlägigen Fachrichtungen 08 99 **Studies of Nonlinear Electrodynamics of**

High-temperature Superconductors, 1991 *Physical Properties Of High Temperature Superconductors* V Donald M Ginsberg, 1996-04-20 The publication of Volume V of *Physical Properties of High Temperature Superconductors* is expected in March 1996. It will have chapters of interest for both fundamental studies and applied research. The topics discussed are expected to include the electromagnetic response, penetration depth and surface resistance, local lattice distortions, the influence of vortex fluctuations on macroscopic behavior, the properties of superlattices and the symmetry of the superconducting order parameter.

High Temperature Superconductors And Other Superfluids A S Alexandrov, Nevill Mott, 1994-11-24 Written by eminent researchers in the field, this text describes the theory of superconductivity and superfluidity starting from liquid helium and a charged Bose gas. It also discusses the modern bipolaron theory of strongly coupled superconductors, which explains the basic physical properties of high temperature superconductors. This book will be

Engineering Electrodynamics Janusz Turowski, Marek Turowski, 2017-12-19 Due to a huge concentration of electromagnetic fields and eddy currents, large power equipment and systems are prone to crushing forces, overheating, and overloading. Luckily, power failures due to disturbances like these can be predicted and/or prevented. Based on the success of internationally acclaimed computer programs such as the authors' own RNM 3D Engineering Electrodynamics, *Electric Machine Transformer and Power Equipment Design* explains how to implement industry-proven modeling and design techniques to solve complex electromagnetic phenomena. Considering recent progress in magnetic and superconducting materials, as well as modern methods of mechatronics and computer science, this theory and application-driven book analyzes materials structure and 3D fields, taking into account magnetic and thermal nonlinearities. Supplies necessary physical insight for the creation of electromagnetic and electromechanical high power equipment models. Describes parameters for electromagnetic calculation of the structural parts of transformers, electric machines, apparatuses, and other electrical equipment. Covers power frequency 50/60 Hz worldwide and US equipment applications. Includes examples, case studies, and homework problems.

Engineering Electrodynamics *Electric Machine Transformer and Power Equipment Design* provides engineers, students, and academia with a thorough understanding of the physics principles, modeling, and design of contemporary industrial devices.

Electrodynamics of Solids Martin Dressel, George Grüner, 2002-01-17 The authors of this book present a thorough discussion of the optical properties of solids, with a focus on electron states and their response to electrodynamic fields. A review of the fundamental aspects of the propagation of electromagnetic fields and their interaction with condensed matter is given. This is followed by a discussion of the optical properties of metals, semiconductors, and collective states of solids such as superconductors. Theoretical concepts, measurement techniques, and experimental results are covered in three interrelated sections. Well-established mature fields are discussed, for example, classical metals and semiconductors, together with modern topics at the focus of current interest. The substantial reference list included will also prove to be a valuable resource for those interested in the electronic

properties of solids The book is intended for use by advanced undergraduate and graduate students and researchers active in the fields of condensed matter physics materials science and optical engineering High-Temperature Superconductors

Rainer Wesche, 2024-08-15 This book describes the status of research and development in the field of high temperature superconductivity reached in the mid of the twenty twenties Starting from the milestones in the history of superconductivity the main characteristics of the superconducting state are presented Special physical properties of high temperature superconductors are highlighted Main classes of superconducting materials are introduced with the focus on high temperature superconductors cuprates and iron based superconductors and MgB₂ Besides the material properties relevant for applications the deposition of superconductor films and the manufacture of high temperature superconductor wires are described An outlook toward the future is included covering potential applications of high temperature superconductors in magnet technology and the electric power system **Studies of Nonlinear Electrodynamics of High-temperature**

Superconductors Quan-Chiu Harry Lam, 1991 *Electrodynamics of Quantum-Critical Conductors and Superconductors* Uwe Santiago Pracht, 2017-12-14 This thesis presents and discusses recent optical low temperature experiments on disordered NbN granular Al thin films and the heavy fermion compound CeCoIn₅ offering a unified picture of quantum critical superconductivity It provides a concise introduction to the respective theoretical models employed to interpret the experimental results and guides readers through in depth calculations supplemented with supportive figures in order to both retrace the interpretations and span the bridge between experiment and state of the art theory **Handbook of**

Superconducting Materials David A. Cardwell, David S. Ginley, 2003 *Introduction to Superconductivity* Michael Tinkham, 2004-01-01 Well known for its accessibility to graduate students and experimental physicists this volume emphasizes physical arguments and minimizes theoretical formalism The second edition of this classic text features revisions by the author that improve its user friendly qualities and an introductory survey of latter day developments in classic superconductivity enhances the volume's value as a reference for researchers Starting with a historical overview the text proceeds with an introduction to the electrodynamics of superconductors and presents expositions of the Bardeen Cooper Schrieffer theory and the Ginzburg Landau theory Additional subjects include magnetic properties of classic type II superconductors the Josephson effect both in terms of basic phenomena and applications and of the phenomena unique to small junctions fluctuation effects in classic superconductors the high temperature superconductors special topics such as the Bogoliubov method magnetic perturbations and gapless superconductivity and time dependent Ginzburg Landau theory and nonequilibrium superconductivity 1996 edition Studies of High Temperature Superconductors Anant Narlikar, 1996 Six chapters report recent research on high temperature superconductors from the perspectives of radio frequency investigations microwave surface impedance and device applications mixed state and superconducting fluctuations in single crystals circuits and systems microwave and radio frequency **Scientific and Technical Aerospace Reports**, 1995

Magnetic Properties Of Josephson Junction Networks: An Introduction Roberto De Luca, 2020-06-19 The study of the magnetic response of Josephson junction networks can be useful in outlining the behaviour of existing superconducting electronic devices in conceiving new types of magnetic sensors and in describing the low field magnetic properties of granular superconductors In the present work a wide introduction to Josephson junction networks is provided The Josephson equations are introduced by means of Ohta's semi classical model and a simple description of the magnetic response of multiply connected superconductors is given The analysis of the magnetic response of Josephson junction networks is gradually built up from simple interferometers to three dimensional lattices of superconducting devices The analytic description of these systems may be applied when fabricating ultrasensitive vectorial magnetic field sensors and interpreting the low field magnetic properties of superconducting granular systems

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