

[Books] Physical Kinetics Volume 10 Course Of Theoretical Physics S

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Course Of Theoretical Physics, Vol.10 Physical Kinetics-Landau 10 2010-01-01

Physical Kinetics-L. P. Pitaevskii 2012-12-02

This volume is mainly concerned with a systematic development of the theory of plasmas, the authority being firmly rooted in the pioneering work of Landau. Corresponding results are also given for partially ionized plasmas, relativistic plasmas, degenerate or non-ideal plasmas and solid state plasmas.

Physical Kinetics-L. P. Pitaevskii 1981-01-15

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Physical Kinetics-Evgenii Mikhailovich Lifshitz [s] 1981

The approach to physical kinetics is closely integrated with that of other branches of physics as presented in the companion volumes of this series. The major part of the contents is concerned with a systematic development of the theory of plasmas, the authority being firmly rooted in the pioneer work of Landau. Although the main scope concerns fully ionized gaseous plasmas, corresponding results are also given for partially ionized plasmas, relativistic plasmas, degenerate or non-ideal plasmas and solid state plasmas. Problems (with answers) are to be found in the text. This work completes the Course of Theoretical Physics begun over 20 years ago

Classical Kinetic Theory of Weakly Turbulent Nonlinear Plasma Processes-Peter H. Yoon 2019-09-12

A systematic overview of the kinetic theory of weak plasma turbulence, including the foundational concepts and mathematical and technical details.

Physical Kinetics-Marian Apostol 2019-10-28

This book presents the subject of physical kinetics from an original and unique angle, by deriving the Boltzmann equation from atomic motion, making extensive use of Landau’s concept of elementary excitations. It includes external forces, besides statistical motion, in its treatment of the subject wherever relevant. It also details the kinetic theory of classical gas and its transport, devoting special attention to the classical plasma. In addition, the book emphasises the role played by the anharmonic interactions in the lifetime of phonons, and presents the basic features of superconductivity and superfluidity.

Particle Interactions in High-Temperature Plasmas-Oliver James Pike 2017-08-17

This thesis makes two important contributions to plasma physics. The first is the extension of the seminal theoretical works of Spitzer and Braginskii, which describe the basics of particle interactions in plasma, to relativistic systems. Relativistic plasmas have long been studied in high-energy astrophysics and are becoming increasingly attainable in the laboratory. The second is the design of a new class of photon-photon collider, which is the first capable of detecting the Breit-Wheeler process. Though it offers the simplest way for light to be converted into matter, the process has never been detected in the 80 years since its theoretical prediction. The experimental scheme proposed here exploits the radiation used in inertial confinement fusion experiments and could in principle be implemented in one of several current-generation facilities.

A Concise Handbook of Mathematics, Physics, and Engineering Sciences-Andrei D. Polyenin 2010-10-18

A Concise Handbook of Mathematics, Physics, and Engineering Sciences takes a practical approach to the basic notions, formulas, equations, problems, theorems, methods, and laws that most frequently occur in scientific and engineering applications and university education. The authors pay special attention to issues that many engineers and students

Kinetic Theory of Gases and Plasmas-PPJM Schram 2012-12-06

Kinetic theory is the link between the non-equilibrium statistical mechanics of many particle systems and macroscopic or phenomenological physics. Therefore much attention is paid in this book both to the derivation of kinetic equations with their limitations and generalizations on the one hand, and to the use of kinetic theory for the description of physical phenomena and the calculation of transport coefficients on the other hand. The book is meant for researchers in the field, graduate students and advanced undergraduate students. At the end of each chapter a section of exercises is added not only for the purpose of providing the reader with the opportunity to test his understanding of the theory and his ability to apply it, but also to complete the chapter with relevant additions and examples that otherwise would have overburdened the main text of the preceding sections. The author is indebted to the physicists who taught him Statistical Mechanics, Kinetic Theory, Plasma Physics and Fluid Mechanics. I gratefully acknowledge the fact that much of the inspiration without which this book would not have been possible, originated from what I learned from several outstanding teachers. In particular I want to mention the late Prof. dr. H. C. Brinkman, who directed my first steps in the field of theoretical plasma physics, my thesis advisor Prof. dr. N. G. Van Kampen and Prof. dr. A. N. Kaufman, whose course on Non-Equilibrium Statistical Mechanics in Berkeley I remember with delight.

Course of Theoretical Physics-L. P. Pitaevskii 2013-10-22

The approach to physical kinetics is closely integrated with that of other branches of physics as presented in the companion volumes of this series. The major part of the contents is concerned with a systematic development of the theory of plasmas, the authority being firmly rooted in the pioneer work of Landau. Although the main scope concerns fully ionized gaseous plasmas, corresponding results are also given for partially ionized plasmas, relativistic plasmas, degenerate or non-ideal plasmas and solid state plasmas. Problems (with answers) are to be found in the text. This work completes the Course of Theoretical Physics begun over 20 years ago

Kappa Distributions-Marian Lazar 2021

This book presents recent results on the modelling of space plasmas with Kappa distributions and their interpretation. Hot and dilute space plasmas most often do not reach thermal equilibrium, their dynamics being essentially conditioned by the kinetic effects of plasma particles, i.e., electrons, protons, and heavier ions. Deviations from thermal equilibrium shown by these plasma particles are often described by Kappa distributions. Although well-known, these distributions are still controversial in achieving a statistical characterization and a physical interpretation of non-equilibrium plasmas. The results of the Kappa modelling presented here mark a significant progress with respect to all these aspects and open perspectives to understanding the high-resolution data collected by the new generation of telescopes and spacecraft missions. The book is directed to the large community of plasma astrophysics, including graduate students and specialists from associated disciplines, given the palette of the proposed topics reaching from applications to the solar atmosphere and the solar wind, via linear and quasilinear modelling of multi-species plasmas and waves within, to the fundamental

physics of nonequilibrium plasmas.

The Dynamical Projectors Method-Sergey Leble 2018-03-12

The dynamical projectors method proves to reduce a multicomponent problem to the simplest one-component problem with its solution determined by specific initial or boundary conditions. Its universality and application in many different physical problems make it particularly useful in hydrodynamics, electrodynamics, plasma physics, and boundary layer problems. A great variety of underlying mechanisms are included making this book useful for those working in wave theory, hydrodynamics, electromagnetism, and applications.

Relativistic Hydrodynamics-Luciano Rezzolla 2013-09-26

This book provides a lively and approachable introduction to the main concepts and techniques of relativistic hydrodynamics in a form that will appeal to physicists at advanced undergraduate and post-graduate levels. The book is divided in three parts. The first part deals with the physical aspects of relativistic hydrodynamics, touching fundamental topics such as kinetic theory, equations of state, linear and nonlinear waves in fluids, and the treatment of non-ideal fluids. The second part provides an introductory but complete description of those numerical methods currently adopted in the solution of the relativistic hydrodynamic equations. Finally, the third part is devoted to applications and considers several physical and astrophysical systems for which relativistic hydrodynamics plays a crucial role. The book is especially recommended to astrophysicists, particle physicists, and applied mathematicians.

Landau: The Physicist & the Man-J B Sykes 2013-10-22

The name of Lev Davidovich Landau is widely known as that of one of the greatest twentieth-century physicists. A brilliant teacher to those pupils he carefully chose, notoriously controversial in his outlook and opinions, the combination of his outstanding intellect and striking personality brought him almost legendary fame. This volume contains letters, papers and recollections by friends and pupils, describing Landau’s views of science, culture and life, and provides the reader with a vivid portrait of a remarkable man.

Gribov-80 Memorial Volume-Yuri Dokshitzer 2011

Vladimir Naumovich Gribov was one of the most outstanding theoretical physicists, a key figure in the development of modern elementary particle physics. His insights into the physics of quantum anomalies and the origin of classical solutions (instantons), the notion of parton systems and their evolution in soft and hard hadron interactions, the first theory of neutrino oscillations and conceptual problems of quantization of non-Abelian fields uncovered by him, have left a lasting impact on the theoretical physics of the 21st century. Gribov-80 - the fourth in a series of memorial workshops for V. N. Gribov - was organized on the occasion of his 80th birthday in May 2010, at the Abdus Salam International Centre for Theoretical Physics. The workshop paid tribute to Gribov’s great achievements and brought close colleagues, younger researchers and leading experts together to display the new angles of the Gribov heritage at the new energy frontier opened up by the Large Hadron Collider. The book is a collection of the presentations made at the workshop.

GRIBOV-80 Memorial Volume-Yu L. Dokshitzer 2011

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Polarization Bremsstrahlung-Andrey V. Korol 2014-02-05

This book introduces and reviews both theory and applications of polarizational bremsstrahlung, i.e. the electromagnetic radiation emitted during collisions of charged particles with structured, thus polarizable targets, such as atoms, molecules and clusters. The subject, following the first experimental evidence a few decades ago, has gained importance through a number of modern applications. Thus, the study of several radiative mechanisms is expected to lead to the design of novel light sources, operating in various parts of the electromagnetic spectrum. Conversely, the analysis of the spectral and angular distribution of the photon emission constitutes a new tool for extracting information on the interaction of the colliding particles, and on their internal structure and dynamical properties. Last but not least, accurate quantitative descriptions of the photon emission processes determine the radiative energy losses of particles in various media, thereby providing essential information required for e.g. plasma diagnostics as well as astrophysical and medical applications (such as radiation therapy). This book primarily addresses graduate students and researchers with a background in atomic, molecular, optical or plasma physics, but will also be of benefit to anyone wishing to enter the field.

Advances in Theoretical Physics-Alan H. Luther 2013-10-22

At Copenhagen in June 1988, the 80th Anniversary of the birth of L D Landau, the much respected Soviet physicist and author of the Course on Theoretical Physics, published by Pergamon Press, was celebrated with an International Symposium in his honour. The papers presented at that meeting are published here, providing an overview of recent progress in theoretical physics, covering super-string theories, chaos, high Tc superconductivity and biomolecules.

Vapor-Liquid Interfaces, Bubbles and Droplets-Shigeo Fujikawa 2011-04-18

Physically correct boundary conditions on vapor-liquid interfaces are essential in order to make an analysis of flows of a liquid including bubbles or of a gas including droplets. Suitable boundary conditions do not exist at the present time. This book is concerned with the kinetic boundary condition for both the plane and curved vapor-liquid interfaces, and the fluid dynamics boundary condition for Navier-Stokes(fluid dynamics) equations. The kinetic boundary condition is formulated on the basis of molecular dynamics simulations and the fluid dynamics boundary condition is derived by a perturbation analysis of Gaussian-BGK Boltzmann equation applicable to polyatomic gases. The fluid dynamics boundary condition is applied to actual flow problems of bubbles in a liquid and droplets in a gas.

Relativistic Kinetic Theory-Gregory V. Vereshchagin 2017-02-16

Relativistic kinetic theory has widespread application in astrophysics and cosmology. The interest has grown in recent years as experimentalists are now able to make reliable measurements on physical systems where relativistic effects are no longer negligible. This ambitious monograph is divided into three parts. It presents the basic ideas and concepts of this theory, equations and methods, including derivation of kinetic equations from the relativistic BBGKY hierarchy and discussion of the relation

between kinetic and hydrodynamic levels of description. The second part introduces elements of computational physics with special emphasis on numerical integration of Boltzmann equations and related approaches, as well as multi-component hydrodynamics. The third part presents an overview of applications ranging from covariant theory of plasma response, thermalization of relativistic plasma, Comptonization in static and moving media to kinetics of self-gravitating systems, cosmological structure formation and neutrino emission during the gravitational collapse.

[Fluid Mechanics](#)-L D Landau 1987-08-17

This is the most comprehensive introductory graduate or advanced undergraduate text in fluid mechanics available. It builds up from the fundamentals, often in a general way, to widespread applications, to technology and geophysics. New to this second edition are discussions on the universal dimensions similarity scaling for the laminar boundary layer equations and on the generalized vector field derivatives. In addition, new material on the generalized streamfunction treatment shows how streamfunction may be used in three-dimensional flows. Finally, a new Computational Fluid Dynamics chapter enables computations of some simple flows and provides entry to more advanced literature. * Basic introduction to the subject of fluid mechanics, intended for undergraduate and beginning graduate students of science and engineering. * Includes topics of special interest for geophysicists and to engineers. * New and generalized treatment of similar laminar boundary layers, streamfunctions for three-dimensional flows, vector field derivatives, and gas dynamics. Also a new generalized treatment of boundary conditions in fluid mechanics, and expanded treatment of viscous flows.

[Statistical Physics](#)-E.M. Lifshitz 2013-10-22

The second part of 'Statistical Physics' deals with the quantum theory of the condensed state of matter. This volume is essentially an entirely new book, based on the large amount of new material which has become available in statistical physics since 'Part 1' was published.

[The Vlasov Equation 1](#)-Pierre Bertrand 2019-09-23

The Vlasov equation is the master equation which provides a statistical description for the collective behavior of large numbers of charged particles in mutual, long-range interaction. In other words, a low collision (or "Vlasov") plasma. Plasma physics is itself a relatively young discipline, whose "birth" can be ascribed to the 1920s. The origin of the Vlasov model, however, is even more recent, dating back to the late 1940s. This "young age" is due to the rare occurrence of Vlasov plasma on Earth, despite the fact it characterizes most of the visible matter in the universe. This book - addressed to students, young researchers and to whoever wants a good understanding of Vlasov plasmas - discusses this model with a pedagogical presentation, focusing on the general properties and historical development of the applications of the Vlasov equation. The milestone developments discussed in the first two chapters serve as an introduction to more recent works (characterization of wave propagation and nonlinear properties of the electrostatic limit).

[Simulation with Entropy Thermodynamics](#)-Christophe Goupil 2021-03-11

Beyond its identification with the second law of thermodynamics, entropy is a formidable tool for describing systems in their relationship with their environment. This book proposes to go through some of these situations where the formulation of entropy, and more precisely, the production of entropy in out-of-equilibrium processes, makes it possible to forge an approach to the behavior of very different systems. Whether for dimensioning structures; influencing parameter variability; or optimizing power, efficiency, or waste heat reduction, simulations based on entropy production offer a tool that is both compact and reliable. In the case of systems marked by complexity, it appears to be the only way. In that sense, realistic optimization can be carried out, integrating within the same framework both the system and all the constraints and boundary conditions that define it. Simulations based on entropy give the researcher a powerful analytical framework that crosses the disciplines of physics and links them together.

[Observation, Theory and Modeling of Atmospheric Variability](#)-Xun Zhu 2004-02-25

This book contains tutorial and review articles as well as specific research letters that cover a wide range of topics: (1) dynamics of atmospheric variability from both basic theory and data analysis, (2) physical and mathematical problems in climate modeling and numerical weather prediction, (3) theories of atmospheric radiative transfer and their applications in satellite remote sensing, and (4) mathematical and statistical methods. The book can be used by undergraduates or graduate students majoring in atmospheric sciences, as an introduction to various research areas; and by researchers and educators, as a general review or quick reference in their fields of interest. Contents: Dynamics of Atmospheric Variability Climate Modeling and Numerical Weather Prediction Radiative Transfer and Remote Sensing Mathematical Method Readership: Graduate students, academics and researchers in meteorology/climatology, as well as East Asian weather-forecasting services. Keywords: Atmospheric Variability; Climate Modeling; Numerical Weather Prediction; Atmospheric Radiation; Satellite Remote Sensing

[Handbook of Conveying and Handling of Particulate Solids](#)-A. Levy 2001-10-22

This handbook presents comprehensive coverage of the technology for conveying and handling particulate solids. Each chapter covers a different topic and contains both fundamentals and applications. Usually, each chapter, or a topic within a chapter, starts with one of the review papers. Chapter 1 covers the characterization of the particulate materials. Chapter 2 covers the behaviour of particulate materials during storage, and presents recent developments in storage and feeders design and performance. Chapter 3 presents fundamental studies of particulate flow, while Chapters 4 and 5 present transport solutions, and the pitfalls of pneumatic, slurry, and capsule conveying. Chapters 6, 7 and 8 cover both the fundamentals and development of processes for particulate solids, starting from fluidisation and drying, segregation and mixing, and size-reduction and enlargement. Chapter 9 presents environmental aspects and the classification of the particulate materials after they have been handled by one of the above-mentioned processes. Finally, Chapter 10 covers applications and developments of measurement techniques that are the heart of the analysis of any conveying or handling system.

[Condensed Matter Field Theory](#)-Alexander Altland 2010-03-11

Modern experimental developments in condensed matter and ultracold atom physics present formidable challenges to theorists. This book provides a pedagogical introduction to quantum field theory in many-particle physics, emphasizing the applicability of the formalism to concrete problems. This second edition contains two new chapters developing path integral approaches to classical and quantum nonequilibrium phenomena. Other chapters cover a range of topics, from the introduction of many-body techniques and functional integration, to renormalization group methods, the theory of response functions, and topology. Conceptual aspects and formal methodology are emphasized, but the discussion focuses on practical experimental applications drawn largely from condensed matter physics and neighboring fields. Extended and challenging problems with fully worked solutions provide a bridge between formal manipulations and research-oriented thinking. Aimed at elevating graduate students to a level where they can engage in independent research, this book complements graduate level courses on many-particle theory.

[Thermal Nanosystems and Nanomaterials](#)-Sebastian Volz 2009-12-24

Heat transfer laws for conduction, radiation and convection change when the dimensions of the systems in question shrink. The altered behaviours can be used efficiently in energy conversion, respectively bio- and high-performance materials to control microelectronic devices. To understand and model those thermal mechanisms, specific metrologies have to be established. This book provides an overview of actual devices and materials involving micro-nanoscale heat transfer mechanisms. These are clearly explained and exemplified by a large spectrum of relevant physical models, while the most advanced nanoscale thermal metrologies are presented.

[Fundamentals Of Theoretical Plasma Physics: Mathematical Description Of Plasma Waves](#)-Lee Hee J 2019-03-06

This book is written as a senior undergraduate and graduate textbook of theoretical plasma physics; topics include Boltzmann equation, two-fluid equations, magnetohydrodynamics, Vlasov-Maxwell Plasma, absolute and convective instabilities, fundamental kinetic theory, Lenard-Balescu equation, electric fluctuation, plasma electrodynamics and causality, nonlinear waves, inverse scattering method, surface waves, and dusty plasma. It also includes special topics like parametric instabilities and kinetic theory of surface waves in a plasma slab. The development of theory is presented through gentle mathematical steps through easy and straightforward demonstration. The readers will be able to appreciate the beauty of mathematical analysis in connection with theoretical plasma physics.

[High-energy Nuclear Optics of Polarized Particles](#)-Vladimir G. Baryshevsky 2012

The various phenomena caused by refraction and diffraction of polarized elementary particles in matter have opened up a new research area in the particle physics: nuclear optics of polarized particles. Effects similar to the well-known optical phenomena such as birefringence and Faraday effects, exist also in particle physics, though the particle wavelength is much less than the distance between atoms of matter. Current knowledge of the quasi-optical effects, which exist for all particles in any wavelength range (and energies from low to extremely high), will enable us to investigate different properties of interacting particles (nuclei) in a new aspect. This pioneering book will provide detailed accounts of quasi-optical phenomena in the particle polarization, and will interest physicists and professionals in experimental particle physics.

[Flow-Induced Vibration](#)-S. Ziada 2000-01-01

Flow-induced vibrations and noise continue to cause problems in a wide range of engineering applications ranging from civil engineering and marine structures to power generation and chemical processing. These proceedings bring together more than a hundred papers dealing with a variety of topics relating to flow-induced vibration and noise. The content

[Superconductivity](#)-Karl-Heinz Bennemann 2008-04-25

This extensive and comprehensive handbook systematically reviews the basic physics, theory and recent advances in superconductivity. Covering the entire field, this unparalleled resource carefully blends theoretical studies with experimental results to provide an indispensable foundation for further research. Leading researchers, including Nobel laureates, describe the state of the art in conventional and unconventional superconductors. In addition to full-coverage of novel materials and underlying mechanisms, the handbook reflects continued, intense research into electron-phonon based superconductivity.

[Kinetics of Evaporation](#)-Denis N. Gerasimov 2018-09-03

This monograph discusses the essential principles of the evaporation process by looking at it at the molecular and atomic level. In the first part methods of statistical physics, physical kinetics and numerical modeling are outlined including the Maxwell's distribution function, the Boltzmann kinetic equation, the Vlasov approach, and the CUDA technique. The distribution functions of evaporating particles are then defined. Experimental results on the evaporation coefficient and the temperature jump on the evaporation surface are critically reviewed and compared to the theory and numerical results presented in previous chapters. The book ends with a chapter devoted to evaporation in different processes, such as boiling and cavitation. This monograph addresses graduate students and researchers working on phase transitions and related fields.

[Kinetic Equations](#)-Alexander V. Bobylev 2020-10-12

This two-volume monograph is a comprehensive and up-to-date presentation of the theory and applications of kinetic equations. The first volume covers many-particle dynamics, Maxwell models of the Boltzmann equation (including their exact and self-similar solutions), and hydrodynamic limits beyond the Navier-Stokes level.

[Mathematical Models of Viscous Friction](#)-Paolo Buttà 2015-02-05

In this monograph we present a review of a number of recent results on the motion of a classical body immersed in an infinitely extended medium and subjected to the action of an external force. We investigate this topic in the framework of mathematical physics by focusing mainly on the class of purely Hamiltonian systems, for which very few results are available. We discuss two cases: when the medium is a gas and when it is a fluid. In the first case, the aim is to obtain microscopic models of viscous friction. In the second, we seek to underline some non-trivial features of the motion. Far from giving a general survey on the subject, which is very rich and complex from both a phenomenological and theoretical point of view, we focus on some fairly simple models that can be studied rigorously, thus providing a first step towards a mathematical description of viscous friction. In some cases, we restrict ourselves to studying the problem at a heuristic level, or we present the main ideas, discussing only some aspects of the proof if it is prohibitively technical. This book is principally addressed to researchers or PhD students who are interested in this or related fields of mathematical physics.

[Quantum Electrodynamics](#)-V B Berestetskii 2012-12-02

Several significant additions have been made to the second edition, including the operator method of calculating the bremsstrahlung cross-section, the calculation of the probabilities of photon-induced pair production and photon decay in a magnetic field, the asymptotic form of the scattering amplitudes at high energies, inelastic scattering of electrons by hadrons, and the transformation of electron-positron pairs into hadrons.

[Quantum Mechanics](#)-L D Landau 1991

This edition has been completely revised to include some 20% of new material. Important recent developments such as the theory of Regge poles are now included. Many problems with solutions have been added to those already contained in the book.

[Mechanics](#)-L D Landau 1982-01-29

Devoted to the foundation of mechanics, namely classical Newtonian mechanics, the subject is based mainly on Galileo's principle of relativity and Hamilton's principle of least action. The exposition is simple and leads to the most complete direct means of solving problems in mechanics. The final sections on adiabatic invariants have been revised and augmented. In addition a short biography of L D Landau has been inserted.

[Statistical Physics](#)-L D Landau 2013-10-22

A lucid presentation of statistical physics and thermodynamics which develops from the general principles to give a large number of applications of the theory.

[The Classical Theory of Fields](#)-L D Landau 2013-10-22

Translated from the 6th Russian edition, this latest edition contains seven new sections with chapters on General Relativity, Gravitational Waves and Relativistic Cosmology, where Professor Lifshitz's interests lay. The text of the 3rd English edition has been thoroughly revised and additional problems inserted