Collision Induced Absorption In Gases Cambridge Monographs On Atomic Molecular And Chemical Physics

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A Primer on Quantum Fluids Carlo F. Barenghi 2016-08-10 The aim of this primer is to cover the essential theoretical information, quickly and concisely, in order to enable senior undergraduate and beginning graduate students to tackle projects in topical research areas of quantum fluids, for example, solitons, vortices and collective modes. The selection of the material, both regarding the content and level of presentation, draws on the authors analysis of the success of relevant research projects with newcomers to the field, as well as of the students feedback from many taught and self-study courses on the subject matter. Starting with a brief historical overview, this text covers particle statistics, weakly interacting condensates and their dynamics and finally superfluid helium and quantum turbulence. At the end of each chapter (apart from the first) there are some exercises. Detailed solutions can be made available to instructors upon request to the authors.

Quantum Theory of High-Energy Ion-Atom Collisions Dzevad Belkic 2008-11-13 One of the Top Selling Physics Books according to YBP Library Services Suitable for graduate students, experienced researchers, and experts, this book provides a state-of-the-art review of the non-relativistic theory of high-energy ion-atom collisions. Special attention is paid to four-body interactive dynamics through the most important theoretical methods available to date by critically analyzing their foundation and practical usefulness relative to virtually all the relevant experimental data. Fast ion-atom collisions are of paramount importance in many high-priority branches of science and technology, including accelerator-based physics, the search for new sources of energy, controlled thermonuclear fusion, plasma research, the earth's environment, space research, particle transport physics, therapy of cancer patients by heavy ions, and more. These interdisciplinary fields are in need of knowledge about many cross sections and collisional rates for the analyzed fast ion-atom collisions, such as single ionization, excitation, charge exchange, and various combinations thereof. These include two-electron transitions, such as double ionization, excitation, or capture, as well as simultaneous electron transfer and ionization or excitation and the like—all of which are analyzed in depth in this book. Quantum Theory of High-Energy Ion-Atom Collisions focuses on multifaceted mechanisms of collisional phenomena with heavy ions and atoms at non-relativistic high energies.

Chaos in Atomic Physics R. Blümel 1997-07-24 This book provides a coherent introduction to the manifestations of chaos in atoms and molecules.

An Introduction to Clouds Ulrike Lohmann 2016-06-23 An Introduction to Clouds provides a fundamental understanding of clouds, ranging from cloud microphysics to the large-scale impacts of clouds on climate. On the microscale, phase changes and ice nucleation are covered comprehensively, including aerosol particles and thermodynamics relevant for the formation of clouds and precipitation. At larger scales, cloud dynamics, mid-latitude storms and tropical cyclones are discussed leading to the role of clouds on the hydrological cycle and climate. Each chapter ends with problem sets and multiple-choice questions that can be completed online, and important equations are highlighted in boxes for ease of reference. Combining mathematical formulations with qualitative explanations of underlying concepts, this accessible book requires relatively little previous knowledge, making it ideal for advanced undergraduate and graduate students in atmospheric science, environmental sciences and related disciplines.

Bibliographic Index 1997

Treatise on Geophysics 2015-04-17 Treatise on Geophysics, Second Edition, is a comprehensive and in-depth study of the physics of the Earth beyond what any geophysics text has provided previously. Thoroughly revised and updated, it provides fundamental and state-of-the-art discussion of all aspects of geophysics. A highlight of the second edition is a new volume on Near Surface Geophysics that discusses the role of geophysics in the exploitation and conservation of natural resources and the assessment of degradation of natural systems by pollution. Additional features include new material in the Planets and Moon, Mantle Dynamics, Core Dynamics, Crustal and Lithosphere Dynamics, Evolution of the Earth, and Geodesy volumes. New material is also presented on the uses of Earth gravity measurements. This title is essential for professionals, researchers, professors, and advanced undergraduate and graduate students in the fields of Geophysics and Earth system science. Comprehensive and detailed coverage of all aspects of geophysics Fundamental and state-of-the-art discussions of all research topics Integration of topics into a coherent whole

The Callendar Effect James Fleming 2013-01-22 Guy Stewart Callendar (1898–1964) is noted for identifying, in 1938, the link between the artifcial production of carbon dioxide and global warming. Today this is called the "Callendar Efect. " He was one of Britain's leading steam and combustion engineers, a specialist in infrared physics, author of the standard reference book on the properties of steam at high tempe- tures and pressures, and designer of the burners of the notable World War II airfeld fog dispersal system, FIDO. He was keenly interested in weather and climate, taking measurement so accurate that they were used to correct the ofcial temperature records of central England and collecting a series of worldwide weather data that showed an unprecedented warming trend in the frst four decades of the twentieth century. He formulated a coherent theory of infrared absorption and emission by trace gases, established the nineteenth-century background concentration of carbon dioxide, and - gued that its atmospheric concentration was rising due to human activities, which was causing the climate to warm. Callendar's contributions to climatology led the way in the mid-twentie- century transition from the traditional practice of gathering descriptive c- mate statistics to the new and exciting feld of climate dynamics. In the frst half of the twentieth century, the carbon dioxide theory of climate change xiv Introduction had fallen out of favor with climatists.

Rydberg Atoms Thomas F. Gallagher 2005-11-03 This book provides a comprehensive description of the physics of Rydberg atoms, highlighting their remarkable properties by reference to their behavior in a wide range of physical situations. Following an overview of the basic properties of Rydberg atoms, their interactions with

electric and magnetic fields are analyzed in detail. The collisions of Rydberg atoms with neutral and charged species are described, and the use of multichannel quantum defect theory in the study of Rydberg atomic systems is discussed.

The Atmosphere and Climate of Mars Robert M. Haberle 2017-06-29 Humanity has long been fascinated by the planet Mars. Was its climate ever conducive to life? What is the atmosphere like today and why did it change so dramatically over time? Eleven spacecraft have successfully flown to Mars since the Viking mission of the 1970s and early 1980s. These orbiters, landers and rovers have generated vast amounts of data that now span a Martian decade (roughly eighteen years). This new volume brings together the many new ideas about the atmosphere and climate system that have emerged, including the complex interplay of the volatile and dust cycles, the atmosphere-surface interactions that connect them over time, and the diversity of the planet's environment and its complex history. Including tutorials and explanations of complicated ideas, students, researchers and non-specialists alike are able to use this resource to gain a thorough and up-to-date understanding of this most Earth-like of planetary neighbours.

Introduction to Thermodynamics and Kinetic Theory of Matter Anatoly I. Burshtein 2008-07-11 Imparts the similarities and differences between ratified and condensed matter, classical and quantum systems as well as real and ideal gases. Presents the quasi-thermodynamic theory of gas-liquid interface and its application for density profile calculation within the van der Waals theory of surface tension. Uses inductive logic to lead readers from observation and facts to personal interpretation and from specific conclusions to general ones.

Gas Transport in Porous Media Clifford K. Ho 2006-10-07 CLIFFORD K. HOAND STEPHEN W. WEBB Sandia National Laboratories, P. O. Box 5800, Albuquerque, NM 87185, USA Gas and vapor transport in porous media occur in a number of important applications includingdryingofindustrialandfoodproducts,oilandgasexploration,environm- tal remediation of contaminated sites, and carbon sequestration. Understanding the fundamental mechanisms and processes of gas and vapor transport in porous media allows models to be used to evaluate and optimize the performance and design of these systems. In this book, gas and vapor are distinguished by their available states at stan- ? dard temperature and pressure (20 C, 101 kPa). If the gas-phase constituent can also exist as a liquid phase at standard temperature and pressure (e. g. , water, ethanol, toluene, trichlorothylene), it is considered a vapor. If the gas-phase constituent is non-condensable at standard temperature and pressure (e. g. , oxygen, carbon di- ide, helium, hydrogen, propane), it is considered a gas. The distinction is important because different processes affect the transport and behavior of gases and vapors in porous media. For example, mechanisms specific to vapors include vapor-pressure lowering and enhanced vapor diffusion, which are caused by the presence of a g- phase constituent interacting with its liquid phase in an unsaturated porous media. In addition, the “heat-pipe” exploits isothermal latent heat exchange during evaporation and condensation to effectively transfer heat in designed and natural systems.

Optical Polarization of Molecules Marcis Auzinsh 2005-06-30 This book explains the theory and methods by which gas molecules can be polarized by light, a subject of considerable importance for what it tells us about the electronic structure of molecules and properties of chemical reactions. Starting with a brief review of molecular angular momentum, the text goes on to consider resonant absorption, fluorescence, photodissociation and photoionization, as well as collisions and static fields. A variety of macroscopic effects are considered, among them angular distribution and the polarization of emitted light, ground state depopulation, laser-induced dichroism, the effect of collisions and external magnetic and electric field effects. Most examples in the book are for diatomic molecules, but symmetric-top polyatomic molecules are also included. The book concludes with a short appendix of essential formulae, tables for vector calculus, spherical functions, Wigner rotation matrices, Clebsch-Gordan coefficients, and methods for expansion over irreducible tensors.

Collisional Effects on Molecular Spectra Jean-Michel Hartmann 2008-08-12 Gas phase molecular spectroscopy is a powerful tool for obtaining information on the geometry and internal structure of isolated molecules as well as on the interactions that they undergo. It enables the study of fundamental parameters and processes and is also used for the sounding of gas media through optical techniques. It has been facing always renewed challenges, due to the considerable improvement of experimental techniques and the increasing demand for accuracy and scope of remote sensing applications. In practice, the radiating molecule is usually not isolated but diluted in a mixture at significant total pressure. The collisions among the molecules composing the gas can have a large influence on the spectral shape, affecting all wavelength regions through various mechanisms. These must be taken into account for the correct analysis and prediction of the resulting spectra. This book reviews our current experimental and theoretical knowledge and the practical consequences of collisional effects on molecular spectral shapes in neutral gases. General expressions are first given. They are formal of difficult use for practical calculations often but enable discussion of the approximations leading to simplified situations. The first case examined is that of isolated transitions, with the usual pressure broadening and shifting but also refined effects due to speed dependence and collision-induced velocity changes. Collisional line-mixing, which invalidates the notion of isolated transitions and has spectral consequences when lines are closely spaced, is then discussed within the impact approximation. Regions where the contributions of many distant lines overlap, such as troughs between transitions and band wings, are considered next. For a description of these far wings the finite duration of collisions and concomitant breakdown of the impact approximation must be taken into account. Finally, for long paths or elevated pressures, the dipole or polarizability induced by intermolecular interactions can make significant contributions. Specific models for the description of these collision induced absorption and light scattering processes are presented. The above mentioned topics are reviewed and discussed from a threefold point of view: the various models, the available data, and the consequences for applications including heat transfer, remote sensing and optical sounding. The extensive bibliography and discussion of some remaining problems complete the text. State-of-the-art on the subject A bibliography of nearly 1,000 references Tools for practical calculations Consequences for other scientific fields Numerous illustrative examples Fulfilling a need since there is no equivalent monograph on the subject

New Technical Books New York Public Library 1994

Physics, Uspekhi 2003

Quantum Mechanical Rate Processes in the Condensed Phase Irina Navrotskaya 2006

Atmospheric Radiation Tables Walter M. Elsasser 1960

Collision-induced Absorption in Gases Lothar Frommhold 2006-05-18 The book reviews our present knowledge of collision-induced absorption of infrared radiation in dense gases. The book starts with a recapitulation of essential background information. Experimental results for the absorption spectra are next discussed. Then the causes and properties of dipole moments induced by molecular interactions are reviewed. Two following chapters present the theory of collision-induced absorption in monatomic gas mixtures and in molecular gases and mixtures. The final chapter discusses related phenomena and important applications in astrophysics. The book is a practical guide for the spectroscopic dealing with dense, neutral fluids.

Collisional Effects on Molecular Spectra Jean-Michel Hartmann 2021-01-12 Gas phase molecular spectroscopy is a powerful tool for obtaining information on the geometry and internal structure of isolated molecules and their interactions with others. It enables the understanding and description, through measurements and modeling, of the influence of pressure on light absorption, emission, and scattering by gas molecules, which must be taken into account for the correct analysis and prediction of the resulting spectra. Collisional Effects on Molecular Spectra: Laboratory Experiments and Models, Consequences for Applications, Second Edition provides an updated review of current experimental techniques, theoretical knowledge, and practical applications. After an introduction to

collisional effects on molecular spectra, the book moves on by taking a threefold approach: it highlights key models, reviews available data, and discusses the consequences for applications. These include areas such as heat transfer, remote sensing, optical sounding, metrology, probing of gas media, and climate predictions. This second edition also contains, with respect to the first one, significant amounts of new information, including 23 figures, 8 tables, and around 700 references. Drawing on the extensive experience of its expert authors, Collisional Effects on Molecular Spectra: Laboratory Experiments and Models, Consequences for Applications, Second Edition, is a valuable guide for all those involved with sourcing, researching, interpreting, or applying gas phase molecular spectroscopy techniques across a range of fields Provides updated information on the latest advances in the field, including isolated line shapes, line-broadening and -shifting, line-mixing, the far wings and associated continua, and collision-induced absorption Reviews recently developed experimental techniques of high accuracy and sensitivity Highlights the latest practical applications in areas such as metrology, probing of gas media, and climate prediction

Positron Physics M. Charlton 2005-10-13 This book provides a comprehensive and up-to-date account of the field of low energy positrons and positronium within atomic and molecular physics. It begins with an introduction to the field, discussing the background to low energy positron beams, and then covers topics such as total scattering cross sections, elastic scattering, positronium formation, excitation and ionisation, annihilation and positronium interactions. Each chapter contains a blend of theory and experiment, giving a balanced treatment of all the topics. The book will be useful for graduate students and researchers in physics and chemistry. It is ideal for those wishing to gain rapid, in-depth knowledge of this unique branch of atomic physics.

American Book Publishing Record 1993

Astronomisk tidsskrift 1994

Uspekhi fizicheskikh nauk 2003

Handbook of Materials Modeling Sidney Yip 2007-11-17 The first reference of its kind in the rapidly emerging field of computational approachs to materials research, this is a compendium of perspective-providing and topical articles written to inform students and non-specialists of the current status and capabilities of modelling and simulation. From the standpoint of methodology, the development follows a multiscale approach with emphasis on electronic-structure, atomistic, and mesoscale methods, as well as mathematical analysis and rate processes. Basic models are treated across traditional disciplines, not only in the discussion of methods but also in chapters on crystal defects, microstructure, fluids, polymers and soft matter. Written by authors who are actively participating in the current development, this collection of 150 articles has the breadth and depth to be a major contributor toward defining the field of computational materials. In addition, there are 40 commentaries by highly respected researchers, presenting various views that should interest the future generations of the community. Subject Editors: Martin Bazant, MIT; Bruce Boghosian, Tufts University; Richard Catlow, Royal Institution; Long-Qing Chen, Pennsylvania State University; William Curtin, Brown University; Tomas Diaz de la Rubia, Lawrence Livermore National Laboratory; Nicolas Hadjiconstantinou, MIT; Mark F. Horstemeyer, Mississippi State University; Efthimios Kaxiras, Harvard University; L. Mahadevan, Harvard University; Dimitrios Maroudas, University of Massachusetts; Nicola Marzari, MIT; Horia Metiu, University of California Santa Barbara; Gregory C. Rutledge, MIT; David J. Srolovitz, Princeton University; Bernhardt L. Trout, MIT; Dieter Wolf, Argonne National Laboratory.

Collision- and Interaction-Induced Spectroscopy G.C. Tabisz 2012-12-06 Collision-or interaction-induced spectroscopy refers to radiative transitions, which are forbidden in free atoms or molecules, but which occur in clusters of interacting atoms or molecules. The most common phenomena are induced absorption, in the infrared region, and induced light scattering, which involves inelastic scattering of visible laser light. The particle interactions giving rise to the necessary induced dipole moments and polarizabilities are modelled at long range by multipole expansions; at short range, electron overlap and exchange mechanisms come into play. Information on atomic and molecular interactions and dynamics in dense media on a picosecond timescale may be drawn from the spectra. Collision-induced absorption in the infrared was discovered at the University of Toronto in 1949 by Crawford, Welsh and Locke who studied liquid O and N. Through the 1950s and 1960s, 2 2 experimental elucidation of the phenomenon, particularly in gases, continued and theoretical underpinnings were established. In the late 1960s, the related phenomenon of collision-induced light scattering was first observed in compressed inert gases. In 1978, an 'Enrico Fermi' Summer School was held at Varenna, Italy, under the directorship of J. Van Kranendonk. The lectures, there, reviewed activity from the previous two decades, during which the approach to the subject had not changed greatly. In 1983, a highly successful NATO Advanced Research Workshop was held at Bonas, France, under the directorship of G. Birnbaum. An important outcome of that meeting was the demonstration of the maturity and sophistication of current experimental and theoretical techniques.

Books in Print 1986

Whitaker's Books in Print 1998

Weakly Interacting Molecular Pairs Claude Camy-Peyret 2003-10-31 While pair effects are referred to here as unconventional, in specific spectral domains and/or geophysical conditions they play a dominant role in the absorption/emission properties of the atmosphere, water vapour continuum absorption being one of the most prominent examples. The book clarifies still open questions in this domain and seeks to trace a path to possible answers, since the underlying phenomena are often incompletely understood and a reliable theory is often unavailable. The absence of precise laboratory data on bimolecular absorption is also often a hindrance to the construction of a reliable theoretical model. The book thus describes the latest methods, theories and techniques used to study weakly interacting molecular pairs. There is also a discussion of the serious deficiencies in our understanding of bimolecular phenomena occurring in the atmosphere that will undoubtedly stimulate new laboratory and theoretical investigations. The ultimate goal of the book is to bridge the gap between laboratory experiments, sophisticated theories and field observations in the interests of atmospheric science and applications.

Advances in Chemical Physics Stuart A. Rice 2009-05-27 The Advances in Chemical Physics series presents the cutting edge in every area of the discipline and provides the field with a forum for critical, authoritative evaluations of advances. It provides an editorial framework that makes each volume an excellent supplement to advanced graduate classes, with contributions from experts around the world and a handy glossary for easy reference on new terminology. This series is a wonderful guide for students and professionals in chemical physics and physical chemistry, from academia, government, and industries including chemicals, pharmaceuticals, and polymers.

Optical Engineering 1994 Publishes papers reporting on research and development in optical science and engineering and the practical applications of known optical science, engineering, and technology.

Electron-Atom Collisions Ian E. McCarthy 2005-09-15 This book is a comprehensive introduction to electron-atom collisions, covering both theory and experiment. The interaction of electrons with atoms is the field that most deeply probes both the structure and reaction dynamics of a many-body system. The book begins with a short account of experimental techniques of cross-section measurement. It then introduces the essential quantum mechanics background needed. The following chapters cover one-electron problems (from the classic particle in a box to a relativistic electron in a central potential), the theory of atomic bound states, formal scattering theory, calculation of scattering amplitudes, spin-independent and spin-dependent scattering observables, ionisation and electron momentum spectroscopy. The connections between experimental and theoretical developments are emphasised throughout.

Physics at Surfaces Andrew Zangwill 1988-03-24 Physics at Surfaces is a unique graduate-level introduction to the

physics and chemical physics of solid surfaces, and atoms and molecules that interact with solid surfaces. A subject of keen scientific inquiry since the last century, surface physics emerged as an independent discipline only in the late 1960s as a result of the development of ultra-high vacuum technology and high speed digital computers. With these tools, reliable experimental measurements and theoretical calculations could at last be compared. Progress in the last decade has been truly striking. This volume provides a synthesis of the entire field of surface physics from the perspective of a modern condensed matter physicist with a healthy interest in chemical physics. The exposition intertwines experiment and theory whenever possible, although there is little detailed discussion of technique. This much-needed text will be invaluable to graduate students and researchers in condensed matter physics, physical chemistry and materials science working in, or taking graduate courses in, surface science.

Transport of Infrared Atmospheric Radiation Boris M. Smirnov 2020-02-10 This book sets out to give a rigorous mathematical description of the greenhouse effect through the theory of infrared atmospheric emission. In contrast to traditional climatological analysis, this approach eschews empirical relations in favour of a strict thermodynamical derivation, based on data from NASA and from the HITRAN spectroscopy database. The results highlight new aspects of the role of clouds in the greenhouse effect.

The British National Bibliography Arthur James Wells 1994

Cumulative Book Index 1995 A world list of books in the English language.

Ultrafast Spectroscopy of HOD in Liquid D2O Christopher P. Lawrence 2003

Electron Spectrometry of Atoms Using Synchrotron Radiation Volker Schmidt 1997-05-15 The study of electron spectrometry using synchrotron radiation is a growing field of research driven by the increasing availability of advanced synchrotron radiation light sources and improved theoretical methods for solving the many-electron problem in atoms. This balanced account, by a leading researcher in this field, will be of value to both theorists and experimentalists in atomic, molecular and chemical physicists.

Forthcoming Books Rose Arny 1993

Photodissociation Dynamics Reinhard Schinke 1995-05-11 Starting from multi-dimensional potential energy surfaces and the Schrödinger equation of nuclear motion, this text elucidates the achievements in calculating photodissociation cross sections and fragment state distributions from first principles.

Highly Excited Atoms J. P. Connerade 1998-05-07 An introduction to the physics of highly excited, easily perturbed or interacting atoms. Covers Rydberg states, quantum defect theory, atomic f-values, centrifugal barrier effects, autoionisation, inner shell and double excitation spectra, K-matrix theory, atoms in high laser fields, statistical methods, quantum chaos, and atomic effects in solids.