



Electron Atom Collisions

Hans Kleinpoppen



Electron Atom Collisions:

Electron-atom Collisions Ian Ellery McCarthy, 1994 Theory of Electron-atom Collisions Charles J. Joachain, 1995

Introduction to the Theory of Collisions of Electrons with Atoms and Molecules S.P. Khare, 2012-12-06 An understanding of the collisions between micro particles is of great importance for the number of fields belonging to physics chemistry astrophysics biophysics etc The present book a theory for electron atom and molecule collisions is developed using non relativistic quantum mechanics in a systematic and lucid manner The scattering theory is an essential part of the quantum mechanics course of all universities During the last 30 years the author has lectured on the topics presented in this book collisions physics photon atom collisions electron atom and electron molecule collisions electron photon delayed coincidence technique etc at many institutions including Wayne State University Detroit MI The University of Western Ontario Canada and The Meerut University India The present book is the outcome of those lectures and is written to serve as a textbook for post graduate and pre PhD students and as a reference book for researchers

Theory of Electron-Atom Collisions: Part One: Potential Scattering Philip G. Burke, Charles J. Joachain, 1995-04-30 The authors aim to hone the theory of electron atom and electron ion collisions by developing mathematical equations and comparing their results to the wealth of recent experimental data This first of three parts focuses on potential scattering and will serve as an introduction to many of the concepts covered in Parts II and III As these processes occur in so many of the physical sciences researchers in astrophysics atmospheric physics plasma physics and laser physics will all benefit from the monograph The Theory of Electron-atom Collisions Grigorii Filippovich Drukarev, 1965 *Theory of Electron-Atom Collisions* Philip G Burke, Charles J Joachain, 2014-01-15 *Collisions of Electrons with Atoms and Molecules* G.F. Drukarev, 2012-12-06 This book is a short outline of the present state of the theory of electron collisions with atomic particles atoms molecules and ions It is addressed to those who by nature of their work need detailed information about the cross sections of various processes of electron collisions with atomic particles experimentalists working in plasma physics optics quantum electronics atmospheric and space physics etc Some of the cross sections have been measured But in many important cases the only source of information is theoretical calculation The numerous theoretical papers dealing with electronic collision processes contain various approximations The inter relation between them and the level of their accuracy is often difficult to understand without a systematic study of the theory of atomic collisions not to mention that theoretical considerations are necessary for the consistent interpretation of experimental results The main constituents of the book are 1 General theory with special emphasis on the topics most important for understanding and discussing electron collisions with atomic particles

Electron-Atom and Electron-Molecule Collisions Jürgen Hinze, 2013-11-11 The papers collected in this volume have been presented during a workshop on Electron Atom and Molecule Collisions held at the Centre for Interdisciplinary Studies of the University of Bielefeld in May 1980 This workshop part of a larger program concerned with the Properties and

Reactions of Isolated Molecules and Atoms focused on the theory and computational techniques for the quantitative description of electron scattering phenomena With the advances which have been made in the accurate quantum mechanical characterisation of bound states of atoms and molecules the more complicated description of the unbound systems and resonances important in electron collision processes has matured too As explained in detail in the articles of this volume the theory for the quantitative explanation of elastic and inelastic electron molecule collisions of photo and multiple photon ionization and even for electron impact ionization is well developed in a form which lends itself to a complete quantitative ab initio interpretation and prediction of the observable effects Many of the experiences gained and the techniques which have evolved over the years in the computational characterization of bound states have become an essential basis for this development To be sure much needs to be done before we have a complete and detailed theoretical understanding of the known collisional processes and of the phenomena and effects which may still be uncovered with the continuing refinement of the experimental techniques

Electron Emission in Heavy Ion-Atom Collisions Nikolaus Stolterfoht, Robert D. DuBois, Roberto D. Rivarola, 2013-06-29 Electron EM reviews the theoretical and experimental work of the last 30 years on continuous electron emission in energetic ion atom collisions High incident energies for which the projectile is faster than the mean orbital velocity of the active electron are considered Emphasis is placed on the interpretation of ionization mechanisms They are interpreted in terms of Coulomb centers associated with the projectile and target nuclear fields which strongly interact with the outgoing electron General properties of the two center electron emission are analyzed Particular attention is given to screening effects A brief overview of multiple ionization processes is also presented The survey concludes with a complete compilation of experimental studies of ionization cross sections

Resonance Phenomena in Electron-atom Collisions V. I. Lend'el, Viacheslav Tadeushevich Navrotsky, Emel'ian Petrovich Sabad, 1992 Describes the scattering of electrons by atoms and atomic ions This scattering is one of the fundamental processes in plasma physics nuclear fusion quantum chemistry astrophysics and the physics of the upper atmosphere

Theory of Electron—Atom Collisions Philip G. Burke, Charles J. Joachain, 2013-06-29 The authors aim to hone the theory of electron atom and electron ion collisions by developing mathematical equations and comparing their results to the wealth of recent experimental data This first of three parts focuses on potential scattering and will serve as an introduction to many of the concepts covered in Parts II and III As these processes occur in so many of the physical sciences researchers in astrophysics atmospheric physics plasma physics and laser physics will all benefit from the monograph

Atomic Collisions Fizikas institūts (Latvija), 1966

Introduction to the Theory of Collisions of Electrons with Atoms and Molecules Khare Satya Prakash, 2013-03-26 An understanding of the collisions between micro particles is of great importance for the number of fields belonging to physics chemistry astrophysics biophysics etc The present book a theory for electron atom and molecule collisions is developed using non relativistic quantum mechanics in a systematic and lucid manner The scattering theory is an essential part of the quantum

mechanics course of all universities During the last 30 years the author has lectured on the topics presented in this book collisions physics photon atom collisions electron atom and electron molecule collisions electron photon delayed coincidence technique etc at many institutions including Wayne State University Detroit MI The University of Western Ontario Canada and The Meerut University India The present book is the outcome of those lectures and is written to serve as a textbook for post graduate and pre PhD students and as a reference book for researchers

Electron-Atom Collisions Maurizio Dapor, 2022-03-07 Electron collisions with atoms ions and molecules have been investigated since the earliest years of the last century because of their pervasiveness and importance in fields ranging from astrophysics and plasma physics to atmospheric and condensed matter physics Written in an accessible yet rigorous style this book introduces the theory of electron atom scattering into both the non relativistic and relativistic quantum frameworks The book also includes exercises with an increasing degree of difficulty to allow the reader to become familiar with the subject

Resonance Phenomena in Electron-Atom Collisions Vladimir I. Lengyel, Vyacheslav T. Navrotsky, Emil P. Sabad, 1992 Resonance phenomena have been the topic of a number of reviews and separate questions have been elucidated in some monographs But the absence of a balanced integral account of the current status of the problem hinders the orientation in this area The present book is an attempt to fill this gap The results of investigations of the resonance scattering of electrons by atoms and ions are considered We compare different theoretical methods of description of resonance phenomena for example the close coupling method R matrix method and diagonalization method Special attention is paid to the analysis of the accuracy of the theoretical calculations and experimental data Besides the conventional analytical solutions of a multiparticle problem more recently developed methods made possible by high speed computers are discussed in detail Several computer programs are scrutinized This book is intended for physicists engaged in the problems of electronic and atomic collisions and related areas such as plasma and laser physics It should be of interest to university students and postgraduates

Electron-Atom and Electron-Molecule Collisions Jurgen Hinze, 2014-01-15

Coherence and Correlation in Atomic Collisions Hans Kleinpoppen, 2013-11-11 H KLEINPOPPEN AND J F WILLIAMS It has only very recently become possible to study angular correlations and coherence effects in different areas of atomic collision processes These investigations have provided us with an analysis of experimental data in terms of scattering amplitudes and their phases of target parameters such as orientation alignment and state multipoles and also of coherence parameters e g the degree of coherence of excitation In this way the analysis of electron photon ion photon atom photon or electron ion coincidences from electron atom ion atom or atom atom collisional excitation has led to a breakthrough such that the above quantities represent most crucial and sensitive tests for theories of atomic collision processes Similarly the powerful e 2e experiments electron electron coincidences from impact ionization of atoms have attracted much attention where improved experimental studies and detailed theoretical description provide a wealth of information on either the collisional ionization process or the atomic structure of the target atom

Interference effects many electron correlations and energy and angular momentum exchange between electrons in a Coulomb field play a decisive role in the understanding of postcollision interactions. New results on coherence effects and orientation and alignment in collisional processes of ions with surfaces and crystal lattices show links to relevant interference phenomena in atomic collisions. In small angle elastic electron atom scattering the effect of angular coherence can be studied in a crossed beam experiment. *Atomic Collisions* R. Ya Damburg, M. V. Kurepa, R. K. Peterkop, V. Ya Veldre, 1963

Lectures on Ion-Atom Collisions Jörg Eichler, 2005-09-23 Atomic collisions offer some unique opportunities to study atomic structure and reaction mechanisms in experiment and theory especially for projectiles of high atomic number provided by modern accelerators. The book is meant as an introduction into the field and provides some basic theoretical understanding of the atomic processes occurring when a projectile hits another atom. It also furnishes the tools for a mathematical description however without going deeper into the technical details which can be found in the literature given. With this aim the focus is on reactions in which only a single active electron participates. Collisional excitation, ionization and charge transfer are discussed for collision velocities ranging from slow to comparable to the speed of light. For the highest projectile velocities energy can be converted into mass so that electron positron pairs are created. In addition to the systematic treatment a theoretical section specializes on electron-electron correlations and three chapters are devoted to selected highlights bordering to surface science and to physics with antiprotons. Simple access to the theory of collisions between ions and atoms. Systematic treatment of basic features needed for an understanding. Mathematical details are omitted and referred to references. In order to bear out the essential ideas most clearly a single active electron is assumed in most cases. In selected examples theoretical results are confronted with experiment. Discussion supported by a large number of illustrations. Selected highlights in borderline fields are presented.

R-Matrix Theory of Atomic Collisions Philip George Burke, 2011-03-28 Commencing with a self contained overview of atomic collision theory this monograph presents recent developments of R matrix theory and its applications to a wide range of atomic molecular and optical processes. These developments include the electron and photon collisions with atoms ions and molecules which are required in the analysis of laboratory and astrophysical plasmas multiphoton processes required in the analysis of superintense laser interactions with atoms and molecules and positron collisions with atoms and molecules required in antimatter studies of scientific and technological importance. Basic mathematical results and general and widely used R matrix computer programs are summarized in the appendices.

Decoding **Electron Atom Collisions**: Revealing the Captivating Potential of Verbal Expression

In a time characterized by interconnectedness and an insatiable thirst for knowledge, the captivating potential of verbal expression has emerged as a formidable force. Its capability to evoke sentiments, stimulate introspection, and incite profound transformations is genuinely awe-inspiring. Within the pages of "**Electron Atom Collisions**," a mesmerizing literary creation penned by a celebrated wordsmith, readers set about an enlightening odyssey, unraveling the intricate significance of language and its enduring effect on our lives. In this appraisal, we shall explore the book's central themes, evaluate its distinctive writing style, and gauge its pervasive influence on the hearts and minds of its readership.

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