

Advances In Atomic Molecular And Optical Physics Vol 59

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Explore the cutting-edge developments presented in "Advances In Atomic Molecular And Optical Physics Vol 59," delving into the latest research across atomic, molecular, and optical (AMO) physics. This volume offers invaluable insights into quantum phenomena, novel experimental techniques, and theoretical breakthroughs shaping the future of physics.

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Advances in Atomic, Molecular, and Optical Physics

This volume continues the tradition of the Advances series. It contains contributions from experts in the field of atomic, molecular, and optical (AMO) physics. The articles contain some review material, but are intended to provide a comprehensive picture of recent important developments in AMO physics. Both theoretical and experimental articles are included in the volume. International experts Comprehensive articles New developments

Advances In Atomic, Molecular, and Optical Physics

This volume contains the index for volumes 1-38 in the Advances in Atomic, Molecular, and Optical Physics series.

Advances in Atomic and Molecular Physics

Praise for Previous Volumes "This volume maintains the authoritative standards of the series...The editors and publishers are to be congratulated" - M.S. CHILD in PHYSICS BULLETIN "Maintains the high standards of earlier volumes in the series...All the series are written by experts in the field, and their summaries are most timely...Strongly recommended." - G. HERZBERG in AMERICAN SCIENTIST

Advances in Atomic, Molecular, and Optical Physics

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Advances in Atomic, Molecular, and Optical Physics

Volume 55 of the Advances Series contains seven contributions, covering a diversity of subject areas in atomic, molecular and optical physics. In their contribution, Stowe, Thorpe, Pe'er, Ye, Stalnaker, Gerginov, and Diddams explore recent developments in direct frequency comb spectroscopy. Precise phase coherence among successive ultrashort pulses of a frequency comb allows one to probe fast dynamics in the time domain and high-resolution structural information in the frequency domain for both atoms and molecules. The authors provide a detailed review of some of the current applications that exploit the unique features of frequency comb spectroscopy and discuss its future directions. Yurvsky, Olshanii and Weiss review theory and experiment of elongated atom traps that confine ultracold gases in a quasi-one-dimensional regime. Under certain conditions, these quasi-one-dimensional gases are well-described by integrable one-dimensional many-body models with exact quantum solutions. Thermodynamic and correlation properties of one such model that has been experimentally realized are reviewed. DePaola, Morgenstein and Andersen discuss magneto-optical trap recoil ion momentum spectroscopy (MOTRIMS), exploring collisions between a projectile and target resulting in charged target fragments. MOTRIMS combines the technology of laser cooling and trapping of target atoms with the momentum analysis of the charged fragments that recoil from the target. The authors review the different MOTRIMS experimental approaches and the spectroscopic and collisional investigations performed so far. Safronova and Johnson give an overview of atomic many-body perturbation theory and discuss why extensions of the theory are needed. They present "all-order" results based on a linearized version of coupled cluster expansions and apply the theory to calculations of energies, transition matrix elements and hyperfine constants. Another contribution on atomic theory, authored by Fischer, explores the advantages of expanding the atomic radial wave functions in a B-spline basis. The differential equations are replaced by non-linear systems of equations and the problems of orthogonality requirements can be dealt with using projection operators. Electron-ion collisional processes are analyzed by Mueller, including descriptions of the experimental techniques needed to obtain cross section data and typical values for these cross sections. The present status of the field is discussed in relation to the detailed cross sections and rate coefficients that are needed for understanding laboratory or astrophysical plasmas. Finally, Duan and Monroe review ways to achieve scalable and robust quantum communication, state engineering, and quantum computation. Using radiation and atoms, ions, or atomic ensembles, they show that they can construct scalable quantum networks that are inherently insensitive to noise. Progress in experimental realization of their proposals is outlined. • International experts • Comprehensive articles • New developments

Advances in Atomic, Molecular, and Optical Physics

Advances in Atomic, Molecular, and Optical Physics publishes reviews of recent developments in a field which is in a state of rapid growth, as new experimental and theoretical techniques are used on many old and new problems. Topics covered include related applied areas, such as atmospheric science, astrophysics, surface physics and laser physics. Articles are written by distinguished experts, and contain both relevant review material and detailed descriptions of important recent developments. International experts Comprehensive articles New developments

Advances in Atomic, Molecular, and Optical Physics

The goals of atomic, molecular, and optical physics (AMO physics) are to elucidate the fundamental laws of physics, to understand the structure of matter and how matter evolves at the atomic and molecular levels, to understand light in all its manifestations, and to create new techniques and devices. AMO physics provides theoretical and experimental methods and essential data to neighboring areas of science such as chemistry, astrophysics, condensed-matter physics, plasma physics, surface science, biology, and medicine. It contributes to the national security system and to the nation's programs in fusion, directed energy, and materials research. Lasers and advanced technologies such as optical processing and laser isotope separation have been made possible by discoveries in AMO physics, and the research underlies new industries such as fiber-optics communications and laser-assisted manufacturing. These developments are expected to help the nation to maintain its industrial competitiveness and its military strength in the years to come. This report describes the field, characterizes recent advances, and identifies current frontiers of research.

Atomic, Molecular, and Optical Physics

This series, established in 1965, is concerned with recent developments in the general area of atomic, molecular, and optical physics. The field is in a state of rapid growth, as new experimental and theoretical techniques are used on many old and new problems. Topics covered also include related applied areas, such as atmospheric science, astrophysics, surface physics, and laser physics. Articles are written by distinguished experts who are active in their research fields. The articles contain both relevant review material as well as detailed descriptions of important recent developments.

Advances in Atomic, Molecular and Optical Physics

"Presents recent developments in the general area of atomic, molecular, and optical physics. Topics covered generally include related applied areas - such as atmospheric science, astrophysics, surface physics, and laser physics."--Provided by publisher.

Advances in Atomic, Molecular, and Optical Physics

This text provides a summary of the key ideas, techniques and research results in the field of atomic, molecular and optical physics. It is intended to be of interest to all physicians (especially in condensed matter and chemical physics) and engineers, as

Advances in Atomic, Molecular, and Optical Physics

ATOMIC AND MOLECULAR PHYSICS: Introduction to Advanced Topics introduces advanced topics of Atomic and Molecular Collision Physics covering Atomic structure calculations, Photoionization of atomic systems, Electron-atom collisions, Ion-atom collisions, Collisions involving exotic particles, Ultracold atoms and Bose-Einstein condensation as well as Atomic data and Plasma diagnostics. This volume is very useful to start research in theoretical and experimental Atomic and Molecular Physics. The book is also helpful to those working in interrelated research areas like Laser physics, Astrophysics and Plasma and Fusion research where such a background of theoretical Atomic Collision Physics is an integral part.

Advances in Atomic, Molecular, and Optical Physics

This thesis focuses on nonlinear spectroscopy from a quantum optics perspective. First, it provides a detailed introduction to nonlinear optical signals; starting from Glauber's photon counting formalism, it establishes the diagrammatic formulation, which forms the backbone of nonlinear molecular spectroscopy. The main body of the thesis investigates the impact of quantum correlations in entangled photon states on two-photon transitions, with a particular focus on the time-energy uncertainty, which restricts the possible simultaneous time and frequency resolution in measurements. It found that this can be violated with entangled light for individual transitions. The thesis then presents simulations of possible experimental setups that could exploit this quantum advantage. The final chapter is devoted to an application of the rapidly growing field of multidimensional spectroscopy to trapped ion chains, where it is employed to investigate nonequilibrium properties in quantum simulations.

Advances in Atomic and Molecular Physics

The series Topics in Current Chemistry presents critical reviews of the present and future trends in modern chemical research. The scope of coverage is all areas of chemical science including the interfaces with related disciplines such as biology, medicine and materials science. The goal of each thematic volume is to give the non-specialist reader, whether in academia or industry, a comprehensive insight into an area where new research is emerging which is of interest to a larger scientific audience. Each review within the volume critically surveys one aspect of that topic and places it within the context of the volume as a whole. The most significant developments of the last 5 to 10 years are presented using selected examples to illustrate the principles discussed. The coverage is not intended to be an exhaustive summary of the field or include large quantities of data, but should rather be conceptual, concentrating on the methodological thinking that will allow the non-specialist reader to understand the information presented. Contributions also offer an outlook on potential future developments in the field. Review articles for the individual volumes are invited by the volume editors. Readership: research chemists at universities or in industry, graduate students

Advances in Atomic, Molecular, and Optical Physics

The third, partly revised and enlarged edition of this introductory reference summarizes the terms and definitions, most important phenomena, and regulations occurring in the physics, chemistry, technology, and application of nanostructures. A representative collection of fundamental terms and definitions from quantum physics and chemistry, special mathematics, organic and inorganic chemistry, solid state physics, material science and technology accompanies recommended secondary sources for an extended study of any given subject. Each of the more than 2,200 entries, from a few sentences to a page in length, interprets the term or definition in question and briefly presents the main features of the phenomena behind it. Additional information in the form of notes ("First described in\

Atomic, Molecular, and Optical Physics Handbook

The breadth, scope and volume of research in atomic, molecular and optical (AMO) physics have increased enormously in the last few years. Following the widespread use of pulsed lasers, certain newly emerging areas as well as selected mature subfields are ushering in a second renaissance. This volume focuses on current research in these crucial areas: cold atoms and Bose-Einstein condensates, quantum information and quantum computation, and new techniques for investigating collisions and structure. The topics covered include: the multireference coupled cluster method in quantum chemistry and the role of electronic correlation in nanosystems; laser cooling of atoms and theories of the Bose-Einstein condensate; and quantum computing and quantum information transfer using cold atoms and shaped ultrafast pulses. Other articles deal with recent findings in heavy ion collisions with clusters, time-of-flight spectroscopy techniques, and a specific example of a chaotic quantum system. The contributions will greatly assist in the sharing of specialized knowledge among experts and will also be useful for postgraduate students striving to obtain an overall picture of the current research status in the areas covered.

Atomic and Molecular Physics

This book collects research and review articles covering some recent trends in nonrelativistic quantum electrodynamics, specifically the interaction of atoms or molecules within the quantum electromagnetic radiation field and the related physical effects. Specific topics covered are: two- and three-body dispersion interactions between atoms and molecules, both in the nonretarded van der Waals and the retarded Casimir–Polder regime; vacuum field fluctuations of the electromagnetic field and their effect in atomic systems; dispersion interactions between uniformly accelerating atoms and relation with the Fulling–Davies–Unruh effect; dynamics of atomic systems under strong electromagnetic fields; symmetries in quantum electrodynamics; and open quantum systems.

Quantum-Enhanced Nonlinear Spectroscopy

The first six chapters introduce Schrödinger's equation and develop the quantized description of common systems that exist in real space like a vibrator, nano-particles, atoms, crystals, etc. Beginning in Ch. 7 and for the remaining nine chapters, the focus is primarily on dynamical behaviour and how to think about real quantum systems. Spin, the quantized electromagnetic field, dissipation, loss and spontaneous emission, are discussed as well as quantum optics and the operator equations for common two-state systems such as the quantum flip flop and the density matrix equations. The book is structured so that a two semester course sequence is possible or a single semester course with options discussed in the preface to set different learning objectives. .

Frontiers in Atomic, Molecular and Optical Physics, Vol. 3

A comprehensive assessment of the current state of atomic, molecular, and optical science in the US. Considers the personnel, facilities, and funding required to meet national needs in education, defense, industry, and human health; current and future opportunities; research and educational priorities

Density-Functional Methods for Excited States

The Advances in Chemical Physics series provides the chemical physics and physical chemistry fields with a forum for critical, authoritative evaluations of advances in every area of the discipline. Filled with cutting-edge research reported in a cohesive manner not found elsewhere in the literature, each volume of the Advances in Chemical Physics series serves as the perfect supplement to any advanced graduate class devoted to the study of chemical physics.

What is What in the Nanoworld

This book presents a basic introduction to quantum mechanics. Depending on the choice of topics, it can be used for a one-semester or two-semester course. An attempt has been made to anticipate the conceptual problems students encounter when they first study quantum mechanics. Wherever possible, examples are given to illustrate the underlying physics associated with the mathematical equations of quantum mechanics. To this end, connections are made with corresponding phenomena in classical mechanics and electromagnetism. The problems at the end of each chapter are intended to help students master the course material and to explore more advanced topics. Many calculations exploit the extraordinary capabilities of computer programs such as Mathematica, MatLab, and Maple. Students are urged to use these programs, just as they had been urged to use calculators in the past. The treatment of various topics is rather complete, in that most steps in derivations are included. Several of the chapters go beyond what is traditionally covered in an introductory course. The goal of the presentation is to provide the students with a solid background in quantum mechanics.

Current Topics In Atomic, Molecular And Optical Physics: Invited Lectures Of Tc-2005

Modern Electronic Structure Theory provides a didactically oriented description of the latest computational techniques in electronic structure theory and their impact in several areas of chemistry. The book is aimed at first year graduate students or college seniors considering graduate study in computational chemistry, or researchers who wish to acquire a wider knowledge of this field.

New Trends in Quantum Electrodynamics

Keywords: "This treatise is a pedagogically oriented collection of 22 chapters chosen to comprehensively present the quantum mechanics of electronic phenomena in molecules. It is an excellent effort to match increases in the physical understanding of chemistry with the astonishing advances in digital computer power and accessibility ... The two-volume set is a necessary addition to chemistry libraries or research group holdings." J. Am. Chem. Soc.

Introduction to Quantum Nanotechnology

This series, established in 1965, is concerned with recent developments in the general area of atomic, molecular, and optical physics. The field is in a state of rapid growth, as new experimental and theoretical techniques are used on many old and new problems. Topics covered also include related applied areas, such as atmospheric science, astrophysics, surface physics, and laser physics. Articles are written by distinguished experts who are active in their research fields. The articles contain both relevant review material and detailed descriptions of important recent developments.

Atomic, Molecular, and Optical Science

Of all measurement units, frequency is the one that may be determined with the highest degree of accuracy. It equally allows precise measurements of other physical and technical quantities, whenever they can be measured in terms of frequency. This volume covers the central methods and techniques relevant for frequency standards developed in physics, electronics, quantum electronics, and statistics. After a review of the basic principles, the book looks at the realisation of commonly used components. It then continues with the description and characterisation of important frequency standards from atomic clocks, to frequency stabilised lasers. The whole is rounded off with a discussion of topical applications in engineering, telecommunications, and metrology.

Advances in Chemical Physics, Volume 59, Index 1 - 55

The Vol.1 devoted to various topics of optics and optic instrumentation, and contains 17 chapters written by 36 experts in the field from 15 countries: Brazil, China, Denmark, France, Germany, India, Japan, Mexico, Russia, Turkey, Slovenia, South Korea, UK, Ukraine and USA. Advances in Optics: Reviews Book Series is a comprehensive study of the field of optics, which provides readers with the most up-to-date coverage of optics, photonics and lasers with a good balance of practical and theoretical aspects. Directed towards both physicists and engineers this Book Series is also suitable for audiences focusing on applications of optics. A clear comprehensive presentation makes these books work well as both a teaching resources and a reference books. The book is intended for researchers and scientists in physics and optics, in academia and industry, as well as postgraduate students.

Introductory Quantum Mechanics

Combined with the other two volumes, this text is a comprehensive treatment of the key experimental methods of atomic, molecular, and optical physics, as well as an excellent experimental handbook for the field. The wide availability of tunable lasers in the past several years has revolutionized the field and led to the introduction of many new experimental methods that are covered in these volumes. Traditional methods are also included to ensure that the volumes will be a complete reference source for the field.

Modern Electronic Structure Theory

Advances in Optics: Reviews Book Series is a comprehensive study of the field of optics, which provides readers with the most up-to-date coverage of optics, photonics and lasers with a good balance of practical and theoretical aspects. Directed towards both physicists and engineers this Book Series is also suitable for audiences focusing on applications of optics. A clear comprehensive presentation makes these books work well as both a teaching resource and a reference book. The book is intended for researchers and scientists in physics and optics, in academia and industry, as well as postgraduate students. The Vol.1 is devoted to various topics of optics and optical instrumentation, and contains 17 chapters written by 36 experts in the field from 15 countries: Brazil, China, Denmark, France, Germany, India, Japan, Mexico, Russia, Turkey, Slovenia, South Korea, UK, Ukraine and USA.

Modern Electronic Structure Theory

Covers quantum scattering theories, experimental and theoretical calculations and applications in a comprehensive manner.

Advances in Atomic, Molecular, and Optical Physics

This book, which presents the peer-reviewed post-proceedings of CSNDD 2012 and CSNDD 2014, addresses the important role that relevant concepts and tools from nonlinear and complex dynamics could play in present and future engineering applications. It includes 22 chapters contributed by outstanding researchers and covering various aspects of applications, including: structural health monitoring, diagnosis and damage detection, experimental methodologies, active vibration control and smart structures, passive control of structures using nonlinear energy sinks, vibro-impact dynamic MEMS/NEMS/AFM, energy-harvesting materials and structures, and time-delayed feedback control, as well as aspects of deterministic versus stochastic dynamics and control of nonlinear phenomena in physics. Researchers and engineers interested in the challenges posed and opportunities offered by nonlinearities in the development of passive and active control strategies, energy harvesting, novel design criteria, modeling and characterization will find the book to be an outstanding introduction.

Frequency Standards

Comprises a comprehensive reference source that unifies the entire fields of atomic molecular and optical (AMO) physics, assembling the principal ideas, techniques and results of the field. 92 chapters written by about 120 authors present the principal ideas, techniques and results of the field, together with a guide to the primary research literature (carefully edited to ensure a uniform coverage and style, with extensive cross-references). Along with a summary of key ideas, techniques, and results, many chapters offer diagrams of apparatus, graphs, and tables of data. From atomic spectroscopy to applications in comets, one finds contributions from over 100 authors, all leaders in their respective disciplines. Substantially updated and expanded since the original 1996 edition, it now contains several entirely new chapters covering current areas of great research interest that barely existed in 1996, such as Bose-Einstein condensation, quantum information, and cosmological variations of the fundamental constants. A fully-searchable CD-ROM version of the contents accompanies the handbook.

Recent Advances in Atomic Physics

Compiled by 330 of the most widely respected names in the electro-optical sciences, the Encyclopedia is destined to serve as the premiere guide in the field with nearly 2000 figures, 560 photographs, 260 tables, and 3800 equations. From astronomy to x-ray optics, this reference contains more than 230 vivid entries examining the most intriguing technological advances and perspectives from distinguished professionals around the globe. The contributors have selected topics of utmost importance in areas

including digital image enhancement, biological modeling, biomedical spectroscopy, and ocean optics, providing thorough coverage of recent applications in this continually expanding field.

Advances in Optics, Vol. 1

Atomic, Molecular, and Optical Physics: Atoms and Molecules