Introductory Quantum Optics Authors Gerry Christopher Knight Peter 2004 Published By Cambridge University Press Paperback

Frontiers and Advances in Molecular Spectroscopy once again brings together the most eminent scientists from around the world to describe their work at the cutting-edge of molecular spectroscopy. Much of what we know about atoms, molecules and the nature of matter has been obtained using spectroscopy over the last one hundred years or so. Going far beyond the topics discussed in Jaan Laane's earlier book on the subject, these chapters describe new methodologies and applications, instrumental developments and theory, which are taking spectroscopy into still new frontiers. The robust range of topics once again demonstrates the wide utility of spectroscopic techniques. New topics include ultrafast spectroscopy of the transition state, SERS/far-uv spectroscopy, femtosecond coherent anti-Stokes Raman spectroscopy, high-resolution laser induced fluorescence spectroscopy, Raman spectroscopy and biosensors, vibrational optical activity, ultrafast two-dimensional spectroscopy, biology with x-ray lasers, isomerization dynamics and hydrogen bonding, single molecule imaging, spectra of intermediates, matrix isolation spectroscopy and more. Covers spectroscopic investigations on the cutting edge of science Written and edited by leading experts in their respective fields Allows researchers to access a broad range of essential modern spectroscopy content from a single source rather than wading through hundreds of scattered journal articles

Atomic correlations have been studied in physics for over 50 years and known as collective effects until recently when they came to be recognized as a source of entanglement. This is the first book that contains detailed and comprehensive analysis of two currently extensively studied subjects of atomic and quantum physics—atomic correlations and their relations to entanglement between atoms or atomic systems—along with the newest developments in these fields. This book assembles accounts of many phenomena related to or resulting from atomic correlations. The essential language of the book is in terms of density matrices and master equations that provide detailed theoretical treatments and experimental analysis of phenomena such as entanglement between atoms, spontaneously or externally induced atomic coherence, engineering of atomic correlations, storage and controlled transfer of correlations, and dynamics of correlated systems.

This textbook is for a course in advanced solid-state theory. It is aimed at graduate students in their third or fourth year of study who wish to learn the advanced techniques of solid-state theoretical physics. The method of Green's functions is introduced at the beginning and used throughout. Indeed, it could be considered a book on practical applications of Green's functions, although I prefer to call it a book on physics. The method of Green's functions has been used by many theorists to derive equations which, when solved, provide an accurate numerical description of many processes in solids and quantum fluids. In this book I attempt to summarize many of these theories in order to show how Green's functions are used to solve real problems. My goal, in writing each section, is to describe calculations which can be compared with experiments and to provide these comparisons whenever available. The student is

expected to have a background in quantum mechanics at the level acquired from a graduate course using the textbook by either L. I. Schiff, A. S. Davydov, or I. Landau and E. M. Lifshiftz. Similarly, a prior course in solid-state physics is expected, since the reader is assumed to know concepts such as Brillouin zones and energy band theory. Each chapter has problems which are an important part of the lesson; the problems often provide physical insights which are not in the text. Sometimes the answers to the problems are provided, but usually not.

Quantum mechanics and the theory of operators on Hilbert space have been deeply linked since their beginnings in the early twentieth century. States of a quantum system correspond to certain elements of the configuration space and observables correspond to certain operators on the space. This book is a brief, but self-contained, introduction to the mathematical methods of quantum mechanics, with a view towards applications to Schrodinger operators. Part 1 of the book is a concise introduction to the spectral theory of unbounded operators. Only those topics that will be needed for later applications are covered. The spectral theorem is a central topic in this approach and is introduced at an early stage. Part 2 starts with the free Schrodinger equation and computes the free resolvent and time evolution. Position, momentum, and angular momentum are discussed via algebraic methods. Various mathematical methods are developed, which are then used to compute the spectrum of the hydrogen atom. Further topics include the nondegeneracy of the ground state, spectra of atoms, and scattering theory. This book serves as a self-contained introduction to spectral theory of unbounded operators in Hilbert space with full proofs and minimal prerequisites: Only a solid knowledge of advanced calculus and a one-semester introduction to complex analysis are required. In particular, no functional analysis and no Lebesgue integration theory are assumed. It develops the mathematical tools necessary to prove some key results in nonrelativistic quantum mechanics. Mathematical Methods in Quantum Mechanics is intended for beginning graduate students in both mathematics and physics and provides a solid foundation for reading more advanced books and current research literature. It is well suited for self-study and includes numerous exercises (many with hints).

Using a selection of key experiments performed over the past 30 years or so, we present a discussion of the strikingly counter-intuitive phenomena of the quantum world that defy explanation in terms of everyday "common sense" reasoning, and we provide the corresponding quantum mechanical explanations with a very elementary use of associated formalism. Most, but certainly not all, of the experiments we describe are optical experiments involving a very small number of photons (particles of light). We begin with experiments on the wave-particle duality of electrons, proceed to experiments on the particle nature of light and single photon interference, delayed choice experiments and interaction-free detection, then go on to experiments involving the interference of two photons, quantum entanglement and Bell's Theorem, quantum teleportation, large-scale quantum effects and the divide between the classical and quantum worlds, addressing the question as to whether or not there is such a divide.

This book presents a comprehensive overview of the spectacular advances seen in atomic physics during the last 50 years. The authors explain how such progress was possible by highlighting connections between developments that occurred at different times. They discuss the new perspectives and the new research fields that look

promising. The emphasis is placed, not on detailed calculations, but rather on physical ideas. Combining both theoretical and experimental considerations, the book will be of interest to a wide range of students, teachers and researchers in quantum and atomic physics.Contents: General IntroductionGeneral Background"Light: A Source of Information on Atoms: "Optical MethodsLinear Superpositions of Internal Atomic StatesResonance FluorescenceAdvances in High Resolution Spectroscopy"Atom-Photon Interactions: A Source of Perturbations forAtoms Which Can Be Useful: "Perturbations Due to a Quasi Resonant Optical ExcitationPerturbations Due to a High Frequency Excitation"Atom-Photon Interactions: A Simple System for Studying Higher Order Effects: "Multiphoton Processes Between Discrete StatesPhotoionization of Atoms in Intense Laser fields"Atom-Photon Interactions: A Tool for Controlling and Manipulating Atomic Motion: "Radiative Forces Exerted on a Two-Level Atom at RestLaser Cooling of Two-Level AtomsSub-Doppler Cooling. Sub-Recoil CoolingTrapping of Particles"Ultracold Interactions and Their Control: "Two-Body Interactions at Low TemperaturesControlling Atom-Atom Interactions"Exploring Quantum Interferences with Few Atoms and Photons: "Interference of Atomic de Broglie WavesRamsey Fringes Revisited and Atomic InterferometryQuantum Correlations. Entangled States"Degenerate Quantum Gases: "Emergence of Quantum Effects in a GasThe Long Quest for Bose-Einstein CondensationMean Field Description of a Bose-Einstein CondensateCoherence Properties of Bose-Einstein CondensatesElementary Excitations and Superfluidity in Bose-Einstein Condensates"Frontiers of Atomic Physics: "Testing Fundamental Symmetries. Parity Violation in AtomsQuantum Gases as Simple Systems for Many-Body PhysicsExtreme LightGeneral Conclusion Readership: Graduate students, researchers and academics interested in quantum and atomic physics.

Covering a number of important subjects in quantum optics, this textbook is an excellent introduction for advanced undergraduate and beginning graduate students, familiarizing readers with the basic concepts and formalism as well as the most recent advances. The first part of the textbook covers the semi-classical approach where matter is quantized, but light is not. It describes significant phenomena in quantum optics, including the principles of lasers. The second part is devoted to the full quantum description of light and its interaction with matter, covering topics such as spontaneous emission, and classical and non-classical states of light. An overview of photon entanglement and applications to quantum information is also given. In the third part, non-linear optics and laser cooling of atoms are presented, where using both approaches allows for a comprehensive description. Each chapter describes basic concepts in detail, and more specific concepts and phenomena are presented in 'complements'.

This volume is a review on coherent states and some of their applications. The usefulness of the concept of coherent states is illustrated by considering specific examples from the fields of physics and mathematical physics. Particular emphasis is given to a general historical introduction, general continuous representations, generalized coherent states, classical and quantum correspondence, path integrals and canonical formalism. Applications are considered in quantum mechanics, optics, quantum chemistry, atomic physics, statistical physics, nuclear physics, particle physics and cosmology. A selection of original papers is reprinted.

This book develops the theoretical and experimental basis of quantum optics, i.e. the interaction of individual particles of light (photons) with matter, starting from elementary quantum theory. The self-contained exposition will be useful to graduate students in physics, engineering, chemistry, and senior undergraduates in physics.

Covering the theory of computation, information and communications, the physical aspects of computation, and the physical limits of computers, this text is based on the notes taken by one of its editors, Tony Hey, on a lecture course on computation given b

Concepts of Quantum Optics is a coherent and sequential coverage of some real insight into quantum physics. This book is divided into six chapters, and begins with an overview of the principles and concepts of radiation and quanta, with an emphasis on the significance of the Maxwell's electromagnetic theory of light. The next chapter describes first the properties of the radiation field in a bounded cavity, showing how each cavity field mode has the characteristics of a simple harmonic oscillator and how each can be quantized using known results for the quantum harmonic oscillator. This chapter also deals with the quantum fluctuations of the radiation field and the interpretation of a photon as an occupation of a normal mode of the system. These topics are followed by discussions of the radiation absorption and emission and the principles of coherent state and coherence functions. The final chapter considers the concept of semi-classical theory and its connection to quantum electrodynamics. This book is of value to undergraduate and postgraduate students who are starting research in laser physics or quantum optics.

Ideal for graduate courses on quantum optics, this textbook provides an up-to-date account of the basic principles and applications. It features end-of-chapter exercises with solutions available for instructors at www.cambridge.org/9781107006409. It is invaluable to both graduate students and researchers in physics and photonics, quantum information science and quantum communications.

In his foreword to Schrödinger's Machines, Paul Davies writes, "The nineteenth century was known as the machine age, the twentieth century will go down in history as the information age. I believe the twenty-first century will be the quantum age." Perhaps the most successful scientific theory in history, quantum mechanics has already ushered in the information age with inventions like the transistor and the laser. In Schrödinger's Machines, renowned quantum physicist Gerard Milburn explores how our ever-increasing ability to manipulate atomic and subatomic processes is turning purely hypothetical situations and concepts (of a truly weird nature) into concrete, practical devices-- resulting in a complete transformation of our world view. Imagine the creation of machines the size of molecules, detectors sensitive enough to pick up the sound of a pin dropping on the other side of the earth, the fabrication of new and exotic materials, and extraordinarily powerful computers that can process information in many

alternative realities simultaneously, creating a whole new type of mathematics. This isn't science fiction, but just some of the breathtaking possibilities offered by quantum technology over the next fifty years. Leaving the common sense of Newtonian machines far behind, Schrödinger's Machines is an advance preview of the strange new world ahead. Clearly presented, and with an acute awareness of recent advances in the field, it's indispensable reading for anyone interested in the future.

Quantum cryptography (or quantum key distribution) is a state-of-the-art technique that exploits properties of quantum mechanics to guarantee the secure exchange of secret keys. This 2006 text introduces the principles and techniques of quantum cryptography, setting it in the wider context of cryptography and security, with specific focus on secret-key distillation. The book starts with an overview chapter, progressing to classical cryptography, information theory (classical and quantum), and applications of quantum cryptography. The discussion moves to secret-key distillation, privacy amplification and reconciliation techniques, concluding with the security principles of quantum cryptography. The author explains the physical implementation and security of these systems, enabling engineers to gauge the suitability of quantum cryptography for securing transmission in their particular application. With its blend of fundamental theory, implementation techniques, and details of recent protocols, this book will be of interest to graduate students, researchers, and practitioners in electrical engineering, physics, and computer science.

This is the first of a two-volume presentation on current research problems in quantum optics, and will serve as a standard reference in the field for many years to come. The book provides an introduction to the methods of quantum statistical mechanics used in quantum optics and their application to the quantum theories of the single-mode laser and optical bistability. The generalized representations of Drummond and Gardiner are discussed together with the more standard methods for deriving Fokker-Planck equations.

This book on quantum optics is from the point of view of an experimentalist. It approaches the theory of quantum optics with the language of optical modes of classical wave theory, with which experimentalists are most familiar. This approach makes the transition easy from classical optics to quantum optics. The emphasis on the multimode description of an optical system is more realistic than in most quantum optics textbooks. After the theoretical part, the book goes directly to the two most basic experimental techniques in quantum optics and establishes the connection between the experiments and the theory. The applications include some key quantum optics experiments, and a few more current interests that deal with quantum correlation and entanglement, quantum noise in phase measurement and amplification, and quantum state measurement. Request Inspection Copy Contents: Theoretical Foundations of Quantum Optics:Historical Development of Quantum Optics and A Brief IntroductionMode Theory of Optical Fields and Their QuantizationQuantum

States of Single-Mode FieldsQuantum States of Multi-Mode FieldsTheory of Photo-detection and Quantum Theory of CoherenceGeneration and Transformation of Quantum StatesExperimental Techniques in Quantum Optics and Their Applications:Experimental Techniques of Quantum Optics I: Photon Counting TechniqueApplications of Photon Counting Techniques: Multi-Photon Interference and EntanglementExperimental Techniques of Quantum Optics II: Detection of Continuous Photo-CurrentsApplications of Homodyne Detection Technique: Quantum Measurement of Continuous VariablesQuantum Noise in Phase MeasurementAppendices:Derivation of an Explicit Expression for Û of a Lossless Beam SplitterEvaluation of the Two Sums in Eq. (8.100) Readership: Advanced undergraduates, graduate students and researchers in quantum optics.

Provides fully updated coverage of new experiments in quantum optics This fully revised and expanded edition of a well-established textbook on experiments on quantum optics covers new concepts, results, procedures, and developments in state-of-the-art experiments. It starts with the basic building blocks and ideas of quantum optics, then moves on to detailed procedures and new techniques for each experiment. Focusing on metrology, communications, and quantum logic, this new edition also places more emphasis on single photon technology and hybrid detection. In addition, it offers end-of-chapter summaries and full problem sets throughout. Beginning with an introduction to the subject, A Guide to Experiments in Quantum Optics, 3rd Edition presents readers with chapters on classical models of light, photons, quantum models of light, as well as basic optical components. It goes on to give readers full coverage of lasers and amplifiers, and examines numerous photodetection techniques being used today. Other chapters examine quantum noise, squeezing experiments, the application of squeezed light, and fundamental tests of quantum mechanics. The book finishes with a section on quantum information before summarizing of the contents and offering an outlook on the future of the field. -Provides all new updates to the field of quantum optics, covering the building blocks, models and concepts, latest results, detailed procedures, and modern experiments -Places emphasis on three major goals: metrology, communications, and quantum logic -Presents fundamental tests of quantum mechanics (Schrodinger Kitten, multimode entanglement, photon systems as quantum emulators), and introduces the density function -Includes new trends and technologies in quantum optics and photodetection, new results in sensing and metrology, and more coverage of quantum gates and logic, cluster states, waveguides for multimodes, discord and other quantum measures, and quantum control -Offers end of chapter summaries and problem sets as new features A Guide to Experiments in Quantum Optics, 3rd Edition is an ideal book for professionals, and graduate and upper level students in physics and engineering science.

The book describes classical (non-quantum) optical phenomena and the instruments and technology based on them. It includes many cutting-edge areas

of modern physics and its applications which are not covered in many larger and more expensive books.

This book is a thoroughly modern and highly pedagogical graduate-level introduction to quantum optics, a subject which has witnessed stunning developments in recent years and has come to occupy a central role in the 'second quantum revolution'. The reader is invited to explore the fundamental role that quantum optics plays in the control and manipulation of quantum systems, leading to ultracold atoms, circuit QED, quantum information science, quantum optomechanics, and quantum metrology. The building blocks of the subject are presented in a sequential fashion, starting from the simplest physical situations before moving to increasingly complicated ones. This pedagogically appealing approach leads to quantum entanglement and measurement theory being introduced early on and before more specialized topics such as cavity QED or laser cooling. The final chapter illustrates the power of scientific cross-fertilization by surveying cutting-edge applications of quantum optics and optomechanics in gravitational wave detection, tests of fundamental physics, searches for dark matter, geophysical monitoring, and ultraprecise clocks. Complete with worked examples and exercises, this book provides the reader with enough background knowledge and understanding to follow the current journal literature and begin producing their own original research.

The emerging field of semiconductor quantum optics combines semiconductor physics and quantum optics, with the aim of developing quantum devices with unprecedented performance. In this book researchers and graduate students alike will reach a new level of understanding to begin conducting state-of-the-art investigations. The book combines theoretical methods from quantum optics and solid-state physics to give a consistent microscopic description of light-matter- and many-body-interaction effects in low-dimensional semiconductor nanostructures. It develops the systematic theory needed to treat semiconductor quantum-optical effects, such as strong light-matter coupling, light-matter entanglement, squeezing, as well as quantum-optical semiconductor spectroscopy. Detailed derivations of key equations help readers learn the techniques and nearly 300 exercises help test their understanding of the materials covered. The book is accompanied by a website hosted by the authors, containing further discussions on topical issues, latest trends and publications on the field. The link can be found at www.cambridge.org/9780521875097.

An in-depth and wide-ranging introduction to the field of quantum optics.

An introduction to the area of condensed matter in a nutshell. This textbook covers the standard topics, including crystal structures, energy bands, phonons, optical properties, ferroelectricity, superconductivity, and magnetism.

Quantum Optics for Engineers provides a transparent and methodical introduction to quantum optics via the Dirac's bra–ket notation with an emphasis on practical applications and basic aspects of quantum mechanics such as Heisenberg's uncertainty principle and Schrodinger's equation. Self-contained

and using mainly first-year calculus and algebra tools, the book: Illustrates the interferometric quantum origin of fundamental optical principles such as diffraction, refraction, and reflection Provides a transparent introduction, via Dirac's notation, to the probability amplitude of quantum entanglement Explains applications of the probability amplitude of quantum entanglement to optical communications, quantum cryptography, quantum teleportation, and quantum computing. Quantum Optics for Engineers is succinct, transparent, and practical, revealing the intriguing world of quantum entanglement via many practical examples. Ample illustrations are used throughout its presentation and the theory is presented in a methodical, detailed approach.

A unified treatment of coherence theory and polarization for graduate students and researchers in physics and engineering.

Quantum computing promises to solve problems which are intractable on digital computers. Highly parallel quantum algorithms can decrease the computational time for some problems by many orders of magnitude. This important book explains how quantum computers can do these amazing things. Several algorithms are illustrated: the discrete Fourier transform, Shor's algorithm for prime factorization; algorithms for quantum logic gates; physical implementations of quantum logic gates in ion traps and in spin chains; the simplest schemes for quantum error correction; correction of errors caused by imperfect resonant pulses; correction of errors caused by the nonresonant actions of a pulse; and numerical simulations of dynamical behavior of the quantum Control-Not gate. An overview of some basic elements of computer science is presented, including the Turing machine, Boolean algebra, and logic gates. The required quantum ideas are explained.

Written primarily for advanced undergraduate and masters level students in physics, this text includes a broad range of topics in applied quantum optics such as laser cooling, Bose-Einstein condensation and quantum information processing.

Since the early days of nonlinear optics in the 1960s, the field has expanded dramatically, and is now a vast and vibrant field with countless technological applications. Providing a gentle introduction to the principles of the subject, this textbook is ideal for graduate students starting their research in this exciting area. After basic ideas have been outlined, the book offers a thorough analysis of second harmonic generation and related second-order processes, before moving on to third-order effects, the nonlinear optics of short optical pulses and coherent effects such as electromagnetically-induced transparency. A simplified treatment of high harmonic generation is presented at the end. More advanced topics, such as the linear and nonlinear optics of crystals, the tensor nature of the nonlinear coefficients and their quantum mechanical representation, are confined to specialist chapters so that readers can focus on basic principles before tackling these more difficult aspects of the subject.

The term 'nonclassical states' refers to the quantum states that cannot be produced in the usual sources of light, such as lasers or lamps, rather than those requiring more sophisticated apparatus for their production. Theory of Non-classical States of Light describes the current status of the theory of nonclassical states of light including many new and important results as well as introductory material and the history of the subject. The authors concentrate on the most important types of nonclassical states, namely squeezed, even/odd ('Schrodinger cat') and binomial states, including their generalizations. However, a review of other types of nonclassical is also given in the introduction, and methods for generating nonclassical states on various processes of light-matter interaction, their phase-space description, and the time evolution of nonclassical states in these processes is presented in separate chapters. This contributed volume contains all of the necessary formulae and references required to gain a

good understanding of the principles and current status of the field. It will provide a valuable information resource for advanced students and researchers in quantum physics.

Physics in the Modern World, Second Edition focuses on the applications of physics in a world dominated by technology and the many ways that physical ideas are manifest in everyday situations, from the operation of rockets and cameras to space travel and X-ray photography. It shows how physical principles bring a pattern of simplicity and continuity to the diverse natural and technological world around us. Automobile air bags, artificial gravity, and pollution control, as well as appliance economics, radar, and other modern phenomena and devices are discussed to emphasize the way that physical principles are applied in today's world. Comprised of 21 chapters, this book begins with an introduction to physical ideas, with particular reference to the basic concepts used in describing and measuring things such as length, time, and mass. The discussion then turns to motion, force, and linear momentum, along with circular motion, torque, and angular momentum. Subsequent chapters focus on gravitation and space travel; energy and electricity; liquids and gases; electromagnetism; heat; waves; electromagnetic radiation; light; atoms; relativity; structure of matter; nuclei and nuclear power; and radiation. Each chapter concludes with a list of exercises that include questions and problems. This monograph is intended for physics students who are specializing in other disciplines.

This highly unusual book began as a serious inquiry into Schrödinger's question, “What is life?”, and as a celebration of life itself. It takes the reader on a voyage of discovery through many areas of contemporary physics, from non-equilibrium thermodynamics and quantum optics to liquid crystals and fractals, all necessary for illuminating the problem of life. In the process, the reader is treated to a rare and exquisite view of the organism, gaining novel insights not only into the physics, but also into “the poetry and meaning of being alive.” This much-enlarged third edition includes new findings on the central role of biological water in organizing living processes; it also completes the author's novel theory of the organism and its applications in ecology, physiology and brain science.

Publisher Description

This graduate-level text surveys the fundamentals of quantum optics, including the quantum theory of partial coherence and the nature of the relations between classical and quantum theories of coherence.1968 edition.

Quantum Optics gives a comprehensive coverage of developments in quantum optics over the past twenty years. In the early chapters the formalism of quantum optics is elucidated and the main techniques are introduced. These are applied in the later chapters to problems such as squeezed states of light, resonance fluorescence, laser theory, quantum theory of four-wave mixing, quantum non-demolition measurements, Bell's inequalities, and atom optics. Experimental results are used to illustrate the theory throughout. This yields the most comprehensive and up-to-date coverage of experiment and theory in quantum optics in any textbook.

From events at Nuremberg and Tokyo after World War II, to the recent trials of Slobodan Miloševi? and Saddam Hussein, war crimes trials are an increasingly pervasive feature of the aftermath of conflict. In his new book, Law, War and Crime, Gerry Simpson explores the meaning and effect of such trials, and places them in their broader political and cultural contexts. The book traces the development of the war crimes field from its origins in the outlawing of piracy to its contemporary manifestation in the establishment of the International Criminal Court in The Hague. Simpson argues that the field of war crimes is constituted by a number of tensions between, for example, politics and law, local justice and cosmopolitan reckoning, collective guilt and individual responsibility, and between the instinct that war, at worst, is an error and the conviction that war is a crime. Written in the wake of an extraordinary period in the life of the law, the book asks a number of critical questions. What does it mean to

talk about war in the language of the criminal law? What are the consequences of seeking to criminalise the conduct of one's enemies? How did this relatively new phenomenon of putting on trial perpetrators of mass atrocity and defeated enemies come into existence? This book seeks to answer these important questions whilst shedding new light on the complex relationship between law, war and crime.

The authors examine several topical subjects, commencing with a general introduction to path integrals in quantum mechanics and the group theoretical backgrounds for path integrals. Applications of harmonic analysis, polar coordinate formulation, various techniques and path integrals on SU(2) and SU(1, 1) are discussed. Soluble examples presented include particle-flux system, a pulsed oscillator, magnetic monopole, the Coulomb problem in curved space and others. The second part deals with the SU(2) coherent states and their applications. Construction and generalization of the SU(2) coherent states, formulation of coherent path integrals for spin and unitary spin, and semiclassical quantization are presented. Applications are made to the study of quantum fluctuation, the nonlinear field model and phase holonomy. The final chapters present the theory of the SU(1, 1) coherent states and their applications. The radial coulomb problem, the Morse oscillator, and the large-N approximation are discussed. Applications to problems in quantum optics such as squeezed states, interaction with the squeezed vacuum states, and phase operator formalism are also included.This book will be useful as an introduction to the subject as well as a valuable work of reference. Contents:Part I Path Integrals for SU(2) and SU(1,1) (A Inomata):IntroductionTechniques for Path IntegrationPath Integrals on SU(2)Path Integrals for SU(1,1)Exactly Path-Integrable ExamplesPart II Path Integrals in the SU(2) Coherent State Representation and Related Topics (H Kuratsuji):IntroductionGlauber States RevisitedSU(2) Coherent States and Their GeneralizationPath Integrals for Spin and Unitary SpinSemiclassical Quantization TheoryApplicationsNonlinear Field ModelPhase HolonomyPart III SU(1,1) Coherent States and Path Integrals for SU(1,1) (C C Gerry):IntroductionSU(1,1) and the Perelemov Coherent StatesPath Integral and Classical DynamicsApplications in Quantum MechanicsApplication to Quantum Optics Readership: Physicists. keywords: “The book contains rich supplementary material in appendices. It may turn out to be a useful summary of recent results and a good starting point for further investigations.” Pavel Štovícek Mathematical Reviews “… this book is extremely useful.” J Beckers

This self-contained treatment of field quantization requires no prior knowledge of nonlinear optics. Supplemented by end-of-chapter exercises and detailed examples of calculation techniques in different systems, it is a valuable resource for graduate students and researchers in nonlinear optics, condensed matter physics, quantum information and atomic physics.

The four-week period fran May 20 to June 16, 1984 was an intensive period of advanced study on the foundations and frontiers of nonequili brium statistical physics (NSP). During the first two weeks of this period, an advanced-study course on the "Foundations of NSP" was con ducted in Albuquerque under the sponsorship of the University of New Mexico Center for High-Technology Materials. This was followed by a two-week NATO Advanced Study Insti tute on the "Frontiers of NSP" in Santa Fe under the same directorship. Many Students attended both meetings. This book comprises proceedings based on those lectures and covering a broad spectrum of topics in NSP ranging fran basic problems in quantum measurement theory to analogies between lasers and Darwinian evolution. The various types of quantum distribution functions and their uses are treated by several authors. other tools of NSP, such as Langevin equations, Fokker-Planck equations, and master equations, are developed and applied to areas such as laser physics, plasma physics, Brownian motion, and hydrodynamic instabilities. The properties and experimental detection of squeezed states and antibunching are described, as well as experimental tests of the violation of Bell's inequality. Information theory, mean-field theory, reservoir theory, entropy maximization, and even a novel nonlinear generalization of

quantum mechanics are used to discuss nonequilibrium phenanena and the approach toward thermodynamic equilibrium.

Quantum information processing offers fundamental improvements over classical information processing, such as computing power, secure communication, and high-precision measurements. However, the best way to create practical devices is not yet known. This textbook describes the techniques that are likely to be used in implementing optical quantum information processors. After developing the fundamental concepts in quantum optics and quantum information theory, the book shows how optical systems can be used to build quantum computers according to the most recent ideas. It discusses implementations based on single photons and linear optics, optically controlled atoms and solid-state systems, atomic ensembles, and optical continuous variables. This book is ideal for graduate students beginning research in optical quantum information processing. It presents the most important techniques of the field using worked examples and over 120 exercises.

Conspiracy theories are everywhere in post-war American culture. From postmodern novels to The X-Files and from gangsta rap to feminist polemic, there is a widespread suspicion that sinister forces are conspiring to take control of our national destiny, our minds, and even our bodies. Conspiracy explanations can no longer be dismissed as the paranoid delusions of far-right crackpots. Indeed, they have become a necessary response to a risky and increasingly globalized world, in which everything is connected but nothing adds up. Peter Knight provides an engaging and cogent analysis of the development of conspiracy culture, from 1960s' countercultural suspicions about the authorities to the 1990s, where a paranoid attitude is both routine and ironic. Conspiracy Culture analyses conspiracy narratives about familiar topics like the Kennedy assassination, alien abduction, body horror, AIDS, crack cocaine, the New World Order, as well as more unusual ones like the conspiracies of patriarchy and white supremacy. Conspiracy Culture shows how Americans have come to distrust not only the narratives of the authorities, but even the authority of narrative itself to explain What Is Really Going On. From the complexities of Thomas Pynchon's novels to the endless mysteries of The X-Files, Knight argues that contemporary conspiracy culture is marked by an infinite regress of suspicion. Trust no one, because we have met the enemy and it is us.