Quantum Detection And Estimation Theory

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This concise and readable book addresses primarily readers with a background in classical statistical physics and introduces quantum mechanical notions as required. Conceived as a primer to bridge the gap between statistical physics and quantum information, it emphasizes concepts and thorough discussions of the fundamental notions and prepares the reader for deeper studies, not least through a selection of well chosen exercises.
The purpose of this book is to provide a deeper insight into the modern theories of molecular matter. It incorporates the most important developments which have taken place during the last decades and reflects the modern trend to abstraction. At the present state of the art we have acquired a fairly good knowledge of "how to. compute" small molecules us ing the methods of quantum chemistry. Yet, in spite of many statements to the contrary and many superficial discussions, the theoretical basis of chemistry and biology is not safely in our hands. It is all but impossible to summarize the modern developments of the theory of matter in nontechnical language. But I hope that I can give some feeling for the problems, the intellectual excitements and the wor ries of some theoreticians. I know very well that such an enterprise is a dangerous adventure and that one says that a clever scientist should take care of his reputation by barricading himself behind the safe wall of his speciality. This volume is not meant to be a textbook; in many respects it has complementary goals. For good and bad reasons, most textbooks ignore the historical and philosophical aspects and go ahead on the basis of crude simplifications; many even lie like the devil and do not shrink from naive indoctrination. Some sections of this book can be read as commentaries on our standard texts, they are intended to stir the waters with controversy.
Nano-Optics: Fundamentals, Experimental Methods, and Applications offers insights into the fundamentals and industrial applications of nanoscale light-emitting materials and their composites. This book serves as a reference, offering an overview of existing research, with a particular focus on industrial applications. Nano-optics is the branch of nanoscience and nanotechnology that deals with interaction of light with nanoscale objects. This book explores the materials, structure, manufacturing techniques, and industrial applications of nano-optics. The applications discussed include healthcare, communication, astronomy, and satellites. Explains the major manufacturing techniques for light-emitting nanoscale materials Discusses how nanoscale optical materials are being used in a range of industrial applications Assesses the challenges of using nano-optics in a mass-production context
Modern quantum measurement for graduate students and researchers in quantum information, quantum metrology, quantum control and related fields.
David Middleton was a towering figure of 20th Century engineering and science and one of the founders of statistical communication theory. During the second World War, the young David Middleton, working with Van Fleck, devised the notion of the matched filter, which is the most basic method used for detecting signals in noise. Over the intervening six decades, the contributions of Middleton have become classics. This collection of essays by leading scientists, engineers and colleagues of David are in his honor and reflect the wide influence that he has had on many fields. Also included is the introduction by Middleton to his forthcoming book, which gives a wonderful view of the field of communication, its history and his own views on the field that he developed over the past 60 years. Focusing on classical noise modeling and applications, Classical, Semi-Classical and Quantum Noise includes coverage of statistical communication theory, non-stationary noise, molecular footprints, noise suppression, Quantum error correction, and other related topics.
This book constitutes the thoroughly refereed post-conference proceedings of the 5th Conference on Theory of Quantum Computation, Communication, and Cryptography, TQC 2010, held in Leeds, UK, in April 2010. The 15 revised papers presented were carefully selected during two rounds of reviewing and improvement. Focussing on theoretical aspects of quantum computation, quantum communication, and quantum cryptography - part of a larger interdisciplinary field embedding information science in a quantum mechanical framework - the papers present current original research. Topics addressed include quantum algorithms, models of quantum computation, quantum complexity theory, simulation of quantum systems, quantum cryptography, quantum communication, quantum estimation and measurement, quantum noise, quantum coding theory, fault-tolerant quantum computing, and entanglement theory.
The book provides an overview of the most advanced quantum informational geometric techniques, which can help quantum communication theorists analyze quantum channels, such as security or additivity properties. Each section addresses an area of major research of quantum information theory and quantum communication networks. The authors present the fundamental theoretical results of quantum information theory, while also presenting the details of advanced quantum ccommunication protocols with clear mathematical and information theoretical background. This book bridges the gap between quantum physics, quantum information theory, and practical engineering.
The seven-volume set LNCS 12137, 12138, 12139, 12140, 12141, 12142, and 12143 constitutes the proceedings of the 20th International Conference on Computational Science, ICCS 2020, held in Amsterdam, The Netherlands, in June 2020.* The total of 101 papers and 248 workshop papers presented in this book set were carefully reviewed and selected from 719 submissions (230 submissions to the main track and 489 submissions to the workshops). The papers were organized in topical sections named: Part I: ICCS Main Track Part II: ICCS Main Track Part III: Advances in High-Performance Computational Earth Sciences: Applications and Frameworks; Agent-Based Simulations, Adaptive Algorithms and Solvers; Applications of Computational Methods in Artificial Intelligence and Machine Learning; Biomedical and Bioinformatics Challenges for Computer Science Part IV: Classifier Learning from Difficult Data; Complex Social Systems through the Lens of Computational Science; Computational Health; Computational Methods for Emerging Problems in (Dis-)Information Analysis Part V: Computational Optimization, Modelling and Simulation; Computational Science in IoT and Smart Systems; Computer Graphics, Image Processing and Artificial Intelligence Part VI: Data Driven Computational Sciences; Machine Learning and Data Assimilation for Dynamical Systems; Meshfree Methods in Computational Sciences; Multiscale Modelling and Simulation; Quantum Computing Workshop Part VII: Simulations of Flow and Transport: Modeling, Algorithms and Computation; Smart Systems: Bringing Together Computer Vision, Sensor Networks and Machine Learning; Software Engineering for Computational Science; Solving Problems with Uncertainties; Teaching Computational Science; UNcErtainty QUantIficatiOn for ComputationAl modeLs *The conference was canceled due to the COVID-19 pandemic.
We describe the use of quantum-mechanically entangled photons for sensing intrusions across a physical perimeter. Our approach to intrusion detection uses the no-cloning principle of quantum information science as protection against an intruder's ability to spoof a sensor

receiver using a 'classical' intercept-resend attack. We explore the bounds on detection using quantum detection and estimation theory, and we experimentally demonstrate the underlying principle of entanglement-based detection using the visibility derived from polarization-correlation measurements.

Recent experimental advances in the control of quantum superconducting circuits, nano-mechanical resonators and photonic crystals has meant that quantum measurement theory is now an indispensable part of the modelling and design of experimental technologies. This book, aimed at graduate students and researchers in physics, gives a thorough introduction to the basic theory of quantum measurement and many of its important modern applications. Measurement and control is explicitly treated in superconducting circuits and optical and opto-mechanical systems, and methods for deriving the Hamiltonians of superconducting circuits are introduced in detail. Further applications covered include feedback control, metrology, open systems and thermal environments, Maxwell's demon, and the quantum-to-classical transition.

This book summarizes the efforts of ten papers collected by the Special Issue "Condensed-Matter-Principia Based Information & Statistical Measures: From Classical to Quantum". It calls for papers which deal with condensed-matter systems, or their interdisciplinary analogs, for which well-defined classical–statistical vs. quantum information measures can be inferred while based on the entropy concept. The contents have mainly been rested upon objectives addressed by an international colloquium held on October 2019, in UTP Bydgoszcz, Poland (see http://zmpf.imif.utp.edu.pl/rci-jcs/rci-jcs-4/), with an emphasis placed on the achievements of Professor Gerard Czajkowski, who commenced his research activity with open diffusion–reaction systems under the supervision of Roman S. Ingarden (Toru?), a father of Polish synergetics, and original thermodynamic approaches to self-organization. The active cooperation of Professor Czajkowski, mainly with German physicists (Friedrich Schloegl, Aachen; Werner Ebeling, Berlin), ought to be highlighted. In light of this, a development of his research, as it has moved from statistical thermodynamics to solid state theory, pursued in terms of nonlinear solid-state optics (Franco Bassani, Pisa), and culminated very recently with large quasiparticles termed Rydberg excitons, and their coherent interactions with light, is worth delineating.

This book introduces mathematicians, physicists, and philosophers to a new, coherent approach to theory and interpretation of quantum physics, in which classical and quantum thinking live peacefully side by side and jointly fertilize the intuition. The formal, mathematical core of quantum physics is cleanly separated from the interpretation issues. The book demonstrates that the universe can be rationally and objectively understood from the smallest to the largest levels of modeling. The thermal interpretation featured in this book succeeds without any change in the theory. It involves one radical step, the reinterpretation of an assumption that was virtually never questioned before - the traditional eigenvalue link between theory and observation is replaced by a q-expectation link: Objective properties are given by q-expectations of products of quantum fields and what is computable from these. Averaging over macroscopic spacetime regions produces macroscopic quantities with negligible uncertainty, and leads to classical physics. - Reflects the actual practice of quantum physics. - Models the quantum-classical interface through coherent spaces. - Interprets both quantum mechanics and quantum field theory. - Eliminates probability and measurement from the foundations. - Proposes a novel solution of the measurement problem.

The important changes quantum mechanics has undergone in recent years are reflected in this approach for students. A strong narrative and over 300 worked problems lead the student from experiment, through general principles of the theory, to modern applications. Stepping through results allows students to gain a thorough understanding. Starting with basic quantum mechanics, the book moves on to more advanced theory, followed by applications, perturbation methods and special fields, and ending with developments in the field. Historical, mathematical and philosophical boxes guide the student through the theory. Unique to this textbook are chapters on measurement and quantum optics, both at the forefront of current research. Advanced undergraduate and graduate students will benefit from this perspective on the fundamental physical paradigm and its applications. Online resources including solutions to selected problems, and 200 figures, with colour versions of some figures, are available at www.cambridge.org/Auletta.

This volume contains translations of papers that originally appeared in the Japanese journal Sugaku. The papers range over a variety of topics in probability theory, statistics, and applications. This volume is suitable for graduate students and research mathematicians interested in probability and statistics.

' Quantum statistical inference, a research field with deep roots in the foundations of both quantum physics and mathematical statistics, has made remarkable progress since 1990. In particular, its asymptotic theory has been developed during this period. However, there has hitherto been no book covering this remarkable progress after 1990; the famous textbooks by Holevo and Helstrom deal only with research results in the earlier stage (1960s-1970s). This book presents the important and recent results of quantum statistical inference. It focuses on the asymptotic theory, which is one of the central issues of mathematical statistics and had not been investigated in quantum statistical inference until the early 1980s. It contains outstanding papers after Holevo's textbook, some of which are of great importance but are not available now. The reader is expected to have only elementary mathematical knowledge, and therefore much of the content will be accessible to graduate students as well as research workers in related fields. Introductions to quantum statistical inference have been specially written for the book. Asymptotic Theory of Quantum Statistical Inference: Selected Papers will give the reader a new insight into physics and statistical inference. Contents:Hypothesis TestingQuantum Cramér-Rao Bound in Mixed States ModelQuantum Cramér-Rao Bound in Pure States ModelGroup Symmetric Approach to Pure States ModelLarge Deviation Theory in Quantum EstimationFuther Topics on Quantum Statistical Inference Readership: Graduate students in quantum physics, mathematical physics, and probability and statistics. Keywords:Quantum Information;Estimation Theory;Statistics;Statistical Inference;Mathematical Physics;Asymptotic Theory;Hypothesis TestingReviews:“This book will give the scholars new insight into physics and statistical inference.”Zentralblatt MATH '

Remarkable recent progress in quantum optics has given rise to extremely precise quantum measurements that are used in the research into the fundamentals of quantum physics, and in different branches of physics such as optical spectroscopy. This progress stimulates new technologies in the field of optical communications, optical computation and information systems. This state-of-the-art volume presents work from a Summer School on Advances in Quantum Optics and Spectroscopy of Solids, held in Ankara, Turkey, in 1995. The various contributions written by leading scientists in the field cover a wide range of subjects in this exciting area of physics, and report new and important results and ideas. Topics dealt with include the interaction of quantum light with trapped atoms and condensed matter; quantum tomography and phase analysis; and many applications of quantum optics from mesoscopic physics to correlation spectroscopy of non-classical states, which are of major importance in understanding the nature of collective excitations in solids. Audience: This book will be of interest to postgraduate students and researchers whose work involves quantum optics, solid state spectroscopy and its applications.

This book reviews selected topics charterized by great progress and covers the field from theoretical areas to experimental ones. It contains fundamental areas, quantum query complexity, quantum statistical inference, quantum cloning, quantum entanglement, additivity. It treats three types of quantum security system, quantum public key cryptography, quantum key distribution, and quantum steganography. A photonic system is highlighted for the realization of quantum information processing.

The International Workshop on Quantum Communications and Measurement was held at the University of Nottingham from July 10-16, 1994. It followed the successful meeting on Quantum Aspects of Optical Communications in Paris in November 1990. This time the conference was devoted to mathematical, physical and engineering aspects of quantum noise, signal processing and quantum informa tion in open systems, quantum channels, and optical communications. It brought research workers in the experimental and engineering aspects of quantum optics and communication systems into contact with theoreticians working in quantum probability and measurement theory. The workshop was

attended by more than 130 participants from 22 different countries. The largest groups [after the UK (31)] were from Japan (19) and from Russia (14). The subjects discussed included the mathematical foundations of quantum communication systems, experiments and devices, the problem of collapse and continuous measurement, quantum input and output processes, causality and nondemolition observation, squeezed states, quan tum jumps, state diffusion and spontaneous localization, filtering and control in quantum systems, and new quantum optical phenomena and effects, including non classical light. These new mathematical and physical ideas were stimulated by recent advances in generation and detection of light with low quantum noise and the development of techniques for trapping a single atom over an extended period of time, making it possible to observe individual quantum phenomena at the macroscopic level.

Developing many of the major, exciting, pre- and post-millennium developments from the ground up, this book is an ideal entry point for graduate students into quantum information theory. Significant attention is given to quantum mechanics for quantum information theory, and careful studies of the important protocols of teleportation, superdense coding, and entanglement distribution are presented. In this new edition, readers can expect to find over 100 pages of new material, including detailed discussions of Bell's theorem, the CHSH game, Tsirelson's theorem, the axiomatic approach to quantum channels, the definition of the diamond norm and its interpretation, and a proof of the Choi–Kraus theorem. Discussion of the importance of the quantum dynamic capacity formula has been completely revised, and many new exercises and references have been added. This new edition will be welcomed by the upcoming generation of quantum information theorists and the already established community of classical information theorists.

This graduate-level textbook provides a unified viewpoint of quantum information theory that merges key topics from both the information-theoretic and quantum- mechanical viewpoints. The text provides a unified viewpoint of quantum information theory and lucid explanations of those basic results, so that the reader fundamentally grasps advances and challenges. This unified approach makes accessible such advanced topics in quantum communication as quantum teleportation, superdense coding, quantum state transmission (quantum error-correction), and quantum encryption.

The author presents a unified treatment of this highly interdisciplinary topic to help define the notion of cognitive radio. The book begins with addressing issues such as the fundamental system concept and basic mathematical tools such as spectrum sensing and machine learning, before moving on to more advanced concepts and discussions about the future of cognitive radio. From the fundamentals in spectrum sensing to the applications of cognitive algorithms to radio communications, and discussion of radio platforms and testbeds to show the applicability of the theory to practice, the author aims to provide an introduction to a fast moving topic for students and researchers seeking to develop a thorough understanding of cognitive radio networks. Examines basic mathematical tools before moving on to more advanced concepts and discussions about the future of cognitive radio Describe the fundamentals of cognitive radio, providing a step by step treatment of the topics to enable progressive learning Includes questions, exercises and suggestions for extra reading at the end of each chapter Topics covered in the book include: Spectrum Sensing: Basic Techniques; Cooperative Spectrum Sensing Wideband Spectrum Sensing; Agile Transmission Techniques: Orthogonal Frequency Division Multiplexing Multiple Input Multiple Output for Cognitive Radio; Convex Optimization for Cognitive Radio; Cognitive Core (I): Algorithms for Reasoning and Learning; Cognitive Core (II): Game Theory; Cognitive Radio Network IEEE 802.22: The First Cognitive Radio Wireless Regional Area Network Standard, and Radio Platforms and Testbeds.

This book is a comprehensive survey of most of the theoretical and experimental achievements in the field of quantum estimation of states and operations. Albeit still quite young, this field has already been recognized as a necessary tool for research in quantum optics and quantum information, beyond being a fascinating subject in its own right since it touches upon the conceptual foundations of quantum mechanics. The book consists of twelve extensive lectures that are essentially self-contained and modular, allowing combination of various chapters as a basis for advanced courses and seminars on theoretical or experimental aspects. The last two chapters, for instance, form a self-contained exposition on quantum discrimination problems. The book will benefit graduate students and newcomers to the field as a high-level but accessible textbook, lecturers in search for advanced course material and researchers wishing to consult a modern and authoritative source of reference.

This graduate textbook provides a unified view of quantum information theory. Clearly explaining the necessary mathematical basis, it merges key topics from both information-theoretic and quantum- mechanical viewpoints and provides lucid explanations of the basic results. Thanks to this unified approach, it makes accessible such advanced topics in quantum communication as quantum teleportation, superdense coding, quantum state transmission (quantum error-correction) and quantum encryption. Since the publication of the preceding book Quantum Information: An Introduction, there have been tremendous strides in the field of quantum information. In particular, the following topics – all of which are addressed here – made seen major advances: quantum state discrimination, quantum channel capacity, bipartite and multipartite entanglement, security analysis on quantum communication, reverse Shannon theorem and uncertainty relation. With regard to the analysis of quantum security, the present book employs an improved method for the evaluation of leaked information and identifies a remarkable relation between quantum security and quantum coherence. Taken together, these two improvements allow a better analysis of quantum state transmission. In addition, various types of the newly discovered uncertainty relation are explained. Presenting a wealth of new developments, the book introduces readers to the latest advances and challenges in quantum information. To aid in understanding, each chapter is accompanied by a set of exercises and solutions.

This largely self-contained book on the theory of quantum information focuses on precise mathematical formulations and proofs of fundamental facts that form the foundation of the subject. It is intended for graduate students and researchers in mathematics, computer science, and theoretical physics seeking to develop a thorough understanding of key results, proof techniques, and methodologies that are relevant to a wide range of research topics within the theory of quantum information and computation. The book is accessible to readers with an understanding of basic mathematics, including linear algebra, mathematical analysis, and probability theory. An introductory chapter summarizes these necessary mathematical prerequisites, and starting from this foundation, the book includes clear and complete proofs of all results it presents. Each subsequent chapter includes challenging exercises intended to help readers to develop their own skills for discovering proofs concerning the theory of quantum information.

This book gives an overview for practitioners and students of quantum physics and information science. It provides ready access to essential information on quantum information processing and communication, such as definitions, protocols and algorithms. Quantum information science is rarely found in clear and concise form. This book brings together this information from its various sources. It allows researchers and students in a range of areas including physics, photonics, solid-state electronics, nuclear magnetic resonance and information technology, in their applied and theoretical branches, to have this vital material directly at hand.

This book demonstrates that a quantum communication system using the coherent light of a laser can achieve performance orders of magnitude superior to classical optical communications Quantum Communications provides the Masters and PhD signals or communications student with a complete basics-to-applications course in using the principles of quantum mechanics to provide cutting-edge telecommunications. Assuming only knowledge of elementary probability, complex analysis and optics, the book guides its reader through the fundamentals of vector and Hilbert spaces and the necessary quantum-mechanical ideas, simply formulated in four postulates. A turn to practical matters begins with and is then developed by: development of the concept of quantum decision, emphasizing the optimization of measurements to extract useful information from a quantum system; general formulation of a transmitter–receiver system particular treatment of the most popular quantum communications systems—OOK, PPM, PSK and QAM; more realistic performance evaluation introducing

thermal noise and system description with density operators; consideration of scarce existing implementations of quantum communications systems and their difficulties with suggestions for future improvement; and separate treatment of quantum information with discrete and continuous states. Quantum Communications develops the engineering student's exposure to quantum mechanics and shows physics students that its theories can have practically beneficial application in communications systems. The use of example and exercise questions (together with a downloadable solutions manual for instructors, available from http://extras.springer.com/) will help to make the material presented really sink in for students and invigorate subsequent research.

This volume contains current work at the frontiers of research in quantum probability, infinite dimensional stochastic analysis, quantum information and statistics. It presents a carefully chosen collection of articles by experts to highlight the latest developments in those fields. Included in this volume are expository papers which will help increase communication between researchers working in these areas. The tools and techniques presented here will be of great value to research mathematicians, graduate students and applied mathematicians.

This textbook integrates the most advanced topics of physical-layer security, cryptography, covert/stealth communications, quantum key distribution (QKD), and cyber security to tackle complex security issues. After introducing the reader to various concepts and practices, the author addresses how these can work together to target problems, rather than treating them as separate disciplines. This book offers students an in-depth exposition on: cryptography, information-theoretic approach to cryptography, physical-layer security, covert/stealth/low-probability of detection communications, quantum information theory, QKD, and cyber security; to mention few. The goal is to provide a unified description of the most advanced topics related to: (i) modern cryptography, (ii) physical-layer security, (iii) QKD, (iv) covert communications, and (v) cyber security. Each chapter is followed by a set of problems. Also, for readers to better understand the book, an appendix covers all needed background. Homework problems and lecture notes are available online. The book does not require any prior knowledge or prerequisite material.

This book presents a distinctive way of understanding quantum correlations beyond entanglement, introducing readers to this less explored yet very fundamental aspect of quantum theory. It takes into account most of the new ideas involving quantum phenomena, resources, and applications without entanglement, both from a theoretical and an experimental point of view. This book serves as a reference for both beginner students and experienced researchers in physics and applied mathematics, with an interest in joining this novel venture towards understanding the quantum nature of the world.

In the fourty-seven years that have gone by since the first volume of Progress in Optics was published, optics has become one of the most dynamic fields of science. The volumes in this series which have appeared up to now contain more than 300 review articles by distinguished research workers, which have become permanent records for many important developments. Backscattering and Anderson localization of light Advances in oliton manipulation in optical lattices Fundamental quantum noise in optical amplification Invisibility cloaks

This two-volume set covers stochastic processes, information theory and Lie groups in a unified setting, bridging topics rarely studied together. The emphasis is on using stochastic, geometric, and group-theoretic concepts for modeling physical phenomena.

Quantum-state estimation is an important field in quantum information theory that deals with the characterization of states of affairs for quantum sources. This book begins with background formalism in estimation theory to establish the necessary prerequisites. This basic understanding allows us to explore popular likelihood- and entropy-related estimation schemes that are suitable for an introductory survey on the subject. Discussions on practical aspects of quantum-state estimation ensue, with emphasis on the evaluation of tomographic performances for estimation schemes, experimental realizations of quantum measurements and detection of single-mode multi-photon sources. Finally, the concepts of phase-space distribution functions, which compatibly describe these multi-photon sources, are introduced to bridge the gap between discrete and continuous quantum degrees of freedom. This book is intended to serve as an instructive and self-contained medium for advanced undergraduate and postgraduate students to grasp the basics of quantum-state estimation. Any reader with a solid foundation in quantum mechanics, linear algebra and calculus would be able to follow the book comfortably. Contents:PrefaceAcknowledgmentsAcronymsSymbols and NotationsPreliminaries of Quantum-State EstimationInformationally Complete EstimationInformationally Incomplete EstimationPractical Aspects of State EstimationQuasi-Probability Distributions Readership: Advanced undergraduate and graduate students as well as researchers interested in quantum information, estimation theory, and quantum optics. Key Features:This is a relatively new topic with a paucity of literature in the marketThis book is a set of lecture notes that is more suitable for graduate-module teaching, covering the necessary basic elements of this subject in a pedagogical manner before introducing more advanced notions in the later chaptersA solution manual for the problems in the book is currently in the worksKeywords:Quantum State Estimation;Tomography;Quasi-Probability;Likelihood;Entropy;Constrained OptimizationReview: "This book is a detailed, well-written introduction to the way of inferring quantum states parameters from measurement data. This book is surely something to recommend to one's students." Dmitri Mogilevtsev Institute of Physics Minsk, Belarus

Based on the Fourth International Conference on Quantum Communication, Measurement and Computing, this volume brings together scientists working in the interdisciplinary fields of quantum communication science and technology. Topics include quantum information theory, quantum computing, stochastic processes and filtering, and quantum measurement theory

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This volume contains current work at the frontiers of research in quantum probability, infinite dimensional stochastic analysis, quantum information and statistics. It presents a carefully chosen collection of articles by experts to highlight the latest developments in those fields. Included in this volume are expository papers which will help increase communication between researchers working in these areas. The tools and techniques presented here will be of great value to research mathematicians, graduate students and applied mathematicians. Contents:Existence of the Fock Representation for Current Algebras of the Galilei Algebra (L Accardi et al.)Modular Structures and Landau Levels (F Bagarello)On Spectral Approach to Pascal White Noise Functionals (A Barhoumi et al.)Spectral Analysis for Twisted Waveguides (P Briet)On the Classification of Invarient State of Generic Quantum Markov Semigroups: The Gaussian Gauge Invariant Case (S Hachicha)On Difficulties Appearing in the Study of Stochastic Volterra Equations (A Karczewska)Entanglement Protection and Generation in a Two-Atom System (M Orszag)Hilbert Molecules — Square Roots of Positive Maps (M Skeide)Multiparameter Quantum Stochastic Processes (W J Spring)and other papers Readership: Researchers in mathematical physics, stochastic analysis and probability and statistics. Keywords:Quantum Probability;Quantum Markov Semigroups;Entanglement;Quantum Information;Quantum Statistics;Quantum Dilations;Quantum Measurements;Non-Markovian Open Systems