Maurice A De Gosson Born Jordan Quantization

This is likewise one of the factors by obtaining the soft documents of this **Maurice A De Gosson Born Jordan Quantization** by online. You might not require more epoch to spend to go to the book introduction as well as search for them. In some cases, you likewise realize not discover the broadcast Maurice A De Gosson Born Jordan Quantization that you are looking for. It will extremely squander the time.

However below, taking into consideration you visit this web page, it will be fittingly enormously easy to acquire as without difficulty as download lead Maurice A De Gosson Born Jordan Quantization

It will not put up with many era as we run by before. You can pull off it while put it on something else at house and even in your workplace. therefore easy! So, are you question? Just exercise just what we provide under as capably as review **Maurice A De Gosson Born Jordan Quantization** what you bearing in mind to read!

Feynman's Thesis - Richard Phillips Feynman 2005
Richard Feynman's never previously published doctoral thesis formed the heart of much of his brilliant and profound work in theoretical physics. Entitled ?The Principle of Least Action in Quantum Mechanics," its original motive was to quantize the classical action-at-a-distance electrodynamics. Because that theory adopted an overall space?time viewpoint, the classical Hamiltonian approach used in the conventional formulations of quantum theory could not be used, so Feynman turned to the Lagrangian function and the principle of least action as his points of departure.The result was the path integral approach, which satisfied ? and transcended ? its original motivation, and has enjoyed great success in renormalized quantum field theory, including the derivation of the ubiquitous Feynman diagrams for elementary particles. Path integrals have many other applications, including atomic, molecular, and nuclear scattering, statistical mechanics, quantum liquids and solids, Brownian motion, and noise theory. It also sheds new light on fundamental issues like the interpretation of quantum theory because of its new overall space?time viewpoint.The present volume includes Feynman's Princeton thesis, the related review article ?Space?Time Approach to Non-Relativistic Quantum Mechanics? [Reviews of Modern Physics 20 (1948), 367?387], Paul Dirac's seminal paper ?The Lagrangian in Quantum Mechanics'' [Physikalische Zeitschrift der Sowjetunion, Band 3, Heft 1 (1933)], and an introduction by Laurie M Brown.
The Geometry of Heisenberg Groups - Ernst Binz 2008
"The three-dimensional Heisenberg group, being a quite simple non-commutative Lie group, appears prominently in various applications of mathematics. The goal of this book is to present basic geometric and algebraic properties of the Heisenberg group and its relation to other important mathematical structures (the skew field of quaternions, symplectic structures, and representations) and to describe some of its applications. In particular, the authors address such subjects as signal analysis and processing, geometric optics, and quantization. In each case, the authors present necessary details of the applied topic being considered." "This book manages to encompass a large variety of topics being easily accessible in its fundamentals. It can be useful to students and researchers working in mathematics and in applied mathematics."--BOOK JACKET.
Born-Jordan Quantization - Maurice A. de Gosson 2016-01-11
This book presents a comprehensive mathematical study of the operators behind the Born-Jordan quantization scheme. The Schrödinger and Heisenberg pictures of quantum mechanics are equivalent only if the Born-Jordan scheme is used. Thus, Born-Jordan quantization provides the only physically consistent quantization scheme, as opposed to the Weyl quantization commonly used by physicists. In this book we develop Born-Jordan quantization from an operator-theoretical point of view, and analyze in depth the conceptual differences between the two schemes. We discuss various physically motivated approaches, in particular the Feynman-integral point of view. One important and intriguing feature of Born-Jordan quantization is that it is not one-to-one: there are infinitely many classical observables whose quantization is zero.
Symplectic Geometry and Quantum Mechanics - Maurice A. de Gosson 2006-08-06
This book offers a complete discussion of techniques and topics intervening in the mathematical treatment of quantum and semi-classical mechanics. It starts with a very readable introduction to symplectic geometry. Many topics are also of genuine interest for pure mathematicians working in geometry and topology.
Emergence Of The Quantum From The Classical: Mathematical Aspects Of Quantum Processes - De Gosson Maurice A 2017-11-10
The emergence of quantum mechanics from classical world mechanics is now a well-established theme in mathematical physics. This book demonstrates that quantum mechanics can indeed be viewed as a refinement of Hamiltonian mechanics, and builds on the work of George Mackey in relation to their mathematical foundations. Additionally when looking at the differences with classical mechanics, quantum mechanics crucially depends on the value of Planck's constant h. Recent cosmological observations tend to indicate that not only the fine structure constant α but also h might have varied in both time and space since the Big Bang. We explore the mathematical and physical consequences of a variation of h; surprisingly we see that a decrease of h leads to transitions from the quantum to the classical. Emergence of the Quantum from the Classical provides help to undergraduate and graduate students of mathematics, physics and quantum theory looking to advance into research in the field. Contents: Hamiltonian MechanicsHamilton-Jacobi TheoryMatter Waves, Schrödinger's Equation, and Bohm's Theory The MetatronUncertainties and Quantum BlobsQuantum States and the Density MatrixVarying Planck's ConstantAppendices: The Symplectic GroupThe Metaplectic RepresentationBorn-Jordan QuantizationTwisted Product and Convolution Readership: Undergraduate and graduate students of mathematics and physics, interested in analysis and differential equations, probability and statistics, geometry and topology and mathematical physics. Keywords: Classical Mechanics;Hamiltonian Mechanics;Quantum Mechanics;Planck's Constant;Mathematical Physics;Algebraic GeometryReview:0
Optomagnonic Structures: Novel Architectures For Simultaneous Control Of Light And Spin Waves - Evangelos Almpanis 2021-01-18
Understanding, controlling and, more importantly, enhancing the interaction between light (photons) and spin waves (magnons) can be, among others, a step towards the realization of magnon-mediated microwave-to-optical transducers for quantum computing applications or hybrid solid-state spintronic-photonic interconnections. In this respect, the development of novel composite multifunctional micro/nanostructures — so-called optomagnonic — which simultaneously control optical and spin waves and enhance their interaction, is particularly attractive.This book constitutes a collective work, comprising seven chapters from leading researchers in the field of optomagnonics and related areas. Apart from exciting recent developments, it provides the necessary fundamental knowledge in an explanatory manner and, therefore, it is accessible to non-experts. It is suitable for PhD students, post-docs, and researchers who are

willing to get engaged in optomagnonics, while selected parts could also serve as lecture material for advanced courses. With increasing demand for miniaturized optomagnonic devices, this book will be an important resource to researchers working on optomagnonics, magneto-optics, spintronics, as well as on hybrid micro/nano devices for information processing.

Rational Reconstructions of Modern Physics - Peter Mittelstaedt 2010-11-05

Newton's classical physics and its underlying ontology are loaded with several metaphysical hypotheses that cannot be justified by rational reasoning nor by experimental evidence. Furthermore, it is well known that some of these hypotheses are not contained in the great theories of modern physics, such as the theory of relativity and quantum mechanics. This book shows that, on the basis of Newton's classical physics and by rational reconstruction, the theory of relativity as well as quantum mechanics can be obtained by partly eliminating or attenuating the metaphysical hypotheses. Moreover, it is shown that these reconstructions do not require additional hypotheses or new experimental results.

Linear Transformations in Hilbert Space and Their Applications to Analysis - Marshall Harvey Stone 1932-12-31

On Angular Momentum - Julian Schwinger 1952

Trace Ideals and Their Applications - Barry Simon 2005

From a review of the first edition: Beautifully written and well organized ... indispensable for those interested in certain areas of mathematical physics ... for the expert and beginner alike. The author deserves to be congratulated both for his work in unifying a subject and for showing workers in the field new directions for future development. --Zentralblatt MATH This is a second edition of a well-known book on the theory of trace ideals in the algebra of operators in a Hilbert space. Because of the theory's many different applications, the book was widely used and much in demand. For this second edition, the author has added four chapters on the closely related theory of rank one perturbations of self-adjoint operators. He has also included a comprehensive index and an addendum describing some developments since the original notes were published. This book continues to be a vital source of information for those interested in the theory of trace ideals and in its applications to various areas of mathematical physics.

Dissipative Phase Transitions - Pierluigi Colli 2006

Phase transition phenomena arise in a variety of relevant real world situations, such as melting and freezing in a solid-liquid system, evaporation, solid-solid phase transitions in shape memory alloys, combustion, crystal growth, damage in elastic materials, glass formation, phase transitions in polymers, and plasticity. The practical interest of such phenomenology is evident and has deeply influenced the technological development of our society, stimulating intense mathematical research in this area. This book analyzes and approximates some models and related partial differential equation problems that involve phase transitions in different contexts and include dissipation effects. Contents: Mathematical Models Including a Hysteresis Operator (T Aiki); Modelling Phase Transitions via an Entropy Equation: Long-Time Behavior of the Solutions (E Bonetti); Global Solution to a One Dimensional Phase Transition Model with Strong Dissipation (G Bonfanti & F Luterotti); A Global in Time Result for an Integro-Differential Parabolic Inverse Problem in the Space of Bounded Functions (F Colombo et al.); Weak Solutions for Stefan Problems with Convections (T Fukao); Memory Relaxation of the One-Dimensional CahnOCoHilliard Equation (S Gatti et al.); Mathematical Models for Phase Transition in Materials with Thermal Memory (G Gentili & C Giorgi); Hysteresis in a First Order Hyperbolic Equation (J Kopfovi); Approximation of Inverse Problems Related to Parabolic Integro-Differential Systems of Caginalp Type (A Lorenzi & E Rocca); Gradient Flow Reaction/Diffusion Models in Phase Transitions (J Norbury & C Girardet); New Existence Result for a 3-D Shape Memory Model (I Pawlow & W M Zajaczkowski); Analysis of a 1-D Thermoviscoelastic Model with Temperature-Dependent Viscosity (R Peyroux & U Stefanelli); Global Attractor for the Weak Solutions of a Class of Viscous Cahn-Hilliard Equations (R Rossi); Stability for Phase Field Systems Involving Indefinite Surface Tension Coefficients (K Shirakawa); Geometric Features of p -Laplace Phase Transitions (E Valdinoci). Readership: Applied mathematicians and researchers in analysis and differential equations."

Joseph Fourier 250th Birthday - Frédéric Barbaresco 2019-03-28

For the 250th birthday of Joseph Fourier, born in 1768 in Auxerre, France, this MDPI Special Issue will explore modern topics related to Fourier Analysis and Heat Equation. Modern developments of Fourier analysis during the 20th century have explored generalizations of Fourier and Fourier-Plancherel formula for non-commutative harmonic analysis, applied to locally-compact, non-Abelian groups. In parallel, the theory of coherent states and wavelets has been generalized over Lie groups. One should add the developments, over the last 30 years, of the applications of harmonic analysis to the description of the fascinating world of aperiodic structures in condensed matter physics. The notions of model sets, introduced by Y. Meyer, and of almost periodic functions, have revealed themselves to be extremely fruitful in this domain of natural sciences. The name of Joseph Fourier is also inseparable from the study of the mathematics of heat. Modern research on heat equations explores the extension of the classical diffusion equation on Riemannian, sub-Riemannian manifolds, and Lie groups. In parallel, in geometric mechanics, Jean-Marie Souriau interpreted the temperature vector of Planck as a space-time vector, obtaining, in this way, a phenomenological model of continuous media, which presents some interesting properties. One last comment concerns the fundamental contributions of Fourier analysis to quantum physics: Quantum mechanics and quantum field theory. The content of this Special Issue will highlight papers exploring non-commutative Fourier harmonic analysis, spectral properties of aperiodic order, the hypoelliptic heat equation, and the relativistic heat equation in the context of Information Theory and Geometric Science of Information.

The Wigner Distribution - W. Mecklenbräuker 1997-10-08

In the last two decades, the field of time-frequency analysis has evolved into a widely recognized and applied discipline of signal processing. Besides linear time-frequency representations such as the short-time Fourier transform, the Gabor transform, and the wavelet transform, an important contribution to this development has undoubtedly been the Wigner distribution (WD) which holds an exceptional position within the field of bilinear/quadratic time-frequency representations. The WD was first defined in quantum mechanics as early as 1932 by the later Nobel laureate E. Wigner. In 1948, J. Ville introduced this concept in signal analysis. Based on investigations of its mathematical structure and properties by N.G. de Bruijn in 1967, the WD was brought to the attention of a larger signal processing community in 1980. The WD was soon recognized to be important for two reasons: firstly, it provides a powerful theoretical basis for quadratic time-frequency analysis; secondly, its discrete-time form (supplemented by suitable windowing and smoothing) is an eminently practical signal analysis tool. The seven chapters of this book cover a wide range of different aspects of the WD and other linear time-frequency distributions: properties such as positivity, spread, and interference term geometry; signal synthesis methods and their application to signal design, time-frequency filtering, and signal separation; WD based analysis of nonstationary random processes; singular value decompositions and their application to WD based detection and classification; and optical applications of the WD. The size of the chapters has been chosen such that an in-depth treatment of the various topics is achieved.

Emergent Quantum Mechanics - Jan Walleczek 2019-04-02

Emergent quantum mechanics explores the possibility of an ontology for quantum mechanics. The resurgence of interest in "deeper-level" theories for quantum phenomena challenges the standard, textbook interpretation. The book presents expert views that critically evaluate the significance—for 21st century physics—of ontological quantum mechanics, an approach that David Bohm helped pioneer. The possibility of a deterministic quantum theory was first introduced with the original de Broglie-Bohm theory, which has also been developed as Bohmian

mechanics. The wide range of perspectives that were contributed to this book on the occasion of David Bohm's centennial celebration provide ample evidence for the physical consistency of ontological quantum mechanics. The book addresses deeper-level questions such as the following: Is reality intrinsically random or fundamentally interconnected? Is the universe local or nonlocal? Might a radically new conception of reality include a form of quantum causality or quantum ontology? What is the role of the experimenter agent? As the book demonstrates, the advancement of 'quantum ontology'—as a scientific concept—marks a clear break with classical reality. The search for quantum reality entails unconventional causal structures and non-classical ontology, which can be fully consistent with the known record of quantum observations in the laboratory.

Clifford Algebras and their Applications in Mathematical Physics - F. Brackx 1993-10-31

This International Conference on Clifford AlgebrfU and Their Application, in Math ematical Phy,ic, is the third in a series of conferences on this theme, which started at the Univer,ity of Kent in Canterbury in 1985 and was continued at the Univer,iU de, Science, et Technique, du Languedoc in Montpellier in 1989. Since the start of this series of Conferences the research fields under consideration have evolved quite a lot. The number of scientific papers on Clifford Algebra, Clifford Analysis and their impact on the modelling of physics phenomena have increased tremendously and several new books on these topics were published. We were very pleased to see old friends back and to wellcome new guests who by their inspiring talks contributed fundamentally to tracing new paths for the future development of this research area. The Conference was organized in Deinze, a small rural town in the vicinity of the University town Gent. It was hosted by De Ceder, a vacation and seminar center in a green area, a typical landscape of Flanders's "plat pays" . The Conference was attended by 61 participants coming from 18 countries; there were 10 main talks on invitation, 37 contributions accepted by the Organizing Com mittee and a poster session. There was also a book display of Kluwer Academic Publishers. As in the Proceedings of the Canterbury and Montpellier conferences we have grouped the papers accordingly to the themes they are related to: Clifford Algebra, Clifford Analysis, Classical Mechanics, Mathematical Physics and Physics Models.

The Arrows of Time - Laura Mersini-Houghton 2012-05-30

The concept of time has fascinated humanity throughout recorded history, and it remains one of the biggest mysteries in science and philosophy. Time is clearly one of the fundamental building blocks of the universe and thus a deeper understanding of nature at a fundamental level also demands a comprehension of time. Furthermore, the origins of the universe are closely intertwined with the puzzle of time: Did time emerge at the Big Bang? Why does the arrow of time 'conspire' with the order of the initial state of the universe? This book addresses many of the most important questions about time: What is time, and is it fundamental or emergent? Why is there such an arrow of time, closely related to the initial state of the universe, and why do the cosmic, thermodynamic and other arrows agree? These issues are discussed here by leading experts, and each offers a new perspective on the debate. Their contributions delve into the most difficult research topic in physics, also describing the latest cutting edge research on the subject. The book also offers readers a comparison between the different outlooks of philosophy, physics and cosmology on the puzzle of time. This volume is intended to be useful for research purposes, but most chapters are also accessible to a more general audience of scientifically educated readers looking for deeper insights.

Symmetries in Fundamental Physics - Kurt Sundermeyer 2014-07-23

Over the course of the last century it has become clear that both elementary particle physics and relativity theories are based on the notion of symmetries. These symmetries become manifest in that the "laws of nature" are invariant under spacetime transformations and/or gauge transformations. The consequences of these symmetries were analyzed as early as in 1918 by Emmy Noether on the level of action functionals. Her work did not receive due recognition for nearly half a century, but can today be understood as a recurring theme in classical mechanics, electrodynamics and special relativity, Yang-Mills type quantum field theories, and in general relativity. As a matter of fact, as shown in this monograph, many aspects of physics can be derived solely from symmetry considerations. This substantiates the statement of E.P. Wigner "... if we knew all the laws of nature, or the ultimate Law of nature, the invariance properties of these laws would not furnish us new information." Thanks to Wigner we now also understand the implications of quantum physics and symmetry considerations: Poincare invariance dictates both the characteristic properties of particles (mass, spin, ...) and the wave equations of spin 0, 1/2, 1, ... objects. Further, the work of C.N. Yang and R. Mills reveals the consequences of internal symmetries as exemplified in the symmetry group of elementary particle physics. Given this pivotal role of symmetries it is thus not surprising that current research in fundamental physics is to a great degree motivated and inspired by considerations of symmetry. The treatment of symmetries in this monograph ranges from classical physics to now well-established theories of fundamental interactions, to the latest research on unified theories and quantum gravity.

The Turbulence Problem - Michael Eckert 2019-10-05

On the road toward a history of turbulence, this book focuses on what the actors in this research field have identified as the "turbulence problem". Turbulent flow rose to prominence as one of the most persistent challenges in science. At different times and in different social and disciplinary settings, the nature of this problem has changed in response to changing research agendas. This book does not seek to provide a comprehensive account, but instead an exemplary exposition on the environments in which problems become the subjects of research agendas, with particular emphasis on the first half of the 20th century.

Disquisitiones Arithmeticae - Carl Friedrich Gauss 2018-02-07

Carl Friedrich Gauss's textbook, Disquisitiones arithmeticae, published in 1801 (Latin), remains to this day a true masterpiece of mathematical examination. .

Trends in Stochastic Analysis - Jochen Blath 2009-04-09

Presenting important trends in the field of stochastic analysis, this collection of thirteen articles provides an overview of recent developments and new results. Written by leading experts in the field, the articles cover a wide range of topics, ranging from an alternative set-up of rigorous probability to the sampling of conditioned diffusions. Applications in physics and biology are treated, with discussion of Feynman formulas, intermittency of Anderson models and genetic inference. A large number of the articles are topical surveys of probabilistic tools such as chaining techniques, and of research fields within stochastic analysis, including stochastic dynamics and multifractal analysis. Showcasing the diversity of research activities in the field, this book is essential reading for any student or researcher looking for a guide to modern trends in stochastic analysis and neighbouring fields.

The Wigner Transform - Maurice de Gosson 2017-03-17

This book provides an in-depth and rigorous study of the Wigner transform and its variants. They are presented first within a context of a general mathematical framework, and then through applications to quantum mechanics. The Wigner transform was introduced by Eugene Wigner in 1932 as a probability quasi-distribution which allows expression of quantum mechanical expectation values in the same form as the averages of classical statistical mechanics. It is also used in signal processing as a transform in time-frequency analysis, closely related to the windowed Gabor transform. Written for advanced-level students and professors in mathematics and mathematical physics, it is designed as a complete textbook course providing analysis on the most important research on the subject to date. Due to the advanced nature of the content, it is also suitable for research mathematicians, engineers and chemists active in the field. Request Inspection Copy

Geometric Science of Information - Frank Nielsen 2017-10-26

This book constitutes the refereed proceedings of the Third International Conference on Geometric Science of Information, GSI 2017, held in Paris, France,

in November 2017. The 101 full papers presented were carefully reviewed and selected from 113 submissions and are organized into the following subjects: Statistics on non-linear data Shape Space Optimal Transport & Applications I (Data Science and Economics) Optimal Transport & Applications II (Signal and Image Processing) Topology and statistical learning Statistical Manifold & Hessian Information Geometry Monotone Embedding in Information Geometry Information Structure in Neuroscience Geometric Robotics & Tracking Geometric Mechanics & Robotics Stochastic Geometric Mechanics & Lie Group Thermodynamics Probability on Riemannian Manifolds Divergence Geometry Geometric Deep Learning First and second-order Optimization on Statistical Manifolds Non-parametric Information Geometry Geometry of quantum states Optimization on Manifold Computational Information Geometry Probability Density Estimation Geometry of Tensor-Valued Data Geometry and Inverse Problems Geometry in Vision, Learning and Dynamical Systems Lie Groups and Wavelets Geometry of metric measure spaces Geometry and Telecom Geodesic Methods with Constraints Applications of Distance Geometry

Hall-Effect Sensors - Edward Ramsden 2011-04-01

Without sensors most electronic applications would not exist—sensors perform a vital function, namely providing an interface to the real world. Hall effect sensors, based on a magnetic phenomena, are one of the most commonly used sensing technologies today. In the 1970s it became possible to build Hall effect sensors on integrated circuits with onboard signal processing circuitry, vastly reducing the cost and enabling widespread practical use. One of the first major applications was in computer keyboards, replacing mechanical contacts. Hundreds of millions of these devices are now manufactured each year for use in a great variety of applications, including automobiles, computers, industrial control systems, cell phones, and many others. The importance of these sensors, however, contrasts with the limited information available. Many recent advances in miniaturization, smart sensor configurations, and networkable sensor technology have led to design changes and a need for reliable information. Most of the technical information on Hall effect sensors is supplied by sensor manufacturers and is slanted toward a particular product line. System design and control engineers need an independent, readable source of practical design information and technical details that is not product- or manufacturer-specific and that shows how Hall effect sensors work, how to interface to them, and how to apply them in a variety of uses. This book covers: • the physics behind Hall effect sensors • Hall effect transducers • transducer interfacing • integrated Hall effect sensors and how to interface to them • sensing techniques using Hall effect sensors • application-specific sensor ICs • relevant development and design tools This second edition is expanded and updated to reflect the latest advances in Hall effect devices and applications! Information about various sensor technologies is scarce, scattered and hard to locate. Most of it is either too theoretical for working engineers, or is manufacturer literature that can't be entirely trusted. Engineers and engineering managers need a comprehensive, up-to-date, and accurate reference to use when scoping out their designs incorporating Hall effect sensors. * A comprehensive, up-to-date reference to use when crafting all kinds of designs with Hall effect sensors *Replaces other information about sensors that is too theoretical, too biased toward one particular manufacturer, or too difficult to locate *Highly respected and influential author in the burgeoning sensors community

Semi-Classical Approximation in Quantum Mechanics - Victor P. Maslov 2001-11-30

This volume is concerned with a detailed description of the canonical operator method - one of the asymptotic methods of linear mathematical physics. The book is, in fact, an extension and continuation of the authors' works [59], [60], [65]. The basic ideas are summarized in the Introduction. The book consists of two parts. In the first, the theory of the canonical operator is develop ed, whereas, in the second, many applications of the canonical operator method to concrete problems of mathematical physics are presented. The authors are pleased to express their deep gratitude to S. M. Tsidilin for his valuable comments. THE AUTHORS IX INTRODUCTION 1. Various problems of mathematical and theoretical physics involve partial differential equations with a small parameter at the highest derivative terms. For constructing approximate solutions of these equations, asymptotic methods have long been used. In recent decades there has been a renaissance period of the asymptotic methods of linear mathematical physics. The range of their applicability has expanded: the asymptotic methods have been not only continuously used in traditional branches of mathematical physics but also have had an essential impact on the development of the general theory of partial differential equations. It appeared recently that there is a unified approach to a number of problems which, at first sight, looked rather unrelated.

Symplectic Methods in Harmonic Analysis and in Mathematical Physics - Maurice A. de Gosson 2011-07-30

The aim of this book is to give a rigorous and complete treatment of various topics from harmonic analysis with a strong emphasis on symplectic invariance properties, which are often ignored or underestimated in the time-frequency literature. The topics that are addressed include (but are not limited to) the theory of the Wigner transform, the uncertainty principle (from the point of view of symplectic topology), Weyl calculus and its symplectic covariance, Shubin's global theory of pseudo-differential operators, and Feichtinger's theory of modulation spaces. Several applications to time-frequency analysis and quantum mechanics are given, many of them concurrent with ongoing research. For instance, a non-standard pseudo-differential calculus on phase space where the main role is played by "Bopp operators" (also called "Landau operators" in the literature) is introduced and studied. This calculus is closely related to both the Landau problem and to the deformation quantization theory of Flato and Sternheimer, of which it gives a simple pseudo-differential formulation where Feichtinger's modulation spaces are key actors. This book is primarily directed towards students or researchers in harmonic analysis (in the broad sense) and towards mathematical physicists working in quantum mechanics. It can also be read with profit by researchers in time-frequency analysis, providing a valuable complement to the existing literature on the topic. A certain familiarity with Fourier analysis (in the broad sense) and introductory functional analysis (e.g. the elementary theory of distributions) is assumed. Otherwise, the book is largely self-contained and includes an extensive list of references.

Applications of Chaos and Nonlinear Dynamics in Science and Engineering - Vol. 2 - Santo Banerjee 2012-07-17

Chaos and nonlinear dynamics initially developed as a new emergent field with its foundation in physics and applied mathematics. The highly generic, interdisciplinary quality of the insights gained in the last few decades has spawned myriad applications in almost all branches of science and technology—and even well beyond. Wherever the quantitative modeling and analysis of complex, nonlinear phenomena are required, chaos theory and its methods can play a key role. This second volume concentrates on reviewing further relevant, contemporary applications of chaotic nonlinear systems as they apply to the various cutting-edge branches of engineering. This encompasses, but is not limited to, topics such as the spread of epidemics; electronic circuits; chaos control in mechanical devices; secure communication; and digital watermarking. Featuring contributions from active and leading research groups, this collection is ideal both as a reference work and as a 'recipe book' full of tried and tested, successful engineering applications.

The Tests of Time - Lisa M. Dolling 2003-02-16

The development of physical theory is one of our greatest intellectual achievements. Its products--the currently prevailing theories of physics, astronomy, and cosmology--have proved themselves to possess intrinsic beauty and to have enormous explanatory and predictive power. This anthology of primary readings chronicles the birth and maturation of five such theories (the heliocentric theory, the electromagnetic field theory, special and general relativity, quantum theory, and the big bang theory) in the words of the scientists who brought them to life. It is the first historical account that captures the rich substance of these theories, each of which represents a

fascinating story of the interplay of evidence and insight--and of dialogue among great minds. Readers sit in with Copernicus, Kepler, and Galileo as they overturn the geocentric universe; observe the genius of Faraday and Maxwell as they "discover" the electromagnetic field; look over Einstein's shoulder as he works out the details of relativity; listen in as Einstein and Bohr argue for the soul of quantum mechanics in the Completeness Debate; and watch as Hubble and others reveal the history of the universe. The editors' approach highlights the moments of discovery that rise from scientific creativity, and the presentation humanizes the scientific process, revealing the extent to which great scientists were the first to consider the philosophical implications of their work. But, most significantly, the editors offer this as their central thesis: although each was ushered in by a revolution, and each contains counterintuitive elements that delayed its acceptance, these five theories exhibit a continuous rational development that has led them to a permanent place in the worldview of science. Accessible to the general reader yet sufficiently substantive that working scientists will find value in it, The Tests of Time offers an intimate look into how physical theory has been developed, by the brilliant people who have developed it.

General Relativity, Cosmology and Astrophysics - Jiří Bičák 2014-06-12

The articles included in this Volume represent a broad and highly qualified view on the present state of general relativity, quantum gravity, and their cosmological and astrophysical implications. As such, it may serve as a valuable source of knowledge and inspiration for experts in these fields, as well as an advanced source of information for young researchers. The occasion to gather together so many leading experts in the field was to celebrate the centenary of Einstein's stay in Prague in 1911–1912. It was in fact during his stay in Prague that Einstein started in earnest to develop his ideas about general relativity that fully developed in his paper in 1915. Approaching soon the centenary of his famous paper, this volume offers a precious overview of the path done by the scientific community in this intriguing and vibrant field in the last century, defining the challenges of the next 100 years. The content is divided into four broad parts: (i) Gravity and Prague, (ii) Classical General Relativity, (iii) Cosmology and Quantum Gravity, and (iv) Numerical Relativity and Relativistic Astrophysics.

Elementary Particles - Kobzarev 1989-02-28

This book has come into being as a result of scientific debates. And these debates have determined its structure. The first chapter is in the form of Socratic dialogues between a mathematician (MATH.), two physicists (pHYS. and EXP.) and a philosopher (PHIL.). However, although one of the authors is a theoretical physicist and the other a mathematician, the reader must not think that their opinions have been divided among the participants of the dialogues. We have tried to convey the inner tension of the topic under discussion and its openness. The attitudes of the participants reflect more the possible evaluations of the situation rather than the actual views of the authors. What is more, the subject "elementary particles" as dealt with in the 3 6 dialogue stretches over (2-3) 10 years of historical time and a space of 10 ±1 pages of scientific literature. For this reason, a complete survey of it is un achievable. But, of course, every researcher constructs his own history of his science and sees a certain list of its main pOints. We have attempted to float several possible pictures of this kind. Therefore the fact that Math and Phys talk about the history of element ary particles is not an attempt to present the scientific history of this realm of physics.

Principles Of Newtonian And Quantum Mechanics, The: The Need For Planck's Constant, H (Second Edition) - De Gosson Maurice A 2016-11-10

The second edition of this book deals, as the first, with the foundations of classical physics from the "symplectic" point of view, and of quantum mechanics from the "metaplectic" point of view. We have revised and augmented the topics studied in the first edition in the light of new results, and added several new sections. The Bohmian interpretation of quantum mechanics is discussed in detail. Phase space quantization is achieved using the "principle of the symplectic camel", which is a deep topological property of Hamiltonian flows. We introduce the notion of "quantum blob", which can be viewed as the fundamental phase space unit. The mathematical tools developed in this book are the theory of the symplectic and metaplectic group, the Maslov index in a rigorous form, and the Leray index of a pair of Lagrangian planes. The concept of the "metatron" is introduced, in connection with the Bohmian theory of motion. The short-time behavior of the propagator is studied and applied to the quantum Zeno effect.

Islam, Modernity, and the Liminal Space Between - Mark W. Meehan 2014-02-28

This book investigates the development and function of the Institute of Traditional Islamic Art and Architecture (ITIAA) in Amman, Jordan. A vertical case study using grounded theory methodology, the research creates a rich and holistic understanding of the Institute. Specific areas of study include the factors involved in the founding of the Institute within the context of Arab and Jordanian higher education, the role of traditional Islamic philosophy in the function of the Institute, and the role of the anthropological concept of liminal space in the clarification of students' values during the academic program. Data for the research came from thirty hours of interviews completed with over thirty individuals, a twenty item survey completed by sixty-five students, classroom observations, and analysis of an array of documents from the League of Arab States, the Jordanian Ministry of Higher Education and Research, the Jordanian Accreditation Association, the World Islamic Science and Education University, and the Institute for Traditional Islamic Art and Architecture. In regard to the role of traditional Islamic philosophy, the study delineates how the combination of theological/philosophical commitments of founders, faculty, and students combined to create a deep and pervasive role of traditional Islamic philosophy, evidenced in classrooms, interviews, and documents. Students, faculty and staff reflected a vital commitment to Islamic understandings of education, art, and beauty. The book concludes by noting the vital importance of such institutions as ITIAA in providing the space and means for Arab-Muslims to understand their own culture, assess others, and form new versions of Arab-Muslim culture that are viable and productive in the current age. It is noted that transnational organizations, such as the League of Arab States, could help facilitate educational diversity by fostering the development of a second level of small, traditionally focused institutions. Such institutions can reinforce traditional values, provide liminal experiences, and facilitate creation of artifacts of liminal activity, reflecting students' ability to combine modern and traditional value systems.

The Enigmatic Electron - Malcolm H. Mac Gregor 1992-09-30

The Rationale for the Present Book Perhaps the most critical problem facing present-day particle physicistsis to delineate the relationship between classical and quantum systems. This relationship has many facets. Particle-waveduality is one. The concept of the point particle is another. And theconcept of particle mass is yet another. The electron, as the lightest of the charged particles, represents a fundamental "ground state",and many of the essential problems in the murky area between the domainsofclassical and quantum physics can be brought into focus by studyingjust this one particle. Thus the present book is centered on questions that arise in connection with the electron, and in particular with its mass, which has remained an unsolved, and indeed almost unexplored, mystery. Each student ofphysics, beginner and professional alike, has to fashion for himselfa way of thinking about the electron. If, after reading this book, the reader views this topic somewhat differently than before, the efforts of the author will have been amply rewarded. When physicists were confronted with the properties of the electron, they made a conceptualleap into the unknown: they concluded that the electron does not obey classical laws with respect to mechanics (as connected to the spin of the electron), and also with respect to electrodynamics (as connected to the magnetic moment of the electron).

An Introduction to Frames and Riesz Bases - Ole Christensen 2016-05-24

This revised and expanded monograph presents the general theory for frames and Riesz bases in Hilbert spaces as well as its concrete realizations within Gabor

analysis, wavelet analysis, and generalized shift-invariant systems. Compared with the first edition, more emphasis is put on explicit constructions with attractive properties. Based on the exiting development of frame theory over the last decade, this second edition now includes new sections on the rapidly growing fields of LCA groups, generalized shift-invariant systems, duality theory for as well Gabor frames as wavelet frames, and open problems in the field. Key features include: *Elementary introduction to frame theory in finite-dimensional spaces * Basic results presented in an accessible way for both pure and applied mathematicians * Extensive exercises make the work suitable as a textbook for use in graduate courses * Full proofs includ ed in introductory chapters; only basic knowledge of functional analysis required * Explicit constructions of frames and dual pairs of frames, with applications and connections to time-frequency analysis, wavelets, and generalized shift-invariant systems * Discussion of frames on LCA groups and the concrete realizations in terms of Gabor systems on the elementary groups; connections to sampling theory * Selected research topics presented with recommendations for more advanced topics and further readin g * Open problems to stimulate further research An Introduction to Frames and Riesz Bases will be of interest to graduate students and researchers working in pure and applied mathematics, mathematical physics, and engineering. Professionals working in digital signal processing who wish to understand the theory behind many modern signal processing tools may also find this book a useful self-study reference. Review of the first edition: "Ole Christensen's An Introduction to Frames and Riesz Bases is a first-rate introduction to the field ... . The book provides an excellent exposition of these topics. The material is broad enough to pique the interest of many readers, the included exercises supply some interesting challenges, and the coverage provides enough background for those new to the subject to begin conducting original research." — Eric S. Weber, American Mathematical Monthly, Vol. 112, February, 2005

Quantum Harmonic Analysis - Maurice A. de Gosson 2021-07-05

Quantum mechanics is arguably one of the most successful scientific theories ever and its applications to chemistry, optics, and information theory are innumerable. This book provides the reader with a rigorous treatment of the main mathematical tools from harmonic analysis which play an essential role in the modern formulation of quantum mechanics. This allows us at the same time to suggest some new ideas and methods, with a special focus on topics such as the Wigner phase space formalism and its applications to the theory of the density operator and its entanglement properties. This book can be used with profit by advanced undergraduate students in mathematics and physics, as well as by confirmed researchers.

Landscapes of Time-Frequency Analysis - Paolo Boggiatto 2019-01-30

The chapters in this volume are based on talks given at the inaugural Aspects of Time-Frequency Analysis conference held in Turin, Italy from July 5-7, 2017, which brought together experts in harmonic analysis and its applications. New connections between different but related areas were presented in the context of time-frequency analysis, encouraging future research and collaborations. Some of the topics covered include: Abstract harmonic analysis, Numerical harmonic analysis, Sampling theory, Compressed sensing, Mathematical signal processing, Pseudodifferential operators, and Applications of harmonic analysis to quantum mechanics. Landscapes of Time-Frequency Analysis will be of particular interest to researchers and advanced students working in time-frequency analysis and other related areas of harmonic analysis.

Advances in Microlocal and Time-Frequency Analysis - Paolo Boggiatto 2020-03-03

The present volume gathers contributions to the conference Microlocal and Time-Frequency Analysis 2018 (MLTFA18), which was held at Torino University from the 2nd to the 6th of July 2018. The event was organized in honor of Professor Luigi Rodino on the occasion of his 70th birthday. The conference's focus and the contents of the papers reflect Luigi's various research interests in the course of his long and extremely prolific career at Torino University.

Teleparallel Gravity - Ruben Aldrovandi 2012-08-10

Teleparallel Gravity (TG) is an alternative theory for gravitation, which is equivalent to General Relativity (GR). However, it is conceptually different. For example in GR geometry replaces the concept of force, and the trajectories are determined by geodesics. TG attributes gravitation to torsion, which accounts for gravitation by acting as a force. TG has already solved some old problems of gravitation (like the energy-momentum density of the gravitational field). The interest in TG has grown in the last few years. The book here proposed will be the first one dedicated exclusively to TG, and will include the foundations of the theory, as well as applications to specific problems to illustrate how the theory works.

Quantum Harmonic Analysis - Maurice A. de Gosson 2021-07-05

Quantum mechanics is arguably one of the most successful scientific theories ever and its applications to chemistry, optics, and information theory are innumerable. This book provides the reader with a rigorous treatment of the main mathematical tools from harmonic analysis which play an essential role in the modern formulation of quantum mechanics. This allows us at the same time to suggest some new ideas and methods, with a special focus on topics such as the Wigner phase space formalism and its applications to the theory of the density operator and its entanglement properties. This book can be used with profit by advanced undergraduate students in mathematics and physics, as well as by confirmed researchers.

Techniques and Applications of Path Integration - L. S. Schulman 2012-10-10

Suitable for advanced undergraduates and graduate students, this text develops the techniques of path integration and deals with applications, covering a host of illustrative examples. 26 figures. 1981 edition.

Foundations of Physics - Robert Bruce Lindsay 1981