And World Of Quantum Vacuum Concept A To The Geometry From Philosophical String Microscopic Electrodynamics Scientific Theory

#quantum vacuum concept #string theory geometry #microscopic electrodynamics #philosophical scientific theory #world of quantum

Explore the intricate connections between the quantum vacuum concept, string theory, and microscopic electrodynamics. This content delves into the underlying geometry that shapes these advanced scientific theories, considering their philosophical implications for our understanding of the universe, from the smallest particles to the grandest structures of spacetime.

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The Quantum Vacuum

A vacuum, classically understood, contains nothing. The quantum vacuum, on the other hand, is a seething cauldron of nothingness: particle pairs going in and out of existence continuously and rapidly while exerting influence over an enormous range of scales. Acclaimed mathematical physicist and natural philosopher Luciano Boi expounds the quantum vacuum, exploring the meaning of nothingness and its relationship with physical reality. Boi first provides a deep analysis of the interaction between geometry and physics at the quantum level. He next describes the relationship between the microscopic and macroscopic structures of the world. In so doing, Boi sheds light on the very nature of the universe, stressing in an original and profound way the relationship between quantum geometry and the internal symmetries underlying the behavior of matter and the interactions of forces. Beyond the physics and mathematics of the quantum vacuum, Boi offers a profoundly philosophical interpretation of the concept. Plato and Aristotle did not believe a vacuum was possible. How could nothing be something, they asked? Boi traces the evolution of the quantum vacuum from an abstract concept in ancient Greece to its fundamental role in quantum field theory and string theory in modern times. The quantum vacuum is a complex entity, one essential to understanding some of the most intriguing issues in twentieth-century physics, including cosmic singularity, dark matter and energy, and the existence of the Higgs boson particle. Boi explains with simple clarity the relevant theories and fundamental concepts of the quantum vacuum. Theoretical, mathematical, and particle physicists, as well as researchers and students of the history and philosophy of physics, will find The Quantum Vacuum to be a stimulating and engaging primer on the topic.

Romanian Studies in Philosophy of Science

This book presents a collection of studies by Romanian philosophers, addressing foundational issues currently debated in contemporary philosophy of science. It offers a historical survey of the tradition of scientific philosophy in Romania. It examines some problems in the foundations of logic, mathematics, linguistics, the natural and social sciences. Among the more specific topics, it discusses scientific explanation, models, and mechanisms, as well as memory, artifacts, and rules of research. The book is useful to those interested in the philosophy of real science, but also to those interested in Romanian philosophy.

From Electrons to Elephants and Elections

This highly interdisciplinary book, covering more than six fields, from philosophy and sciences all the way up to the humanities and with contributions from eminent authors, addresses the interplay between content and context, reductionism and holism and their meeting point: the notion of emergence. Much of today's science is reductionist (bottom-up); in other words, behaviour on one level is explained by reducing it to components on a lower level. Chemistry is reduced to atoms, ecosystems are explained in terms of DNA and proteins, etc. This approach fails quickly since we can't cannot extrapolate to the properties of atoms solely from Schrödinger's equation, nor figure out protein folding from an amino acid sequence or obtain the phenotype of an organism from its genotype. An alternative approach to this is holism (top-down). Consider an ecosystem or an organism as a whole: seek patterns on the same scale. Model a galaxy not as 400 billion-point masses (stars) but as an object in its own right with its own properties (spiral, elliptic). Or a hurricane as a structured form of moist air and water vapour. Reductionism is largely about content, whereas holistic models are more attuned to context. Reductionism (content) and holism (context) are not opposing philosophies — in fact, they work best in tandem. Join us on a journey to understand the multifaceted dialectic concerning this duo and how they shape the foundations of sciences and humanities, our thoughts and, the very nature of reality itself.

Weyl and the Problem of Space

This book investigates Hermann Weyl's work on the problem of space from the early 1920s onwards. It presents new material and opens the philosophical problem of space anew, crossing the disciplines of mathematics, history of science and philosophy. With a Kantian starting point Weyl asks: among all the infinitely many conceivable metrical spaces, which one applies to the physical world? In agreement with general relativity, Weyl acknowledges that the metric can quantitatively vary with the physical situation. Despite this freedom, Weyl "deduces", with group-theoretical technicalities, that there is only one "kind" of legitimate metric. This construction was then decisive for the development of gauge theories. Nevertheless, the question of the foundations of the metric of physical theories is only a piece of a wider epistemological problem. Contributing authors mark out the double trajectory that goes through Weyl's texts, from natural science to philosophy and conversely, always through the mediation of mathematics. Readers may trace the philosophical tradition to which Weyl refers and by which he is inspired (Kant, Husserl, Fichte, Leibniz, Becker etc.), and explore the mathematical tradition (Riemann, Helmholtz, Lie, Klein) that permitted Weyl to elaborate and solve his mathematical problem of space. Furthermore, this volume analyzes the role of the interlocutors with whom Weyl discussed the nature of physical space (Einstein, Cartan, De Sitter, Schrödinger, Eddington). This volume features the work of top specialists and will appeal to postgraduates and scholars in philosophy, the history of science, mathematics, or physics.

Reclaiming Space

"Space, to use a worn metaphor, is in the mind of the beholder. When we contemplate the seemingly limitless universe, we tend to project onto space our own hopes and dreams (as well as our fears and anxieties). But like responses to Rorschach inkblots, there are many different hopes, dreams, fears, and anxieties that one can project onto the night's sky. To those who approach it with a thirst for profits, space appears as a resource-rich goldmine, beckoning to anyone with enough wealth and privilege to take advantage of untapped markets. To those who approach it with a yearning for human expansion, space appears as a frontier that is humanity's birthright to conquer, its new manifest destiny. To those who approach it with a passion for knowledge and understanding, space appears as a tantalizing and pristine laboratory for scientific exploration. In these ways, our visions for humanity's future in space--what planets and moons we hope to visit, what we hope to accomplish when we get there--are

more products of our perspectives about space (and our underlying worldviews and value systems) than anything else"--

Entropy, Seismology and the View of Cosmology

This book shows that, to understand the origins of the universe, there is no need to look at deep space or look deep into matter, but, rather, to look at what is hidden under our feet, at our Earth. It notes that various regularities are hidden in the seismicity of the Earth, which can be "seen" by operating with new seismic parameters. These parameters are calculated based on earthquake data recorded by global seismological networks. This approach makes it possible to build a theory of entropy seismology, which can be applied in solving the problem of earthquake prediction, constructing dynamic maps of seismic hazard, and controlling the occurrence of undesirable seismicity as a result of human activity. The book also develops a seismic formalism, which allows one to look at modern problems of physics and cosmology from the unusual positions of entropy seismology.

The Modus Cogitandi of Heraclitus

This is a new reading of Heraclitus by a natural scientist who challenges the traditional view of Heraclitus as the philosopher of flux. A parallel analysis of Heraclitus and Parmenides removes the alleged enigmas and obscurity of their thought, and reveals groundbreaking epistemological thinking. Heraclitus' work is simply an epistemological essay, an essay on method in natural science.

When Form Becomes Substance

This interdisciplinary volume collects contributions from experts in their respective fields with as common theme diagrams. Diagrams play a fundamental role in the mathematical visualization and philosophical analysis of forms in space. Some of the most interesting and profound recent developments in contemporary sciences, whether in topology, geometry, dynamic systems theory, quantum field theory or string theory, have been made possible by the introduction of new types of diagrams, which, in addition to their essential role in the discovery of new classes of spaces and phenomena, have contributed to enriching and clarifying the meaning of the operations, structures and properties that are at the heart of these spaces and phenomena. The volume gives a closer look at the scope and the nature of diagrams as constituents of mathematical and physical thought, their function in contemporary artistic work, and appraise, in particular, the actual importance of the diagrams of knots, of braids, of fields, of interaction, of strings in topology and geometry, in quantum physics and in cosmology, but also in theory of perception, in plastic arts and in philosophy. The editors carefully curated this volume to be an inspiration to students and researchers in philosophy, phenomenology, mathematics and the sciences, as well as artists, musicians and the general interested audience.

Understanding Space, Time and Causality

This book examines issues related to the concepts of space, time and causality in the context of modern physics and ancient Indian traditions. It looks at the similarity and convergence of these concepts of modern physics with those discussed in ancient Indian wisdom. The volume brings the methodologies of empiricism and introspection together to highlight the synergy between these two strands. It discusses wide-ranging themes including the quantum vacuum as ultimate reality, quantum entanglement and metaphysics of relations, identity and individuality, and dark energy and anti-matter as discussed in physics and in Indian philosophical schools like Vedanta, Yoga, Buddhist, Kashmiri Shaivism and Jaina Philosophy. First of its kind, this book will be an essential read for scholars and researches of philosophy, Indian philosophy, philosophy of science, theoretical physics and social science.

The Quantum Vacuum

Milonni describes the concept of the vacuum in quantum physics with an emphasis on quantum electrodynamics. He elucidates in depth and detail the role of the vacuum electromagnetic field in spontaneous emission, the Lamb shift, van der Waals, and Casimir forces, and a variety of other phenomena, some of which are of technological as well as purely scientific importance. This informative text also provides an introduction based on fundamental vacuum processes to the ideas of relativistic quantum electrodynamics and quantum field theory, including renormalization and Feynman diagrams.

Experimental as well as theoreticalaspects of the quantum vacuum are described, and in most cases details of mathematical derivations are included.

Geometry Of Quantum Potential, The: Entropic Information Of The Vacuum

In virtue of its features, Bohm's quantum potential introduces interesting and relevant perspectives towards a satisfactory geometrodynamic description of quantum processes. This book makes a comprehensive state-of-the-art review of some of the most significant elements and results about the geometrodynamic picture determined by the quantum potential in various contexts. Above all, the book explores the perspectives about the fundamental arena subtended by the quantum potential, the link between the geometry associated to the quantum potential and a fundamental quantum vacuum. After an analysis of the geometry subtended by the quantum potential in the different fields of quantum physics (the non-relativistic domain, the relativistic domain, the relativistic quantum field theory, the quantum gravity domain and the canonical quantum cosmology), in the second part of the book, a recent interpretation of Bohm's quantum potential in terms of a more fundamental entity called quantum entropy, the approach of the symmetryzed quantum potential and the link between quantum potential and quantum vacuum are analysed, also in the light of the results obtained by the author. Contents: Introduction The Geometry of the Quantum Potential in Different Contexts Quantum Entropy and Quantum Potential Immediate Quantum Information and Symmetryzed Quantum Potential The Quantum Potential ... and the Quantum Vacuum Conclusions References Index Readership: Researchers interested in the link between the geometrodynamic action of the quantum potential and a fundamental quantum vacuum, in the different contexts of quantum physics. Keywords: Entropy;Quantum;Potential;Symmetry;Geometry;GeometrodynamicReview: Key Features: This book provides a complete guide to the geometrodynamic features of the quantum potential as key of reading and understanding of the different fields of quantum physics To explore relevant perspectives about the fundamental arena of quantum processes which determines the action of the quantum potential and its geometry This book introduces, in the light of relevant current research, interesting and novel perspectives as regards the link between the geometrodynamic action of the quantum potential and a fundamental quantum vacuum, in the different contexts of quantum physics

On Some Metaphysical Problems of Many Worlds Interpretation of Quantum Mechanics

Despite its enormous practical success, many physicists and philosophers alike agree that the quantum theory is full of contradictions and paradoxes which are difficult to solve consistently. Even after 90 years, the experts themselves still do not all agree what to make of it. The area of disagreement centers primarily around the problem of describing observations.

Quantum Electrodynamics

This book contains a systematic analysis of the formalisms of quantum electro dynamics in the presence of an intense external field able to create pairs from the vacuum, and thereby violate the stability of the latter. The approach developed is not specific to quantum electrodynamics, and can equally well be applied to any quantum field theory with an unstable vacuum. It should be noted that only macroscopic external fields are considered, whereas problems associated with the superstrong Coulomb (micro) field are not treated. As a rule, the discussion is confined to those details of the formalism and calculations that are specific to the instability property. For instance, renormalization is not discussed here since, in practical calculations, it is carried out according to standard methods. The presentation is based mainly on original research undertaken by the authors. Chapter 1 contains a general introduction to the problem. It also presents some standard information on quantum electrodynamics, which will be used later in the text. In addition, an interpretation of the concept of an external field is given, and the problems that arise when one tries to keep the interaction with the external field exactly are discussed. In Chapter 2, the perturbation expansion in powers of the radiative interac tion is developed for the matrix elements of transition processes, taking the arbitrary external field into account exactly.

Beyond the Quantum

Already Einstein could never see quantum mechanics as a complete theory. Nowadays, many researchers, including 't Hooft, view quantum mechanics as a statistical description of some underlying reality. The workshop Beyond the Quantum, organized in Spring 2006 at the Lorentz Center in Leiden, The Netherlands, was one of the first meetings completely devoted to physics that may need an

explanation beyond quantum mechanics. A broad variety of subjects was covered. The present book reflects this.

The Geometry of Quantum Potential

Since its foundation more than eight decades ago, quantum mechanics has been plagued by enigmas, mysteries and paradoxes and held hostage by quantum positivism. This fact strongly suggests that something is fundamentally wrong with the quantum mechanics paradigm. The best scientific minds, such as Albert Einstein, Louis de Broglie, David Bohm, Richard Feynman and others have spent years of their professional lives attempting to find resolution to the quantum mechanics predicament, with not much success. A shift of the quantum mechanics paradigm toward a deeper physics theory is long overdue. The Prologue is an introduction by Victor Vaguine of a fundamentally new quantum mechanics paradigm which he calls Super Quantum Mechanics (SQM). The theory and concept will be further expanded in a companion book Conceptual and Philosophical Foundations of Super Quantum Mechanics (February 2013). In contrast with quantum mechanics, which remains an enigmatic and mysterious science full of paradoxes, SQM is an ontological science. The SQM is a giant step in the progression of quantum mechanics toward a deeper physics theory. Fulfilling Einstein's dream, the centerpiece of SQM is an elementary quantum entity/event which can be visualized by humans. Each quantum entity is tangible with all its physical attributes at all times and not hanging in limbo. The philosophy of SQM is non-local realism. SQM brings non-locality dimension into focus and into system. Einstein stubbornly rejected non-locality, in effect imposing a subjective constraint on objective reality. He thus missed a supreme opportunity of a lifetime to free quantum mechanics from the detrimental influence of quantum positivism and to bring it to a deeper level. In contrast with the Standard Model of particle physics, which assumes elementary particles as point-like with no structure, SQM states that elementary particles (and forces) have dimension and structure. Based on three fundamental reasons, Victor Vaguine declares that the string theory is not valid scientific theory. The author ventures into cosmology by declaring intrinsic connections of SQM with the origin of the Universe through his original concept of absolute quantum entanglement at the pre-Big Bang state. Victor Vaguine states that the inflationary multiverse theory is scientifically invalid and replaces it with a concept of Uni-Universe, a new term coined by the author. The Uni-Universe is an assembly of habitable universes in 4-dimensional space. Each individual universe, such as our Universe, is sharply and uniquely defined. Based on the law of fine tuning, the author estimates: • expected time of arrival of humans on the cosmic scene versus actual timing • size of our Universe (unknown to science until now) • the extent of the habitability in the Milky Way galaxy, the observed Universe and our Universe • a time window for emerging intelligence in our Universe. Never ending scientific progress is presented as a series of curtains, each hiding a fundamentally new scientific paradigm. None of the curtains can be opened by logic or mathematical formalism alone—requiring instead great intuition and counter-intuition. Victor Vaguine declares that the lethal combination of materialism and quantum positivism is an impediment to scientific progress in theoretical physics and cosmology. The book, written at a high scientific level, contains minimal mathematical formalism and is accessible for laypersons with intellectual curiosity.

Prologue to Super Quantum Mechanics

This volume provides a sample of the present research on the foundations of quantum mechanics and related topics by collecting the papers of the Italian scholars who attended the conference entitled "The Foundations of Quantum Mechanics — Historical Analysis and Open Questions" (Lecce, 1998). The perspective of the book is interdisciplinary, and hence philosophical, historical and technical papers are gathered together so as to allow the reader to compare different viewpoints and cultural approaches. Most of the papers confront, directly or indirectly, the objectivity problem, taking into account the positions of the founders of QM or more recent developments. More specifically, the technical papers in the book pay special attention to the interpretation of the experiments on Bell's inequalities and to decoherence theory, but topics on unsharp QM, the consistent-history approach, quantum probability and alternative theories are also discussed. Furthermore, a number of historical and philosophical papers are devoted to Planck's, Weyl's and Pauli's thought, but topics such as quantum ontology, predictivity of quantum laws, etc., are treated.

Foundations Of Quantum Mechanics, The: Historical Analysis And Open Questions

Forces of the Quantum Vacuum presents a number of theoretical approaches to Casimir, van der Waals and Casimir-Polder forces that have been fruitfully employed in mainstream research, and

also reviews the experimental evidence for Casimir forces. Beginning with basic ideas in quantum mechanics and building its way to a sophisticated form of macroscopic QED, the book provides an inspiring training manual for graduate students to develop in a natural progression the ideas needed for modern theoretical research on Casimir forces.

Forces of the Quantum Vacuum

What happens to light when it is trapped in a box? Cavity Quantum Electrodynamics addresses a fascinating question in physics: what happens to light, and in particular to its interaction with matter, when it is trapped inside a box? With the aid of a model-building approach, readers discover the answer to this question and come to appreciate its important applications in computing, cryptography, quantum teleportation, and opto-electronics. Instead of taking a traditional approach that requires readers to first master a series of seemingly unconnected mathematical techniques, this book engages the readers' interest and imagination by going straight to the point, introducing the mathematics along the way as needed. Appendices are provided for the additional mathematical theory. Researchers, scientists, and students of modern physics can refer to Cavity Quantum Electrodynamics and examine the field thoroughly. Several key topics covered that readers cannot find in any other quantum optics book include: * Introduction to the problem of the "vacuum catastrophe" and the cosmological constant * Detailed up-to-date account of cavity QED lasers and thresholdless lasing * Examination of cavities with movable walls * First-principles discussion about cavity QED in opencavities * Pedagogical account of microscopic quantization in dielectrics Complementing the coverage of the most advanced theory and techniques, the author provides context by discussing the historical evolution of the field and its discoveries. In that spirit, "recommended reading," provided in each chapter, leads readers to both contemporary literature as well as key historical papers. Despite being one of many specialties within physics, cavity quantum electrodynamics serves as a window to many of the fundamental issues of physics. Cavity Quantum Electrodynamics will serve as an excellent resource for advanced undergraduate quantum mechanics courses as well as for graduate students, researchers, and scientists who need a comprehensive introduction to the field.

Cavity Quantum Electrodynamics

Problems of quantum field theory with unstable vacuum are considered. In the case of quantum electrodynamics, the vacuum instability is connected with the possibility of pair creating by external electromagnetic fields already in zeroth order with respect to the radiation interaction. The perturbation theory is constructed, for which the interaction with the external field is kept exact. Exact Green functions are introduced and the functional formulation is discussed. Perturbation theory for calculating the mean values of the Heisenberg operators and the total probabilities of radiating processes is built in the case under consideration. All results referring to the relations of the optical theorem for the external fields with unstable vacuum are presented. All these particularities are demonstrated for concrete external fields. Problems of the quantum electrodynamics at finite temperature are considered.

Quantum Electrodynamics with Unstable Vacuum

This volume assembles review articles that present the status of frontline research in this field in a manner that makes the material accessible to the educated, but non-specialist, reader. The articles focus on the many-body aspects of the theory of quantum liquids in confined geometry. Research is in the very satisfactory situation where several accurate approaches are available that allow one to describe these systems in a quantitative manner without modelling uncertainty and uncontrolled assumptions. For example, dynamic situations of direct experimental relevance can be modelled with high accuracy.

Microscopic Approaches to Quantum Liquids in Confined Geometries

The second edition of Non-Perturbative Methods in Two-Dimensional Quantum Field Theory is an extensively revised version, involving major changes and additions. Although much of the material is special to two dimensions, the techniques used should prove helpful also in the development of techniques applicable in higher dimensions. In particular, the last three chapters of the book will be of direct interest to researchers wanting to work in the field of conformal field theory and strings. This book is intended for students working for their PhD degree and post-doctoral researchers wishing to acquaint themselves with the non-perturbative aspects of quantum field theory. Contents:Free FieldsThe Thirring ModelDeterminants and Heat KernelsSelf-Interacting Fermionic ModelsNonlinear Ã

Models: Classical AspectsNonlinear ÃModels — Quantum AspectsExact S-Matrices of 2D ModelsThe Wess-Zumino-Witten TheoryQED2: Operator ApproachQuantum ChromodynamicsQED2: Functional ApproachThe Finite Temperature Schwinger ModelNon-Abelian Chiral Gauge TheoriesChiral Quantum ElectrodynamicsConformally Invariant Field TheoryConformal Field Theory with Internal Symmetry2D Gravity and String-Related Topics Readership: Graduate students and researchers in high energy and quantum physics. Keywords:Reviews:"… there are carefully written chapters on the Thirring, Gross-Neveu, and nonlinear Sigma models, as well as the sine-Gordon and Wess-Zumino-Witten theory … In particular, the last three chapters might be of interest to those who work in string theory, in view of the recently discovered AdS/CFT correspondence."Mathematics Abstracts

Non-Perturbative Methods in 2 Dimensional Quantum Field Theory

Finally new physics is emerging and it is simple! For the first time in history of physics we have learned how the electron inner structure looks in three-dimensional space (see Front cover). The foundational transformation of QED brings a plethora of new fundamental scientific discoveries. An example is weak electromagnetism as the second branch of electromagnetism with weak electric charge and weak Planck constant. Both values are established with the precision of ten digits. As turned out, the electron is not a fundamental (intrinsic) fermion, as claimed by the Standard Model for many decades. The electron is a composite fermion of electromagnetism and weak electromagnetism, consisting of the intrinsic electron and the electron neutrino. The electron neutrino has a duo-configuration, consisting of the intrinsic neutrino and the intrinsic antineutrino of opposite helicity. Both, the intrinsic neutrino and the intrinsic antineutrino are exclusive carriers of weak electric charge. The anomalous magnetic moment of the electron has been studied experimentally and theoretically since 1947 Kush measurements. The Standard Model explains the anomaly as a result of contribution interactions, principally by QED. Nothing can be further from the truth. According to Aphysical Quantum Mechanics, so-called "anomaly" is the magnetic moment of the electron neutrino, a constituent of the electron. The electron magnetic moment is a sum of the intrinsic electron magnetic moment equal to one Bohr magneton, and the electron neutrino magnetic moment equal two times of weak Bohr magneton. A long-standing problem of electron neutrino self-mass is resolved and the self-mass is determined with the precision of five digits. The detailed process of the electron formation (for example, following muon decay) is discovered and described instant-by-instant in spacetime dynamics. The corset action brings a newly formed electron from classical world into quantum world by reducing its size almost instantaneously by more that ten orders of magnitude with the energy conservation law observed.

Foundational Transformation of Quantum Electrodynamics

The second edition of Non-Perturbative Methods in Two-Dimensional Quantum Field Theory is an extensively revised version, involving major changes and additions. Although much of the material is special to two dimensions, the techniques used should prove helpful also in the development of techniques applicable in higher dimensions. In particular, the last three chapters of the book will be of direct interest to researchers wanting to work in the field of conformal field theory and strings.This book is intended for students working for their PhD degree and post-doctoral researchers wishing to acquaint themselves with the non-perturbative aspects of quantum field theory.

Non-perturbative Methods in 2 Dimensional Quantum Field Theory

In this book, which has its origin in a series of radio broadcasts, Paul Davies interviews eight physicists involved in debating and testing quantum theory, with radically different views of its significance.

The Ghost in the Atom

The unification between gravity and quantum field theory is one of the major problems in contemporary fundamental Physics. It exists for almost one century, but a final answer is yet to be found. Although string theory and loop quantum gravity have brought many answers to the quantum gravity problem, they also came with a large set of extra questions. In addition to these last two techniques, many other alternative theories have emerged along the decades. This book presents a series of selected chapters written by renowned authors. Each chapter treats gravity and its quantization through known and alternative techniques, aiming a deeper understanding on the quantum nature of gravity. Quantum Gravity is a book where the reader will find a fine collection of physical and mathematical concepts, an up to date research, about the challenging puzzle of quantum gravity.

Quantum Gravity

Aphysical Quantum Mechanics (AQM) is a deeper and more profound quantum theory. Volume One expands the understanding of quantum reality with the addition of two new fundamental categories: aphysical and elementary consciousness of elementary particles. Using the AQM Theory, Volume One details the explanation of all known and long standing quantum enigmas, including "the collapse of the wave function," and presents and explains the inner structures of perfect geometry of the photon and the intrinsic electron. AQM brings not only foundational transformation to quantum mechanics, but also to other branches of physics, such as quantum optics and particle physics. The paradigmatic power of AQM is such that the author was able to uncover 47 fundamental misconceptions/absurdities in the Standard Model theory of particle physics, and to make 27 fundamental scientific discoveries, all presented in these Volumes.

Foundational Transformation of Quantum Mechanics

The book contains the text of lectures given at the third of a series of biennial symposia in mathematical physics held in odd-numbered years. The subject of the symposium is the frontiers of mathematical physics. It deals with quantum phenomena and includes topics such as string theory and quantum gravity, particle physics and field theory, non-communative geometry, integrable models and infinite dimensional symmetry groups, quantum computing and information processing, and quantum chaos. The proceedings have been selected for coverage in: ? Index to Scientific & Technical Proceedings? (ISTP? / ISI Proceedings)? Index to Scientific & Technical Proceedings (ISTP CDROM version / ISI Proceedings)? CC Proceedings ? Engineering & Physical Sciences

Proceedings of the 3rd International Symposium, Quantum Theory and Symmetries

This book offers the revised and completed notes of lectures given at the 2007 conference, "Quantum Potential Theory: Structures and Applications to Physics." These lectures provide an introduction to the theory and discuss various applications.

Quantum Potential Theory

This book provides an up-to-date understanding of the progress and current problems of the interplay of nonlocality in the classical theories of gravitation and quantum theory. These problems lie on the border between general relativity and quantum physics, including quantum gravity.

Classical and Quantum Nonlocality

In 1861, James Clerk-Maxwell published Part II of his four-part series 'On physical lines of force'. In it, he attempted to construct a vortex model of the magnetic field but after much effort neither he, nor other late nineteenth century physicists who followed him, managed to produce a workable theory. What survived from these attempts were Maxwell's four equations of electrodynamics together with the Lorentz force law, formulae that made no attempt to describe an underlying reality but stood only as a mathematical description of the observed phenomena. When the quantum of action was introduced by Planck in 1900 the difficulties that had faced Maxwell's generation were still unresolved. Since then theories of increasing mathematical complexity have been constructed to attempt to bring the totality of phenomena into order with little success. This work examines the problems that had been abandoned long before quantum mechanics was formulated in 1925 and argues that these issues need to be revisited before real progress in the quantum theory of the electromagnetic field can be made.

Quantum Puzzle, The: Critique of Quantum Theory and Electrodynamics

This book is a self-contained presentation of the quantum field theory of topological defects created during spontaneous symmetry breakdown phase transitions, with a particular emphasis on phenomenological issues of current interest.

Quantum Field Theory and Its Macroscopic Manifestations

The book surveys mathematical relations between classical and quantum mechanics, gravity, time and thermodynamics from various points of view and many sources (with appropriate attribution). The emergence theme is developed with an emphasis on the meaning via mathematics. A background theme of Bohemian mechanics and connections to the quantum equivalence principle of Matone et al.

is also developed in great detail. Some original work relating the quantum potential and Ricci flow is also included.

On the Emergence Theme of Physics

The authors introduce the full content of the Microscopic Theory of Superfluid He II, developed since 1998; also given are brief accounts of the application of one concept from the theory, the QCE1 Super-fluidity Mechanism, to superconductors. One peer review report writes: "The authors include more of the underlying physics than some earlier theories, and the comparisons they make with experimental data are satisfactory". The Microscopic Theory of Superfluid He II has several important features, which distinguishes this theory from the previous theories of He II. The immense volume of information the authors have today, especially the pieces of information revealing the microscopic dynamics of the system, was not available to the developers of the previous theories in the 1930s-1940s. This book also demonstrates how the general principles of quantum mechanics and condensed matter physics can be consistently applied to a given system with confidence, once a realistic microscopic model is derived for it. It demonstrates in turn the validity of the general physics principles in such an extreme system as the quantum fluid He II.

The Microscopic Theory of Superfluid He II and with Its QCE Superfluidity Mechanism Applied to Superconductors

This book provides a readable account of the foundations of QFT, in particular of the Euclidean formulation with emphasis on the interplay between physical requirements and mathematical structures. The general structures underlying the conventional local (renormalizable) formulation of gauge QFT are discussed also on the basis of simple models. The mechanism of confinement, non-trivial topology and ?-vacua, chiral symmetry breaking and solution of the U(1) problem are clarified through a careful analysis of the Schwinger model, which settles unclear or debated points.

Selected Topics on the General Properties of Quantum Field Theory

This book deals with quantum field theory, the language of modern elementary particles physics. Based on university lectures given by the author, this volume provides a detailed technical treatment of quantum field theory that is particularly useful for students; it begins with the quantization of the most important free fields, the scalar, the spin-1/2 and the photon fields, and is then followed by a detailed account of symmetry properties, including a discussion on global and local symmetries and the spontaneous breaking of symmetries. Perturbation theory, one-loop effects for quantum electrodynamics, and renormalization properties are also covered. In this second edition new chapters have been introduced with a general description of path integral quantization both on quantum mechanics and in quantum field theory, with a particular attention to the gauge fields. The path integral quantization of Fermi fields is also discussed.

Introduction to Quantum Field Theory

This book "Foundation of quantum mechanics in Dual 4-dimension space-time——The spacetime origin of quantum probability," is a new exploration discussing the physical foundations of quantum mechanics. It contains two parts. One is the interactive realism, the other is the quantum mechanical description of the dual-4 dimensional spacetime. The first one is the philosophical basis of the second. The author thought that the conventional mass-point model is no long proper for the microscopic quantum world. The author used the movement of the rotating matter wave sphere in complex space to deduce the de Broglie matter-wave formula, and pulled the metaphysical hypothesis of the wave function back into the real physical realism. A matte wave is the physical wave, and it has potential applications. The matter wave transfers in the dual-4 dimensional complex space-time, and the complex number enters the cognition domain of space-time intrinsically. The author pointed out that, the state of a moving microscopic object is the combination of its eigen-states from quantum slicing, coherent hence; after quantum measurement, projected into the real 4-dimensional space-time and showing a probability distribution of point particles. Before and after the quantum measurement, the object is not in the same cognition level, nor the same physical space-time, and the Hilbert space is just their common math application space. The quantum measurement induces the transition of the microscopic object in space-time, manifestation, physical model, and theoretical structure, and the quantum probability comes from the space distribution of the field matter sphere, representing the transition from dual-4 complex to real 4-dimensional space-time, and the sphere to the point model. Physical phenomena,

phenomenal entity, physical space-time, physical model, and theoretical structure all must consist intrinsically in logic. These are changing with the change of human cognition, embodying the unity of the human being and the nature. Dual-4 dimensional space-time quantum mechanics gives the wave function the physical realism. So, the concepts of the quantum entanglement, quantum communication and quantum teleportation all may be clarified and understood physically. The book is self-consistent with detailed justification, wherein the interactive realism concept is a new innovation.

Quantum Mechanics Foundation in Dual 4-Dimensional Space-Time —Space-Time Origins of Quantum Probability

The essential features of quantum physics, largely debated since its discovery, are presented in this book, through the description (without mathematics) of recent experiments. Putting the accent on physical phenomena, this book clarifies the historical issues (delocalisation, interferences) and reaches out to modern topics (quantum cryptography, non-locality and teleportation); the debate on interpretations is serenely reviewed.

Quantum Physics: A First Encounter

Recently the interest in Bohm realist interpretation of quantum mechanics has grown. The important advantage of this approach lies in the possibility to introduce non-locality ab initio, and not as an "unexpected host". In this book the authors give a detailed analysis of quantum potential, the non-locality term and its role in quantum cosmology and information. The different approaches to the quantum potential are analysed, starting from the original attempt to introduce a realism of particles trajectories (influenced by de Broglie's pilot wave) to the recent dynamic interpretation provided by Goldstein, Durr, Tumulka and Zanghì, and the geometrodynamic picture, with suggestion about quantum gravity. Finally we focus on the algebraic reading of Hiley and Birkbeck school, that analyse the meaning of the non-local structure of the world, bringing important consequences for the space, time and information concepts.

Quantum Potential: Physics, Geometry and Algebra

Original publication and copyright date: 2010.

Decoding Reality