

John von Neumann and the Foundations of Quantum Physics

edited by
Miklós Rédei and Michael Stöltzner



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John Von Neumann And The Foundations Of Quantum Physics

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John Von Neumann And The Foundations Of Quantum Physics:

Mathematical Foundations of Quantum Mechanics John von Neumann, 1955 A revolutionary book that for the first time provided a rigorous mathematical framework for quantum mechanics Google books **John von Neumann and the Foundations of Quantum Physics** Miklós Rédei, Michael Stöltzner, 2013-03-09 John von Neumann 1903 1957 was undoubtedly one of the scientific geniuses of the 20th century The main fields to which he contributed include various disciplines of pure and applied mathematics mathematical and theoretical physics logic theoretical computer science and computer architecture Von Neumann was also actively involved in politics and science management and he had a major impact on US government decisions during and especially after the Second World War There exist several popular books on his personality and various collections focusing on his achievements in mathematics computer science and economy Strangely enough to date no detailed appraisal of his seminal contributions to the mathematical foundations of quantum physics has appeared Von Neumann's theory of measurement and his critique of hidden variables became the touchstone of most debates in the foundations of quantum mechanics Today his name also figures most prominently in the mathematically rigorous branches of contemporary quantum mechanics of large systems and quantum field theory And finally as one of his last lectures published in this volume for the first time shows he considered the relation of quantum logic and quantum mechanical probability as his most important problem for the second half of the twentieth century The present volume embraces both historical and systematic analyses of his methodology of mathematical physics and of the various aspects of his work in the foundations of quantum physics such as theory of measurement quantum logic and quantum mechanical entropy The volume is rounded off by previously unpublished letters and lectures documenting von Neumann's thinking about quantum theory after his 1932 *Mathematical Foundations of Quantum Mechanics* The general part of the Yearbook contains papers emerging from the Institute's annual lecture series and reviews of important publications of philosophy of science and its history *Mathematical Foundations of Quantum Mechanics* John von Neumann, 2018-02-27 Quantum mechanics was still in its infancy in 1932 when the young John von Neumann who would go on to become one of the greatest mathematicians of the twentieth century published *Mathematical Foundations of Quantum Mechanics* a revolutionary book that for the first time provided a rigorous mathematical framework for the new science Robert Beyer's 1955 English translation which von Neumann reviewed and approved is cited more frequently today than ever before But its many treasures and insights were too often obscured by the limitations of the way the text and equations were set on the page In this new edition of this classic work mathematical physicist Nicholas Wheeler has completely reset the book in TeX making the text and equations far easier to read He has also corrected a handful of typographic errors revised some sentences for clarity and readability provided an index for the first time and added prefatory remarks drawn from the writings of L on Van Hove and Freeman Dyson The result brings new life to an essential work in theoretical physics and mathematics *The*

Philosophy of Science Sahotra Sarkar, Jessica Pfeifer, 2006 The first in depth reference to the field that combines scientific knowledge with philosophical inquiry this encyclopedia brings together a team of leading scholars to provide nearly 150 entries on the essential concepts in the philosophy of science The areas covered include biology chemistry epistemology and metaphysics physics psychology and mind the social sciences and key figures in the combined studies of science and philosophy Midwest

Epistemological and Experimental Perspectives on Quantum Physics Daniel Greenberger, W.L. Reiter, Anton Zeilinger, 2013-04-17 From the very beginning it was realised that quantum physics involves radically new interpretative and epistemological consequences While hitherto there has been no satisfactory philosophical analysis of these consequences recent years have witnessed the accomplishment of many experiments to test the foundations of quantum physics opening up vistas to a completely novel technology quantum technology The contributions in the present volume review the interpretative situation analyze recent fundamental experiments and discuss the implications of possible future technological applications Readership Analytic philosophers logical empiricists scientists especially physicists historians of logic mathematics and physics philosophers of science and advanced students and researchers in these fields Can be used for seminars on theoretical and experimental physics and philosophy of science and as supplementary reading at advanced undergraduate and graduate levels

The Philosophy of Science: N-Z, Index Sahotra Sarkar, Jessica Pfeifer, 2006 The first in depth reference to the field that combines scientific knowledge with philosophical inquiry this encyclopedia brings together a team of leading scholars to provide nearly 150 entries on the essential concepts in the philosophy of science The areas covered include biology chemistry epistemology and metaphysics physics psychology and mind the social sciences and key figures in the combined studies of science and philosophy Midwest

Ernst Mach's Vienna 1895-1930 J.T. Blackmore, R. Itagaki, S. Tanaka, 2001-08-31 This work gives insight into the philosophical influence Ernst Mach 1838 1916 has had on leading Viennese physicists and philosophers of his time by relating the ideas and works of these men to Mach's phenomenalism The relation between Mach and the University of Vienna Philosophical Society is also examined In the process little known documents and correspondence from Mach are presented Additionally this extensive research helps clarify the conflict between Mach and most physicists over the reality of atoms and places the claim of Mach and his followers to represent science and philosophy of science against the claim of Planck and Einstein that phenomenalism and positivism were not even compatible with science Audience This is an ideal book for both graduate students and scholars in the field of history and philosophy of science

The Role of Mathematics in Physical Sciences Giovanni Boniolo, Paolo Budinich, Majda Trobok, 2005-03-10 Even though mathematics and physics have been related for centuries and this relation appears to be unproblematic there are many questions still open Is mathematics really necessary for physics or could physics exist without mathematics Should we think physically and then add the mathematics apt to formalise our physical intuition or should we think mathematically and then interpret physically the obtained results Do we get mathematical objects by

abstraction from real objects or vice versa Why is mathematics effective into physics These are all relevant questions whose answers are necessary to fully understand the status of physics particularly of contemporary physics The aim of this book is to offer plausible answers to such questions through both historical analyses of relevant cases and philosophical analyses of the relations between mathematics and physics

Causality, Measurement Theory and the Differentiable Structure of Space-Time R. N. Sen, 2010-02-11 Introducing graduate students and researchers to mathematical physics this book discusses two recent developments the demonstration that causality can be defined on discrete space times and Sewell's measurement theory in which the wave packet is reduced without recourse to the observer's conscious ego nonlinearities or interaction with the rest of the universe The definition of causality on a discrete space time assumes that space time is made up of geometrical points Using Sewell's measurement theory the author concludes that the notion of geometrical points is as meaningful in quantum mechanics as it is in classical mechanics and that it is impossible to tell whether the differential calculus is a discovery or an invention Providing a mathematical discourse on the relation between theoretical and experimental physics the book gives detailed accounts of the mathematically difficult measurement theories of von Neumann and Sewell

Studies in the Foundations of Quantum Mechanics Patrick Suppes, 1980

Non-locality and Modality

Tomasz Placek, Jeremy Butterfield, 2012-12-06 Quantum theory is the most successful of all physical theories it has a towering mathematical structure a vast range of accurate predictions and technological applications Its interpretation however is as unsettled now as in the heroic days of Einstein and Bohr This book focuses on quantum non locality the curious quantum correlations between spatially separated systems Quantum non locality was one subject of the debates between Einstein Bohr and others such as Schrödinger The topic was revived in the 1960s as a result of Bell's epoch making theorems since then it has been a very active research field both theoretically and experimentally This book contains twenty new papers by eminent researchers who report recent developments in both the physics of the subject and its philosophy The physics topics covered include quantum information the unsharp positive operator approach to observables the state space approach and the pilot wave theory The philosophy papers include precise studies of Bohr's reply to the original Einstein Podolsky Rosen non locality paradox and of non locality's relation to causation probability and modality

Foundations of Quantum Mechanics Società italiana di fisica, 1971 The subject of our discussions E Wigner Foundations of quantum mechanics J M Jauch Limitations on measurement H Stein and A Shimony Optimal measuring apparatus M M Yanase Measure et non s parabilit B D Espagnat Macroscopic physics and the problem of measurement in quantum mechanics G M Prosperi Measurability problems in the quantum theory of fields J Kalckar Introduction to the hidden variable question J S Bell Experimental test of local hidden variable theories A Shimony Experimental test of quantum predictions for widely separated photons L Kasday The many universes interpretation of quantum mechanics B S De Witt On the irreversibility of time and observation in quantum theory H D Zen Observables in general quantum theory C Piron The measuring process and an

axiomatization of quantum mechanics G Ludwig On a new development in the description of correlations between two quantum systems F Herbut and M Vujicic Superselection rules and internal symmetries A Frenkel Measuring processes and additive conservation laws K E Hellwig L interpretation de la mécanique ondulatoire par la théorie de la double solution L de Broglie Une formulation causale de la théorie quantique de la mesure J Andrade e Silva Realism and the wave function of quantum mechanics F Selleri Seminar notes H Neumann Quantum theory as an indication of a new order in physics Philosophical comments on quantum mechanics A Shimony Comments and questions concerning Shimony's lecture J Ehlers

The Philosophy of Quantum Mechanics Max Jammer, 1974-12-03 A Wiley Interscience publication **The Legacy of John von Neumann** American Mathematical Society, 1990 The ideas of John von Neumann have had a profound influence on modern mathematics and science One of the great thinkers of our century von Neumann initiated major branches of mathematics from operator algebras to game theory to scientific computing and had a fundamental impact on such areas as self adjoint operators ergodic theory and the foundations of quantum mechanics and numerical analysis and the design of the modern computer This volume contains the proceedings of an AMS Symposium in Pure Mathematics held at Hofstra University in May 1988 The symposium brought together some of the foremost researchers in the wide range of areas in which von Neumann worked These articles illustrate the sweep of von Neumann's ideas and thinking and document their influence on contemporary mathematics In addition some of those who knew von Neumann when he was alive have presented here personal reminiscences about him This book is directed to those interested in operator theory game theory ergodic theory and scientific computing as well as to historians of mathematics and others having an interest in the contemporary history of the mathematical sciences This book will give readers an appreciation for the workings of the mind of one of the mathematical giants of our time *Historical Studies in the Physical and Biological Sciences*, 2005

Einstein and the Philosophical Problems of 20th-century Physics, 1983 **The Voice of the Martians** George Marx, 2001 *Quantum Probability* Marek Bożejko, Wojciech Młotkowski, Janusz Wysoczański, 2006 *Mathematical Foundations of Quantum Mechanics* John Von Neumann, 1955 **The Philosophy of Karl Popper** Karl Raimund Popper, 1974

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