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Niels Bohr and the Quantum Atom Niels Bohr and the Quantum Atom Uncertainty Niels Bohr and Complementarity Niels Bohr Einstein, Bohr and the Quantum Dilemma Niels Bohr's Times Niels Bohr and the Philosophy of Physics Quantum From Data to Quanta *Bohr & Quantum Theory* **Epistemology and Probability Niels Bohr's Philosophy of Physics** *Quantum* **Niels Bohr and the Development of Physics** Einstein, Bohr and the Quantum Dilemma Atomic Physics and Human Knowledge **The Quest for Reality: Bohr and Wittgenstein - two complementary views** Atomic Theory and the Description of Nature **Love, Literature and the Quantum Atom Harmony and Unity: The Life of Niels Bohr Atoms, Metaphors and Paradoxes Atomic Theory and the Description of Nature Works on Atomic Physics, 1912-1917** *Reading Bohr: Physics and Philosophy* **Redirecting Science: Niels Bohr, Philanthropy, and the Rise of Nuclear Physics Love, Literature and the Quantum Atom The Description of Nature Niels Bohr and the Development of Physics THE ATOM AND THE BOHR THEORY OF ITS STRUCTURE Complementarity Beyond Physics Niels Bohr: His Heritage and Legacy Niels Bohr and the Infinitely Small** The Creation of Quantum Mechanics and the Bohr-Pauli Dialogue *The Historical Development of Quantum Theory* **The Bohr Atom** *Niels Bohr and the development of physics : essays dedicated to Niels Bohr on the occasion of his seventieth birthday* **Niels Bohr: Physics and the World Foundations of Quantum Physics II (1933-1958) Quantum - Illustrated Edition**

Manjit Kumar's superlative history of science's most fundamental revolution - in a brilliant illustrated edition. In this striking and sumptuous two-colour edition, Manjit Kumar's BBC Samuel Johnson Prize-shortlisted Quantum is wonderfully enriched by over 200 photos, artwork, maps and diagrams. It includes photos, some intimate and often little-seen before, of all the key protagonists; reproductions of key documents such as revealing letters and correspondence; detailed diagrams explaining the science and bringing to life classic thought experiments; and evocative portraits of the period, particularly of Cambridge, Copenhagen and Germany of the 1920s and 30s. At a moment of great discovery, one Big Idea can change the world... Niels Bohr's discoveries in quantum theory led to advances in physics and our understanding of atomic structure. His work won him the Nobel Prize in 1922 and his ideas continue to propel physics towards new discoveries. But what is quantum theory? Most of us do not understand even the basics of one of the most significant scientific advances ever made, opening up a whole new field in science, whose ambiguities still challenge scientists around the world. Bohr and Quantum Theory offers an accessible and absorbing account of the man who was both a part of The Manhattan Project but also an advocate of peace.He held the key to understanding such intricate realities as black holes and nuclear energy. Bohr's Big Idea explains complex and crucial ideas in a clear and engaging way, placing quantum theory in the context of a man's life, work and time and examining its important implications for our future. The Big Idea series is a fascinating look at the greatest advances in our scientific history, and at the men and women who made these fundamental breakthroughs. 'This is about gob-smacking science at the far end of reason ... Take it nice and easy and savour the experience of your mind being blown without recourse to hallucinogens' Nicholas Lezard, Guardian For most people, quantum theory is a byword for mysterious, impenetrable science. And yet for many years it was equally baffling for scientists themselves. In this magisterial book, Manjit Kumar gives a dramatic and superbly-written history of this fundamental scientific revolution, and the divisive debate at its core. Quantum theory looks at the very building blocks of our world, the particles and processes without which it could not exist. Yet for 60 years most physicists believed that quantum theory denied the very existence of reality itself. In this tour de force of science history, Manjit Kumar shows how the golden age of physics ignited the greatest intellectual debate of the twentieth century. Quantum theory is weird. In 1905, Albert Einstein suggested that light was a particle, not a wave, defying a century of experiments. Werner Heisenberg's uncertainty principle and Erwin Schrodinger's famous dead-and-alive cat are similarly strange. As Niels Bohr said, if you weren't shocked by quantum theory, you didn't really understand it. While "Quantum" sets the science in the context of the great upheavals of the modern age, Kumar's centrepiece is the conflict between Einstein and Bohr over the nature of reality and the soul of science. 'Bohr brainwashed a whole generation of physicists into believing that the problem had been solved', lamented the Nobel Prize-winning physicist Murray Gell-Mann. But in "Quantum", Kumar brings Einstein back to the centre of the quantum debate. "Quantum" is the essential read for anyone fascinated by this complex and thrilling story and by the band of brilliant men at its heart. Niels Bohr (1885-1962) was a Danish physicist who played a key role in the development of atomic theory and quantum mechanics, he was awarded the Nobel Prize for Physics in 1922. Originally written for various journals during the 1920s, these articles investigate the epistemological significance of discoveries in quantum physics. "Quantum theory, the most successful physical theory of all time, provoked intense debate between the twentieth century's two greatest physicists, Niels Bohr and Albert Einstein. The debate concerned the nature of quantum theory, and the major contradictions and conceptual problems at its heart." "This second edition contains sympathetic accounts of the views of both Bohr and Einstein, and a thorough study of the argument between them. It includes non-technical and non-mathematical accounts of the development of quantum theory and relativity, and also the work of David Bohm and John Bell that restored interest in Einstein's views. It has been extensively revised and updated to cover recent developments, and the account of ongoing work has been brought up to date. A new chapter is devoted to describing the whole area of quantum information theory, from the work of Richard Feynman and David Deutsch that initiated the study of quantum computation to the theoretical and experimental approach to quantum cryptography." "This book provides an account of the development of quantum theory, which will appeal to anyone with an interest in the fundamental questions of physics, its philosophy and its history."--BOOK JACKET. In both science and philosophy, the twentieth century saw a radical breakdown of certainty in the human worldview, as quantum uncertainty and linguistic ambiguity destroyed the comfortable certitudes of the past. As these disciplines form the foundation for a human position in the world, a major epistemological reorganization had to take place. In this book, quantum theorist Stig Stenholm presents Bohr and Wittgenstein, in physics and in philosophy, as central figures representing this revision. Each of them took up the challenge of replacing apparent order and certainty with a provisional understanding based on limited concepts in constant flux. Stenholm concludes that the modern synthesis created by their heirs is far from satisfactory, and the story is so far an unfinished one. The book will appeal to any researcher in either discipline curious about the foundation of modern science, and works to provoke a renewal of discussion and the eventual emergence of a reformed clarity and understanding. The bulk of the present book has not been published previously though Chapters II and IV are based in part on two earlier papers of mine: "The Influence of Harald H!1lffding's Philosophy on Niels Bohr's Interpretation of Quantum Mechanics", which appeared in Danish Yearbook of Philosophy, 1979, and "The Bohr-H!1lffding Relationship Reconsidered", published in Studies in History and Philosophy of Science, 1988. These two papers comple ment each other, and in order to give the whole issue a more extended treatment I have sought, in the present volume by drawing on relevant historical material, to substantiate the claim that H!1lffding was Bohr's mentor. Besides containing a detailed account of Bohr's philosophy, the book, at the same time, serves the purpose of making H!1lffding' s ideas and historical significance better known to a non-Danish readership. During my work on this book I have consulted the Royal Danish Library; the National Archive of Denmark and the Niels Bohr Archive, Copenhagen, in search of relevant material. I am grateful for permission to use and quote material from these sources. Likewise, I am indebted to colleagues and friends for

commenting upon the manuscript: I am especially grateful to Professor Henry Folse for our many discussions during my visit to New Orleans in November-December 1988 and again here in Elsinore in July 1990. Many books have been written on the history of quantum mechanics. So far as I am aware, however, this is the first to incorporate the results of the large amount of detailed scholarly research completed by professional historians of physics over the past fifteen years. It is also, I believe, the first since Max Jammer's pioneering study of fifteen years ago to attempt a genuine 'history' as opposed to a mere technical report or popular or semi-popular account. My aims in making this attempt have been to satisfy the needs of historians of science and, more especially, to promote a serious interest in the history of science among phYSicists and physics students. Since the creation of quantum mechanics was inevitably a technical process conducted through the medium of technical language it has been impossible to avoid the introduction of a large amount of such language. Some acquaintance with quantum mechanics, corresponding to that obtained through an undergraduate physics course, has accordingly been assumed. I have tried to ensure, however, that such an acquaintance should be sufficient as well as necessary, and even someone with only the most basic grounding in physics should be able with judicious skip ping, to get through the book. The technical details are essential to the dialogue, but the plot proceeds and can, I hope, be understood on a non technical level. "Niels Bohr was a central figure in quantum physics, well-known for his work on atomic structure and his contributions to the Copenhagen interpretation of quantum mechanics. In this book, philosopher Slobodan Perović explores the way Bohr practiced and understood physics, and the implications of this for our understanding of modern science, especially contemporary quantum experimental physics. Perović's method of studying Bohr is philosophical-historical, and his aim is to make sense of both Bohr's understanding of physics and his method of inquiry. He argues that in several important respects, Bohr's vision of physics was driven by his desire to develop a comprehensive perspective on key features of experimental observation as well as emerging experimental work. Perović uncovers how Bohr's distinctive breakthrough contributions are characterized by a multi-layered, phased approach of building on basic experimental insights inductively to develop intermediary and overarching hypotheses. The strengths and limitations of this approach, in contrast to the mathematically or metaphysically driven approaches of other physicists at the time, made him a thoroughly distinctive kind of theorist and scientific leader. Once we see that Bohr played the typical role of a laboratory mediator, and excelled in the inductive process this required, we can fully understand the way his work was generated, the role it played in developing novel quantum concepts, and its true limitations, as well as current adherence to and use of Bohr's complementarity approach among contemporary experimentalists"-- This book examines the development of Niels Bohr's crucial insights during the birth of quantum mechanics. “A lucid account of quantum theory (and why you should care) combined with a gripping narrative.”—San Francisco Chronicle Quantum theory is weird. As Niels Bohr said, if you weren’t shocked by quantum theory, you didn’t really understand it. For most people, quantum theory is synonymous with mysterious, impenetrable science. And in fact for many years it was equally baffling for scientists themselves. In this tour de force of science history, Manjit Kumar gives a dramatic and superbly written account of this fundamental scientific revolution, focusing on the central conflict between Einstein and Bohr over the nature of reality and the soul of science. This revelatory book takes a close look at the golden age of physics, the brilliant young minds at its core—and how an idea ignited the greatest intellectual debate of the twentieth century. How and why do complex scientific disciplines such as physics change emphasis from one sub-discipline to another? Do such transitions stem entirely from developments within the discipline itself or also from external factors? This book addresses these questions by examining the transition from atomic to nuclear physics, theoretically and experimentally, at Niels Bohr’s Institute for Theoretical Physics in Copenhagen in the 1930s. On the basis of extensive archival research, Finn Aaserud shows that the “Copenhagen spirit,” the playful research atmosphere under Bohr’s fatherly guidance that permeated the Institute, thrived because of extra-scientific circumstances that Bohr exploited to the fullest, such as the need to help Jewish physicists out of Hitler’s Germany and the changing funding policies of private foundations, notably those of the Rockefeller Foundation which made it opportune to introduce research in experimental biology at the Institute. “A clear, carefully developed and substantially convincing argument... Aaserud gives a detailed and impressively documented account of the direction of Bohr’s scientific interests... Aaserud is... to be congratulated for his original, clear — indeed, didactic — work of scholarship and enlightenment.” — Paul Forman, Physics Today “A professional historian’s study of the happenings at the Niels Bohr Institute in the decisive years 1930 to 1940... In particular, the... support of the Institute by Danish and other foundations, mainly the Rockefeller Foundation, are treated in great detail, revealing many interesting aspects of these relationships... The detailed accounts... of Bohr’s negotiations are a testimony to Bohr’s uncanny ability to get what he wanted from the various foundations... Aaserud’s book is an invaluable source of information [showing] that Bohr was not only an inspiring physicist and philosopher but also a cunning negotiator who knew how to make use of his great reputation for the benefit of science.” — Victor F. Weisskopf, Science “Aaserud elucidates Bohr’s skills not only as mentor and guiding hand behind the ‘Copenhagen spirit,’ but also as financial negotiator.” — Neil Wasserman, Isis, A Journal of the History of Science Society “This book teaches us that running such [a truly elite] institution required entrepreneurial skills as well as scientific genius. Bohr had an abundance of both.” — Jeremy Bernstein, Nature “Redirecting Science is the history of Bohr’s institute during the 1930s when it experienced a drastic change in its research priorities, from a laissez-faire mode of work and lack of clearly defined research programme to a concerted research effort in nuclear physics and experimental biology... Aaserud gives a highly interesting account of the interaction between physics and biology... Aaserud’s carefully documented work is an excellent example of how institutional history may transcend social and institutional limitations and integrate also conceptual history of science.” — Helge Kragh, Centaurus “By showing that a new research programme at one of the most important scientific institutes in the world was triggered, and pushed forward, by social and financial considerations, this book delivers yet another blow to the tired old idea that scientific knowledge is driven by its own internal, inexorable logic. It also throws valuable light on Bohr’s activities and strategies as a fundraiser and institution builder.” — John Krige, The British Journal for the History of Science Niels Bohr and the Quantum Atom is the first book that focuses in detail on the birth and development of Bohr's atomic theory and gives a comprehensive picture of it. At the same time it offers new insight into Bohr's peculiar way of thinking, what Einstein once called his 'unique instinct and tact'. Contrary to most other accounts of the Bohr atom, the book presents it in a broader perspective which includes the reception among other scientists and the criticism launched against it by scientists of a more conservative inclination. Moreover, it discusses the theory as Bohr originally conceived it, namely, as an ambitious theory covering the structure of atoms as well as molecules. By discussing the theory in its entirety it becomes possible to understand why it developed as it did and thereby to use it as an example of the dynamics of scientific theories. At the close of the nineteenth century and the beginning of the twentieth, our knowledge of the activities in the interior of matter experienced a development which surpassed the boldest hopes that could have been entertained by the chemists and physicists of the nineteenth century. The smallest particles of chemistry, the atoms of the elements, which hitherto had been approached merely by inductive thought, now became tangible realities, so to speak, which could be counted and whose tracks could be photographed. A series of remarkable experimental investigations, stimulated largely by the English physicist, J. J. Thomson, had disclosed the existence of negatively charged particles, the so-called electrons, $^{4}/_{2000}$ the mass of the smallest atom of the known elements. A theory of electrons, based on Maxwell’s classical electrodynamical theory and developed mainly through the labours of Lorentz in Holland and Larmor in England, had brought the problem of atomic structure into close connection with the theory of radiation. The experiments of Rutherford proved, beyond a doubt, that atoms were composed simply of light, negative electric particles, and small heavy, positive electric particles. The new “quantum theory” of Planck was proving itself very powerful in overcoming grave difficulties in the theory of radiation. The time thus seemed ripe for a comprehensive investigation of the fundamental problem of physics—the constitution of matter,

and an explanation in terms of simple general laws of the physical and chemical properties of the atoms of the elements. During the first ten years of the new century the problem was attacked with great zeal by many scientists, and many interesting atomic models were developed and studied. But most of these had more significance for chemistry than for physics, and it was not until 1913 that the work of the Danish physicist, Niels Bohr, paved the way for a really physical investigation of the problem in a remarkable series of papers on the spectrum and atomic structure of hydrogen. The ideas of Bohr, founded as they were on the quantum theory, were startling and revolutionary, but their immense success in explaining the facts of experience after a time won for them the wide recognition of the scientific world, and stimulated work by other investigators along similar lines. The past decade has witnessed an enormous development at the hands of scientists in all parts of the world of Bohr’s original conceptions; but through it all Bohr has remained the leading spirit, and the theory which, at the present time, gives the most comprehensive view of atomic structure may, therefore, most properly bear the name of Bohr. It is the object of this book to give the reader a glimpse of the fundamental conceptions of this theory, together with some of the most significant results it has attained. The book is designed to meet the needs of those who wish to keep abreast of modern developments in science, but have neither time nor inclination to delve into the highly mathematical abstract literature in which the developments are usually concealed. It is with this in mind that the first four chapters have been devoted to a general survey of those parts of physics and chemistry which have close connection with atomic theory. No attempt has been made at a mathematical development, and the physical meaning of such mathematical formulæ as do occur has been clearly emphasized in the text. It is hoped, however, that even those readers whose acquaintance with atomic theory is more than casual, will find the book a stimulus to further study of the Bohr theory. Here we wish to record our best thanks to Mr. and Mrs. Lindsay for the ability and the great care with which they have carried out the translation from the Danish original...FROM THE BOOKS Quantum Theory, together with the principles of special and general relativity, constitute a scientific revolution that has profoundly influenced the way in which we think about the universe and the fundamental forces that govern it. The Historical Development of Quantum Theory is a definitive historical study of that scientific work and the human struggles that accompanied it from the beginning. Drawing upon such materials as the resources of the Archives for the History of Quantum Physics, the Niels Bohr Archives, and the archives and scientific correspondence of the principal quantum physicists, as well as Jagdish Mehra's personal discussions over many years with most of the architects of quantum theory, the authors have written a rigorous scientific history of quantum theory in a deeply human context. This multivolume work presents a rich account of an intellectual triumph: a unique analysis of the creative scientific process. The Historical Development of Quantum Theory is science, history, and biography, all wrapped in the story of a great human enterprise. Its lessons will be an aid to those working in the sciences and humanities alike. Containing the proceedings of the symposium held by the American Academy of Arts and Sciences to celebrate the 100th anniversary of the birth of Niels Bohr, this collection was first published in 1988. More than any other individual, Bohr was responsible for the development of quantum mechanics and for many of its applications in the pursuit of fundamental understanding of physical reality. In addition to his unique role in the discovery and elucidation of quantum theory, Bohr led the study of the fission of nuclei and was greatly concerned with the impact of the existence of the atomic bomb in the post-World War II era. This unique volume provides a panoramic view of modern physics, some of the philosophical issues associated with quantum theory, the impact of this momentous scientific development on the political circumstance of the Cold War Era and the qualities of a superlative scientist. This book offers a new perspective on Niels Bohr's interpretation of quantum mechanics as complementarity, and on the relationships between physics and philosophy in Bohr's work. The importance of quantum field theory for Bohr's thinking has not been adequately addressed in the literature on Bohr. This book provides clarification of Bohr's writings (which usually pose problems of reading), and an analysis of the role of quantum field theory in Bohr's thinking. Niels Bohr ranks with Einstein among the physicists of the 20th century. He rose to this status through his invention of the quantum theory of the atom and his leadership in its defense and development. He also ranks with Einstein in his humanism and his sense of responsibility to his science and the society that enabled him to create it. Our book presents unpublished excerpts from extensive correspondence between Bohr and his immediate family, and uses it to describe and analyze the psychological and cultural background to his invention. The book also contains a reprinting of the three papers of 1913 - the Trilogy- in which Bohr worked out the provisional basis of a quantum theory of the atom. The life of Niels Bohr spanned times of revolutionary change in science itself as well as its impact on society. Along with Albert Einstein, Bohr can be considered to be this century's major driving force behind the new philosophical and mathematical descriptions of the structure of the atom and the nucleus. Abraham Pais, the acclaimed biogrpaher of Albert Einstein, here traces Bohr's progress from his well-to-do origins in late nineteenth-century Denmark to his position at centre stage in the world political scene, particularly during the Second World War and the development of atomic weapons. Pais' description moves through the science as it was before Bohr, as it became because of Bohr, and thence to Bohr's scientific and philosophical legacy. That legacy is contained both in theory as it is now universally enshrined, as well as in its practice in such great Danish institutions as Riso. But more than that, Pais captures the essence of Bohr, the intensely private family figure who, despite appalling personal tragedy, became one of the most loved cultural figures of recent times. The gripping, entertaining, and vividly-told narrative of a radical discovery that sent shockwaves through the scientific community and forever changed the way we understand the world. Werner Heisenberg’s “uncertainty principle” challenged centuries of scientific understanding, placed him in direct opposition to Albert Einstein, and put Niels Bohr in the middle of one of the most heated debates in scientific history. Heisenberg’s theorem stated that there were physical limits to what we could know about sub-atomic particles; this “uncertainty” would have shocking implications. In a riveting and lively account, David Lindley captures this critical episode and explains one of the most important scientific discoveries in history, which has since transcended the boundaries of science and influenced everything from literary theory to television. This book presents unpublished excerpts from extensive correspondence between Niels Bohr and his immediate family, and uses it to describe and analyze the psychological and cultural background to his invention of the quantum theory of the atom. Newman College association - staff. This book offers a discussion of Niels Bohr’s conception of “complementarity,” arguably his greatest contribution to physics and philosophy. By tracing Bohr’s work from his 1913 atomic theory to the introduction and then refinement of the idea of complementarity, and by explicating different meanings of “complementarity” in Bohr and the relationships between it and Bohr’s other concepts, the book aims to offer a contained and accessible, and yet sufficiently comprehensive account of Bohr’s work on complementarity and its significance. This book offers an exploration of the relationships between epistemology and probability in the work of Niels Bohr, Werner Heisenberg, and Erwin Schro-¨ dinger, and in quantum mechanics and in modern physics as a whole. It also considers the implications of these relationships and of quantum theory itself for our understanding of the nature of human thinking and knowledge in general, or the ‘‘epistemological lesson of quantum mechanics,’’ as Bohr liked 1 to say. These implications are radical and controversial. While they have been seen as scientifically productive and intellectually liberating to some, Bohr and Heisenberg among them, they have been troublesome to many others, such as Schro¨ dinger and, most prominently, Albert Einstein. Einstein famously refused to believe that God would resort to playing dice or rather to playing with nature in the way quantum mechanics appeared to suggest, which is indeed quite different from playing dice. According to his later (sometime around 1953) remark, a lesser known or commented upon but arguably more important one: ‘‘That the Lord should play [dice], all right; but that He should gamble according to definite rules [i. e. , according to the rules of quantum mechanics, rather than 2 by merely throwing dice], that is beyond me. ’’ Although Einstein’s invocation of God is taken literally sometimes, he was not talking about God but about the way nature works. Bohr’s reply on an earlier occasion to Einstein’s question 1 Cf. This book explores the debate between Einstein and Bohr in the 1920s and 1930s about their interpretations of the

quantum theory. This book gives a clear and comprehensive exposition of Niels Bohr's philosophy of physics. Bohr's ideas are of major importance, for they are the source of the Copenhagen interpretation of quantum physics; yet they are obscure, and call for the sort of close analysis that this book provides. The book describes the historical background of the physics from which Bohr's ideas grew. The core of the book is a detailed analysis of Bohr's arguments for complementarity and of the interpretation which he put upon it. Special emphasis is placed throughout on the contrasting views of Einstein, and the great debate between Bohr and Einstein is thoroughly examined. The book traces the philosophical influences on Bohr, and unravels the realist and anti-realist strands in his thinking. Bohr's philosophy is critically assessed in the light of recent developments in the foundations of quantum physics (the work of Bell and others) and in philosophy (the realism-anti-realism debate) and it is revealed as being much more subtle and sophisticated than it is generally taken to be. While the book will be of interest to specialists, it is written in a style that will make it accessible to those who have no specialist knowledge of the relevant physics and philosophy. In this study Arun Bala examines the implications that Niels Bohr’s principle of complementarity holds for fields beyond physics. Bohr, one of the founding figures of modern quantum physics, argued that the principle of complementarity he proposed for understanding atomic processes has parallels in psychology, biology, and social science, as well as in Buddhist and Taoist thought. But Bohr failed to offer any explanation for why complementarity might extend beyond physics, and his claims have been widely rejected by scientists as empty speculation. Scientific scepticism has only been reinforced by the naïve enthusiasm of postmodern relativists and New Age intuitionists, who seize upon Bohr’s ideas to justify anti-realist and mystical positions. Arun Bala offers a detailed defence of Bohr’s claim that complementarity has far-reaching implications for the biological and social sciences, as well as for comparative philosophies of science, by explaining Bohr’s parallels as responses to the omnipresence of grown properties in nature. Niels Bohr and the Quantum Atom gives a comprehensive account of the birth, development, and decline of Bohr's atomic theory. It presents the theory in a broad context which includes not only its technical aspects, but also its reception, dissemination, and applications in both physics and chemistry. "All students of physics encounter the Bohr model of the atom. However, it is often covered quickly in order that curricula can progress to wave mechanics. This book gives students and instructors a fuller exploration to Bohr's model. Topics covered include the historical background to the model, Bohr's approach to his original derivation, and corollary issues such as the role of angular momentum in the theory, ionized helium, the correspondence principle, the fine-structure constant, de Broglie matter-waves, application of the theory to the diatomic hydrogen molecule, and the magnetic field created by the orbiting electron. It also includes student exercises, a bibliography, a list of important physical constants, and a survey of Bohr's subsequent life and career." -- Prové de l'editor. Niels Bohr and Philosophy of Physics: Twenty-First Century Perspectives examines the philosophical views, influences and legacy of the Nobel Prize physicist and philosophical spokesman of the quantum revolution, Niels Bohr. The sixteen contributions in this collection by some of the best contemporary philosophers and physicists writing on Bohr's philosophy today all carefully distinguish his subtle and unique interpretation of quantum mechanics from views often imputed to him under the banner of the “Copenhagen Interpretation.” With respect to philosophical influences on Bohr's outlook, the contributors analyse prominent similarities between his viewpoint and Kantian ways of thinking, the views of the Danish philosopher Harald Høffding, and themes characteristic of American pragmatism. In recognizing the importance of Bohr's epistemological naturalism they examine his defence of the indispensability of classical concepts from a variety of different perspectives. This collection shows us that Bohr's interpretation of quantum mechanics, now nearly a century old, still has the power to shed light on a variety of issues that have arisen only since his lifetime, as well as decoherence theory and other non-collapse interpretations. Balancing historical themes with contemporary discussions, Niels Bohr and the Philosophy of Physics establishes Bohr's on-going contribution to the philosophy of physics and examines his place in the history of philosophy. Niels Bohr’s atomic theory of 1913 is one of the absolute highlights in the history of modern science. It was only with this work that physicists realized that quantum theory is an essential ingredient in atomic physics, and it was also only with this work that Rutherford’s nuclear model dating from 1911 was transformed into a proper theory of atomic structure. In a longer perspective, Bohr’s quantum atom of 1913 gave rise to the later Heisenberg-Schrödinger quantum mechanics and all its marvellous consequences. This book is a detailed account of the origin of the Bohr atom centred around his original scientific articles of 1913 which are here reproduced and provided with the necessary historical background. In addition to the so-called trilogy – the three papers published in Philosophical Magazine – also two other and less well-known yet important papers are included. The present work starts with a condensed biographical account of Bohr’s life and scientific career, from his birth in Copenhagen in 1885 to his death in the same city 77 years later. It then proceeds with a chapter outlining earlier ideas of atomic structure and tracing Bohr’s route from his doctoral dissertation in 1911 over his stays in Cambridge and Manchester to the submission in April 1913 of the first part of the trilogy. The reproduction of Bohr’s five articles is followed by notes and comments directly related to the texts, with the aim of clarifying some of the textual passages and to explicate names and subjects that may not be clear or well known. The reception of Bohr’s radically new theory by contemporary physicists and chemists is discussed in a final chapter, which deals with the immediate reactions to Bohr's theory 1913-1915 mostly among British, German and American scientists. Historians of science have long been occupied with Bohr’s atomic theory, which was the subject of careful studies in connection with its centenary in 2013. The present work offers an extensive source-based account of the original theory aimed at a non-specialist audience with an interest in the history of physics and the origin of the quantum world. In 1922 Bohr was awarded the Nobel Prize for his theory. The coming centenary will undoubtedly cause an increased interest in how he arrived at his revolutionary picture of the constitution of atoms and molecules. “Blaedel has addressed himself to the task of writing a full-length biography that covers all facets of his subject and that emphasizes that they form part of one harmonious unity. I think that on the whole he has succeeded remarkably well. He gives an accurate picture of the man theorists of my generation both admired and loved. And not only of the physicist: Bohr’s relations with his family and in particular with his wife, an admirable woman, are drawn with sympathy and understanding. Blaedel’s sketch of the atmosphere at Bohr’s institute in Copenhagen... is true to life; it will raise nostalgic memories among those who, like myself, experienced it... [Blaedel] has produced a fitting tribute to a great scientist and a noble man.” — H.B.G. Casimir, Nature “The book is intended primarily for nonphysicists; nevertheless it offers extensive (albeit nontechnical) accounts of all aspects of Bohr’s scientific work. The consistent emphasis, however, is on Bohr as a person—his character, interests andWeltanschauung. Niels Blaedel was able to draw on matchless resources, both human and material: Bohr’s family (especially his widow, Margrethe Bohr, who shared both her memories and her correspondence), Bohr’s former friends and colleagues, and a rich supply of documentary and photographic material from Danish collections, as well as from the AIP Niels Bohr Library in New York. The result is a lavishly illustrated and affectionate account of Bohr from his earliest years until his death... as a general picture of Bohr and his work this book can be warmly recommended.” — Anthony P. French, Physics Today “Niels Bohr is generally regarded as a giant of twentieth-century physics... Bohr was securely entrenched in a Danish culture that is difficult for many historians to penetrate. It is important, then, that at last a biography has been written by a Dane with wide knowledge of the society in which Bohr lived and moved... The author had unprecedented access to Bohr’s family correspondence, primarily with his wife Margrethe, who, before she died at ninety-four in 1984, read Blaedel many letters from her husband... Blaedel’s book, written on commission for the Bohr centennial and published in Danish in 1985, contains valuable insights on Bohr, particularly as they relate to his previously unavailable family correspondence and his place in Danish culture.” — Finn Aaserud, Isis: A Journal of the History of Science “Though Niels Bohr is best known as a distinguished citizen of the international community of science, he was also a leading citizen of Denmark. This is the first biography of Bohr to deal with both of these dimensions to his life, without which it is hard to fully understand either the man or his work.” — Robert March, University of Wisconsin-

Madison, author of Physics for Poets “... the book can be read without any background knowledge in physics. But its overwhelming number of photographs and rich use of letters and recollections make Niels Blaedel’s book closely resemble the great standard biography — a literary monument to Niels Bohr.” — Flemming Christian Nielsen, Jyllands-Posten “Niels Blaedel has solved an almost insoluble problem... thereby clarifying the life of Niels Bohr... a well-constructed piece of documentation and a coherent piece of scientific history.” — Jens Kistrup, Berlingske Tidende Volume 7 is a direct continuation of Volume 6, which documented the birth of the complementarity argument and its earliest elaborations. It covers the extension and refinement of the complementarity argument from 1933 until Bohrs' death in 1962. All Bohr's publications on the subject, together with selected manuscripts and extracts of his correspondence with friends and fellow pioneers such as Werner Heisenberg and Wolfgang Pauli, are included. Divided into two, largely independent parts, the volume begins with Bohr's contributions to "Relativistic Quantum Theory". Together with Léon Rosenfeld, Bohr undertook a thorough investigation of the measuring problem in quantum electrodynamics and demonstrated the full accordance between the formalism and the result of idealized thought experiments. The articles in the second part, although also restricted in scope to the field of physics, address a broader audience. One of the most impressive treatises is Bohr's own account of his debates with Albert Einstein, over more than twenty years, on the consistency, the completeness and the epistemological consequences of quantum mechanics. Volumes 6 and 7 of the Collected Works are in turn related to the forthcoming Volume 10 which broadens the scope by presenting Bohr's applications of the complementarity argument beyond the domain of physics. Although each volume may be read independently, careful attention should be paid to the interrelationships between each volume in order to appreciate the subtlety of Bohr's continued elaboration and fine-tuning of his complementarity argument. This collection of articles, which were first published in 1958 and written on various occasions between 1932 and 1957, forms a sequel to Danish physician Niels Bohr’s earlier essays in Atomic Theory and the Description of Nature (1934). “The theme of the papers is the epistemological lesson which the modern development of atomic physics has given us and its relevance for analysis and synthesis in many fields of human knowledge. “The articles in the previous edition were written at a time when the establishment of the mathematical methods of quantum mechanics had created a firm foundation for the consistent treatment of atomic phenomena, and the conditions for an unambiguous account of experience within this framework were characterized by the notion of complementarity. In the papers collected here, this approach is further developed in logical formulation and given broader application.” The discovery of atomic number, by C.G. Darwin.--The development of the interpretation of the quantum theory, by W. Heisenberg.--Exclusion principle, Lorentz group and reflexion of space-time and charge, by W. Pauli.--On the quantum theory of fields, by L.D. Landau.--On quantum electrodynamics, by L. Rosenfeld.--Quantum theory and relativity, by O. Klein.--On the theory of superconductivity, by H.B.G. Casimir.--The compound nucleus, by F.L. Friedman and V.F. Weisskopf.--Nuclear fission and nuclear stability, by J.A. Wheeler.--On the passage through matter of swift charged particles, by J. Lindhard.

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