# ERHARD SCHEIBE

# Between Rationalism and Empiricism

Selected Papers in the Philosophy of Physics

Edited by Brigitte Falkenburg



**Bernd-Olaf Küppers** 

Between Rationalism and Empiricism Erhard Scheibe, 2002-12-06 Scheibe is one of the most important philosophers of science in Germany He has written extensively on all the problems that confront the philosophy of physics rationalism vs empiricism reductionism the foundations of quantum mechanics space time and much more Since little of his work has been translated into English he is not yet well known internationally However this collection of some 40 of his papers will remedy Between Rationalism and Empiricism Erhard Scheibe, 2012-12-06 Erhard Scheibe is one of this unfortunate situation the most outstanding German philosophers of science He has written extensively on all the problems that confront the philosophy of mathematics and physics rationalism versus empiricism the laws of nature and reductionism He has published books on the logical foundations of quantum mechanics and on the reduction of physical theories Little of his work has been translated into English This collection of 38 essays is intended to remedy this omission and to help to make Erhard Scheibe s philosophical ideas better known to an international audience Rekonstruktion und Reduktion physikalischer **Theorien** Raphael Bolinger, 2015-08-17 Die Arbeit wendet den Ansatz des Wissenschaftsphilosophen Erhard Scheibe zur Rekonstruktion und Reduktion physikalischer Theorien auf die Astroteilchenphysik an eine relativ junge Teildisziplin der Physik in der man von der kosmischen Strahlung auf deren Quellen zur ck schlie t Zur Modellierung dieser Quellen und der von ihnen ausgesandten Strahlung zieht man Gesetze aus einer Vielzahl von Theorien heran fr die es gro teils keine einheitliche theoretische Grundlage gibt und verkn pft sie miteinander Der Astroteilchenphysik kommt damit eine besondere Rolle fr die Beantwortung der philosophisch relevanten Fragen zur Einheit der Physik zu mit denen sich Scheibes Werk befasst Im Rahmen der Arbeit wird aufgezeigt wie Scheibes formaler Ansatz dabei hilft die intertheoretischen Beziehungen die der Verbindung der Gesetze in den Modellen der Astroteilchenphysik zugrunde liegen besser zu verstehen Auch zeigt sie allgemeine Grenzen fr rein formale Vereinheitlichungsstrategien auf Indem sie Scheibes Ansatz in die philosophische Diskussion einbettet legt sie den Grundstein daf r sein Werk auf aktuelle Fragestellungen der Wissenschaftstheorie zu beziehen Von der Physik zur Metaphysik Reiner Hedrich, 2013-05-02 Obwohl der Stringansatz als Versuch einer nomologisch vereinheitlichten Erfassung aller Wechselwirkungen inklusive der Gravitation schon ber drei Jahrzehnte existiert sind die ihm zugrundeliegenden physikalischen Prinzipien noch v llig unklar und es gibt nicht die geringste empirisch berpr fbare quantitative Vorhersage Ohne empirische Daten die mit den etablierten Theorien quantenfeldtheoretischem Standardmodell und Allgemeiner Relativit tstheorie unvereinbar w ren liefert nur die konzeptionelle Inkompatibilit t beider gemeinsam mit der Vereinheitlichungsidee eine Motivation fr den Stringansatz Mit diesem droht jedoch die Physik unter konsequenter Weiterf hrung ihrer bisher erfolgreichen Strategien den methodologischen Rahmen der empirischen Wissenschaften zu berschreiten Mythos Determinismus Brigitte Falkenburg, 2012-02-21 Aus der Sicht der Neurobiologie regiert im Kopf das neuronale Geschehen Doch was wissen die

Hirnforscher genau ber die Mechanismen des Hirngeschehens und ihren Einfluss auf den menschlichen Geist Dieser Frage geht Brigitte Falkenburg nach Die Physik hat sich I ngst vom mechanistischen Weltbild gel st in der Neurobiologie bleiben berholte mechanistische Vorstellungen bis heute wirksam Dabei sind die mechanistischen Erkl rungen der Hirnforschung ganz anders als ihr Name suggeriert und wer annimmt der Geist sei so strukturiert wie die Materie zieht atomistische und kausale Fehlschl sse ber das Bewusstsein Falkenburgs Buch m chte die Debatte um Geist und Gehirn freien Willen und Determinismus endlich davon befreien Es liefert Grundz ge einer Wissenschaftstheorie der Hirnforschung und er ffnet den Weg zu einem differenzierteren Naturverst ndnis und Menschenbild Zur Ontologie der Elementarteilchen Thomas Christian Brückner, 2015-04-30 Ausgehend von den Ergebnissen des Standardmodells der Elementarteilchenphysik analysiert Thomas Christian Br ckner die Ergebnisse der modernen Teilchenphysik Hierbei zeigt er auf welche Grundkonzeptionen das Standardmodell beinhaltet Sein Ziel ist insbesondere eine ontologische Charakterisierung der Elementarteilchen welche anhand der Theorie der Tropen erfolgt Wie sich dabei zeigt weist dieser Ansatz insbesondere fr diesen Gegenstand gegen ber der traditionellen Substanzontologie klare Vorteile auf Spiel mit der Wirklichkeit Reinhold Esterbauer, 2004 Die Naturwissenschaften gelten heute als die Erfahrungswissenschaften schlechthin Obwohl ihr Erfahrungsbegriff wissenschaftspoliti sche und bioethische Entscheidungen latent beeinflu t fragt man kaum danach welche Formen von Erfahrung naturwissenschaftli cher Praxis entsprechen Dies w re umso dringlicher als das naturwissenschaftliche Wirklichkeitsverst ndnis beinahe unhinterfragt zum ma geblichen der Gegenwart avanciert ist Anliegen des interdisziplin r angelegten Sammelbandes ist es Bedingungen natur wissenschaftlicher Erkenntnis zu analysieren und Voraussetzungen einer an den Naturwissenschaften ausgerichteten Wirklichkeitser fahrung offen zu legen INHALT Einleitung M Stadler Zur Bedeutung von Erfahrung in der numerischen Simulation biomechanischer Prozesse A Krassnigg Er wartung und Erfahrung in Physik und Alltag eine Perspektive H H nig Moses und Odysseus ber den Erfahrungsbegriff der Na turwissenschaften aus der Sicht eines Naturwissenschaftlers E Webrsch tz Sig Mehr als nur ein Vermutungswissen Die erlebte Wirklichkeit einer Molekularbiologin C Kummer Wieviel Erfahrung braucht die Biologie E Pernkopf Alphabetisierte Natur Sprachformen in den Naturwissenschaften M G Wei Gender Sex und Chromosomen Anmerkungen zu Judith Butler K Gloy Natur ein Kulturprodukt Eine Typologie der Naturauffassungen R Zecher Kants Goethes und Hengstenbergs Bewertung des na turwissenschaftilchen Erfahrungsbegriff H W Ruckenbauer G erade Thatsachen giebt es nicht nur Interpretationen Vom Schwinden des Realit tsbezugs bei Nietzsche R Schulz Erwartungen im Modus methodischer Wissbarkeit Zum Verh ltnis von na turwissenschaftlicher und hermeneutischer Erfahrung H J Schneider Erfahrung und Erlebnis Ein Pl doyer fr die Legitimit t in teraktiver Erfahrungen in den Naturwissenschaften Namenregister Sachregister Grenzen und Grenzüberschreitungen Wolfram Hogrebe, 2015-03-10 Dieser Band dokumentiert die Hauptvortr ge des XIX Deutschen Kongresses f r Philosophie der vom 23 27 September 2002 in Bonn stattfand Das Thema des Kongresses Grenzen und Grenz

berschreitungen wurde dabei hinsichtlich des gesamten Spektrums philosophischer Fragestellungen beleuchtet So wird die aktuelle Problematik hinsichtlich der Grenzen technischer Machbarkeit und moralischer Verantwortbarkeit ebenso aufgegriffen wie klassische erkenntnis und wissenschaftstheoretische Fragestellungen nach den Grenzen unserer kognitiven M glichkeiten Weitere Beitr ge befassen sich mit Grenzen und Grenz berschreitungen in der sthetik Geschichtsphilosophie Kulturphilosophie Metaphysik Philosophie des Geistes Philosophie der Logik und Mathematik der politischen Philosophie sowie der Religionsphilosophie Der historischen Dimension des Themas wird ebenfalls Rechnung getragen und zugleich die Diskussion von Grenzen und Grenz berschreitungen durch die Geschichte der Philosophie zur ckverfolgt of Physical Theories Erhard Scheibe, 2022-06-30 Using simple physical examples this work by Erhard Scheibe presents an important and powerful approach to the reduction of physical theories Novel to the approach is that it is not based as usual on a single reduction concept that is fixed once and for all but on a series of recursively constructed reductions with which all reductions appear as combinations of very specific elementary reductions. This leaves the general notion of theory reduction initially open and is beneficial for the treatment of the difficult cases of reduction from the fields of special and general relativity thermodynamics statistical mechanics and quantum mechanics which are treated in the second volume The book is systematically organized and intended for readers interested in philosophy of science as well as physicists without deep Contemporary Rationalist Islam in Turkey Gokhan Bacik, 2021-07-29 Nineteenth century philosophical knowledge Istanbul was an intellectual hub of rich discussions about Islam in which leading reformists had a significant role Turkey today appears to be an intellectual vacuum to anyone searching for ongoing critical engagement with Islam The main purpose of this book is to adjust this view of Turkey by showcasing the modern Turkish theologians who challenge mainstream Sunni interpretations of Islam Labelling these theologians as rationalist rather than reformist the author reveals that their theology is inherently anti establishment and thus a religiously oriented challenge to the hegemony of the state sanctioned Islam for the rationalists Turkey's problems have their origins in the Sunni interpretation of Islam Contemporary Rationalist Islam in Turkey analyses nine prominent scholars of Islam who provide a religious opposition to the Sunni revival in Turkey H seyin Atay Yasar Nuri zt rk M Hayri Kirbasoglu Ilhami G ler R Ihsan Elia ik mer zsoy Mustafa zt rk Israfil Balci and Mehmet Azimli These scholars writings are almost exclusively published in Turkish so this book makes their ideas available in English for the first time It also examines the scope methodology and argumentation of the scholars theology categorizing their theological interpretations from historicist to universalist and from empiricist to rationalist In identifying a new rationalist school of Turkish theology and outlining its different manifestations the book breaks new ground It fills a significant gap in the literature on Islamic studies and reveals an understudied dimension of Turkey and Turkish Islam beyond the well known ideas of the AKP and the Gulenists *Physics and Necessity* Olivier Darrigol, 2014-05-22 Can we prove the necessity of our best physical theories by rational means without appeal to experience This book recounts a few

ingenious attempts to derive physical theories by reason only beginning with Descartes geometric construction of the world and finishing with recent derivations of quantum mechanics from natural axioms Deductions based on theological metaphysical or transcendental arguments are worth remembering for the ways they motivated and structured physical theory even though we would now criticize their excessive confidence in the power of the mind Other deductions more modestly relied on criteria for the comprehensibility of nature including forms of measurability causality homogeneity and correspondence The central thesis of this book is that such criteria when properly applied to idealized systems effectively determine some of our most important theories as well as the mathematical character of the laws of physics The relevant arguments are not purely rational because only experience can tell us to which extent nature is comprehensible in a given way Nor do they block the possibility of ever more varied forms of comprehensibility They nonetheless suggest the inevitability of much of our theoretical physics Constituting Objectivity Michael Bitbol, Pierre Kerszberg, Jean Petitot, 2009-03-29 In recent years many philosophers of modern physics came to the conclusion that the problem of how objectivity is constituted rather than merely given can no longer be avoided and therefore that a transcendental approach in the spirit of Kant is now philosophically relevant The usual excuse for skipping this task is that the historical form given by Kant to transcendental epistemology has been challenged by Relativity and Quantum Physics However the true challenge is not to force modern physics into a rigidly construed static version of Kant's philosophy but to provide Kant's method with flexibility and generality In this book the top specialists of the field pin down the methodological core of transcendental epistemology that must be used in order to throw light on the foundations of modern physics First the basic tools Kant used for his transcendental reading of Newtonian Mechanics are examined and then early transcendental approaches of Relativistic and Quantum Physics are revisited Transcendental procedures are also applied to contemporary physics and this renewed transcendental interpretation is finally compared with structural realism and constructive empiricism The book will be of interest to scientists historians and philosophers who are involved in the foundational problems of modern physics

Mechanistic Explanations in Physics and Beyond Brigitte Falkenburg, Gregor Schiemann, 2019-08-28 This volume offers a broad philosophical discussion on mechanical explanations Coverage ranges from historical approaches and general questions to physics and higher level sciences The contributors also consider the topics of complexity emergence and reduction Mechanistic explanations detail how certain properties of a whole stem from the causal activities of its parts This kind of explanation is in particular employed in explanatory models of the behavior of complex systems Often used in biology and neuroscience mechanistic explanation models have been often overlooked in the philosophy of physics The authors correct this surprising neglect They trace these models back to their origins in physics The papers present a comprehensive historical methodological and problem oriented investigation The contributors also investigate the conditions for using models of mechanistic explanations in physics The last papers make the bridge from physics to economics the theory of

complex systems and computer science This book will appeal to graduate students and researchers with an interest in the philosophy of science scientific explanation complex systems models of explanation in physics higher level sciences and causal mechanisms in science The Logic of Thermostatistical Physics Gerard G. Emch, Chuang Liu, 2013-04-17 This book addresses several of the foundational problems in thermophysics i e thermodynamics and statistical mechanics It is an interdisciplinary work in that it examines the philosophical underpinning of scientific models and theories it also refines the analysis of the problems at hand and delineates the place occupied by various scientific models in a generalized philosophical landscape Hence our philosophical or theoretical inquiry focuses sharply on the concept of models and our empirical or laboratory evidence is sought in the model building activities of scientists who have tried to confront the epistemological problems arising in the thermophysical sciences Primarily for researchers and students in physics philosophy of science and mathematics our book aims at informing the readers with all the in dispensable technical details made readily available about the nature of the foundational problems how these problems are approached with the help of various mathematical models and what the philosophical implications of such models and approaches involve Some familiarity with elementary ther mophysics and or with introductory level philosophy of science may help but neither is a prerequisite The logical and mathematical background re quired for the book are introduced in the Appendices Upon using the Subject Index the readers may easily locate the concepts and theorems needed for understanding various parts of the book The Citation Index lists the authors of the contributions we discuss in detail Identity in Physics Steven French, Décio Krause, 2006-06-22 Can quantum particles be regarded as individuals just like books tables and people According to the received view articulated by several physicists in the immediate aftermath of the quantum revolution quantum physics itself tells us they cannot quantum particles unlike their classical counterparts must be regarded as non individuals in some sense However recent work has indicated that this is not the whole story and that the theory is also consistent with the position that such particles can be taken to be individuals albeit at a metaphysical price Drawing on philosophical accounts of identity and individuality as well as the histories of both classical and quantum physics the authors explore these two alternative metaphysical packages In particular they argue that if quantum particles are regarded as individuals then Leibniz's famous Principle of the Identity of Indiscernibles is in fact violated Recent discussions of this conclusion are analysed in detail and again the costs involved in saving the Principle are carefully considered Taking the alternative package the authors deploy recent work in non standard logic and set theory to indicate how we can make sense of the idea that objects can be non individuals. The concluding chapter suggests how these results might then be extended to quantum field theory Identity in Physics brings together a range of work in this area and further develops the authors own contributions to the debate Uniquely as the title indicates it situates this work in the appropriate formal historical and philosophical contexts **Epistemology and Metaphysics for** Qualitative Research Tomas Pernecky, 2016-09-22 This clearly written and provocative text outlines the wide range of

epistemological and metaphysical pillars of research In a clear easy to follow style the reader is guided through an array of concepts that are defined explained and made simple With the aid of helpful examples and case studies the book challenges the prevailing modes of thinking about qualitative inquiry by showcasing an immense variety of philosophical frameworks Armed with a strong understanding of this philosophical backbone students will be able to choose and defend a pick and mix of research methods that will uniquely complement their research Empiricism Rationalism Realism Skepticism Idealism Positivism Post positivism Idea ism Hermeneutics Phenomenology Social Ontology Quantum Mechanics Essential reading for new and experienced researchers this must for any social science bookshelf will help unlock a new level of research Logik in den Wissenschaften Peter Klimczak, Thomas Zoglauer, 2017-11-20 Zwar gibt es eine Vielzahl an Einf hrungen in die formale Logik und der Besuch entsprechender Grundkurse ist fr die Studierenden unterschiedlichster F cher nicht selten verpflichtend wie man diese Logik allerdings jenseits der philosophischen F cher anwenden kann bleibt in der Regel unbeantwortet Diese bislang zu kurz gekommene interdisziplin re Br ckenfunktion der formalen Logik erf llt der vorliegende Band Fachlich ausgewiesene Wissenschaftler der jeweiligen Disziplinen pr sentieren und reflektieren an einem Beispiel Anwendungen der formalen Logik in ihrem Fachbereich Im Mittelpunkt stehen folgende Fragen Wie wird in der jeweiligen Einzelwissenschaft formale Logik zur Modell und Theoriebildung zur Probleml sung zum deduktiven induktiven oder abduktiven Schlie en eingesetzt Wie wird dabei methodisch vorgegangen Welche Kalk le kommen dabei zum Einsatz Entsprechend wendet sich das Buch nicht nur an den Logiker oder Wissenschaftstheoretiker sondern auch an die Vertreter der jeweiligen Disziplinen Es macht die Anwendungsbreite der Logik in den einzelnen Wissenschaften deutlich und leistet zugleich einen Beitrag zur F rderung eines interdisziplin ren Dialogs Said Nursi and Science in Islam Necati Avdin.2019-05-20 This book examines how the prominent Muslim scholar Said Nursi developed an integrative approach to faith and science known as the other indicative mana i harfi and explores how his aim to reconcile two academic disciplines often at odds with one another could be useful in an educational context. The book opens by examining Nursi's evolving thought with regards to secular ideology and modern science It then utilizes the mana i harfi approach to address a number of issues including truth and certainty the relationship between knowledge and worldview formation and the meaning of beings and life Finally it offers a seven dimensional knowledge approach to derive meaning and build good character through understanding scientific knowledge in the mana i harfi perspective This book offers a unique perspective on one of recent Islam's most influential figures and also offers suggestions for teaching religion and science in a more nuanced way It is therefore a great resource for scholars of Islam religion and science Middle East studies and educational studies

**Foundations of Quantum Theory** Klaas Landsman,2017-05-11 This book studies the foundations of quantum theory through its relationship to classical physics This idea goes back to the Copenhagen Interpretation in the original version due to Bohr and Heisenberg which the author relates to the mathematical formalism of operator algebras originally created by

von Neumann The book therefore includes comprehensive appendices on functional analysis and C algebras as well as a briefer one on logic category theory and topos theory Matters of foundational as well as mathematical interest that are covered in detail include symmetry and its spontaneous breaking the measurement problem the Kochen Specker Free Will and Bell Theorems the Kadison Singer conjecture quantization indistinguishable particles the quantum theory of large systems and quantum logic the latter in connection with the topos approach to quantum theory This book is Open Access under a CC BY licence The Language of Living Matter Bernd-Olaf Küppers, 2022-06-01 This book by an eminent scientist and philosopher provides strong evidence for the claim that language is a general principle of Nature rooted exclusively in physical and chemical laws The author's radical idea inevitably leads us to view the essence origin and evolution of life in a completely new light It shifts the coordinates of our scientific world view in favor of an overarching concept of language that is able to bridge the gap between matter and mind At the same time it removes a blind spot in the Darwinian concept of evolution To justify this far reaching idea the book takes a long and deep look at our scientific and philosophical thinking at language as such at science s claim to truth and at its methods unity limits and perspectives These are the cornerstones structuring the book into six thematically self contained chapters rounded off by an epilogue that introduces the new topic of Nature's semantics. The range of issues covered is a testimony to how progress in the life sciences is transforming the whole edifice of science from physics to biology and beyond The book is aimed at a broad academic and general readership it requires no mathematical expertise

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