

a priori of physics	Content	
6.7.1.	External Qualities of Charged Fermions	314
6.7.1.1.	Identical Charged Fermions	314
6.7.1.2.	Opposite Charge Fermions	314
6.7.1.3.	The Bohr-Rutherford Atomic Model	314
6.7.2.	Mutual Exclusive Extension of Fermions	314
6.7.2.2.	The Pauli Exclusion Principle	314
6.7.3.	Orbital Angular Momentum	315
6.7.3.1.	The Squared Perpendicular Part of Orbital Integer Quantum Number Excitation	315
6.7.3.2.	The Orbital Angular Momentum of Multiple Spin entities $\Psi_{\frac{1}{2}}$	315
6.7.3.3.	Atomic Shells and Subshells	316
6.7.3.4.	Categories of Atomic Quantum Numbers	316
6.7.3.5.	Atoms in Practise	317
6.7.4.	The Spatial Wavefunction Probability Distribution Structure of atoms	318
6.8.	Conclusion on Topological Structure of 3-space Founded in Physics	319
6.8.1.	Conclusion on the Local Situated Topological Structure of Natural 3-space	319
6.8.1.2.	The Rest <i>Mass</i> Problem of Fermions	320
6.9.	External Relations Between Fermions in an Extended Space of Information	321
6.9.1.	A New Break Through for Physics Foundation in Human Knowledge of Nature	321
6.9.1.1.	Extension of Space by Grassmann Exterior Products	323
III.	Space-Time Relations in Physics	324
7.	Relation Space of Physics	325
7.1.	Vision of Relations by the Development Concept of Physics in Nature	325
7.1.2.	The Space-Time as Development Information of Extension Relation is Called \mathcal{D} -space	326
7.1.3.	The Full Geometric Space-Time Algebra $\mathcal{G}_{1,3}(\mathbb{R})$ for Physical Relations in \mathcal{D} -space	326
7.1.3.2.	The Multivector Decomposition in a Sum of Grades for \mathcal{D} -space of Physics	328
7.1.3.3.	Conjugation in Space-Time Algebra	328
7.1.3.4.	Reversion of the Odd Chirality Volume Pseudoscalar \mathbf{i} in the $\mathcal{G}_3(\mathbb{R})$ Algebra for 3-space	329
7.1.3.5.	Reversion of the Even Helicity Pseudoscalar \mathbf{i} in the Algebra $\mathcal{G}_{1,3}(\mathbb{R})$ for \mathcal{D} -space	329
7.1.3.6.	The STA Bivector Field \mathbf{F} of STA in the Information Development \mathcal{D} -space of Physics	330
7.1.3.7.	Difference Between the Pseudoscalar Concepts for \mathcal{D} -space and 3-space	330
7.1.4.	The Odd and Even Part of the Geometric Space-Time Algebra $\mathcal{G}_{1,3}(\mathbb{R})$	331
7.1.4.2.	The Transcendental Ignorance of the Odd part of the Geometric Algebra for \mathcal{D} -space	331
7.1.4.3.	The Even Closed Geometric Algebra of \mathcal{D} -space	331
7.1.4.4.	The Even Geometric Spinor Quality in the Algebra $\mathcal{G}_{1,3^+}(\mathbb{R})$ of \mathcal{D} -space	331
7.1.4.5.	The Composite Rotor Structure in \mathcal{D} -space	333
7.1.5.	Stop this volume.	333
7.2.	For inspiration to further work	334
7.3.	Further Work on these Issues is Postponed	335
7.3.1.	The Foundation of Physics is Nature Itself	335
7.3.1.1.	Nature per se as a priori of Physics	335
Epilogue		337
8.	Problematization of the Philosophical approach	337
References		339
List of figures		341
Lexical Index		345

Geometric Critique of Pure Mathematical Reasoning
Research on the a priori of Physics
 Jens Erfurt Andresen
 Edition 2, © 2020-22

a priori of physics Preface

Preface

Motivation for this Book

After my graduation as a Candidate in the Science of Physics from the University of Copenhagen (UCPH) in 1983, I earned an academic position in the Royal Danish Post & Telegraph as a specialist in radio wave propagation for network planning of cellular phone systems. Through this work and my participation in COST (European Cooperation in Science and Technology) projects 207 and 231 I learned that the encoding of information signals in the propagating radio waves was possible. Encoding with a *preserved* phase alignment **direction** of the signal waves even in a multireflection delay spread with Rayleigh fading probability of the received added wavefront, which stays with coherent information. A philosophical question arose for me: Why is this phase information preserved in a radio signal that's not local receiver time-phase-coherent in its wavefront due to the multi-delay spread in its propagation? The encoding method that came possible at that time was Orthogonal Frequency-Division Multiplexing (OFDM).² We physicists immediately know that the preservation of frequency as a quantum is embedded in each photon $h\nu = \hbar\omega$ of the radio signal. Is the quantum phase information of the radio signal also embedded in each photon?

The Philosophical Change

After the big political change in Europa around 1990 and my fiasco making a commercial business out of inventing and improving new electronics for audio amplification, I was so mature that I began reading Immanuel Kant's philosophy etc. From this I found that; to make a persistent impact on our world I had my ambition to author a book concerning the problem of how we humans can know anything about physics.

This project was first started around 2003. I started my writing in my native language Danish to keep all philosophical concepts clear in my mind. I was a novice as an author. My only experience in writing was from my candidate thesis and technical rapports from my work. By studying I. Kant, I found that space and time are a priori transcendental to intuition. To experience something in space a change of space must happen.

New Studies in Modern Physics

What I not learned at university was the later new Standard Model with its zoo of elementary particles. It was exceedingly difficult to find literature that told what it really was, how and why. Someone told me that reading Theodor Frankel, The Geometry of Physics [2], could get you some way to the understanding. I studied this book for some years in my spare time. I also got hold of Peskin & Schroeder, An Introduction to Quantum Field Theory [3]; followed by Mark Srednicki, Quantum Field Theory [4], which i read more carefully. The problem with all these is, that nobody seems to care how all this mathematical theory connects to physical nature.

My problem is, I am keen to know how nature works, not how fantastic humans are able to construct mathematics. Meanwhile all this frustration in breaking through the mythological surface narrative of modern physics I proceeded in my endeavour to find a foundation epistemology for understanding physics.

The Philosophical Concept of Time and Space

We can only experience nature when change happens. Therefore, the first hundred pages of this book criticise the traditional time concept perspective. The space aspect here is restricted to the cyclic circular movement, as the ancient time concept was cyclic. The timing is dual reciprocal to the frequency energy $h\nu = \hbar/T$. For the fundamental timing concept only two conceptual **direction qualities** are essential, one into the *future*, and the other the information *phase angle direction*. Due to the principal idea of causality, analytically these have no opposite orientation.

² The technical explanation of the OFDM has very much in common with the wave packet idea of Schrödinger quantum mechanics. This encoding principle is nowadays used all over e.g., for Wi-Fi and smart devices.

© Copyrighted material from hardback: ISBN-13: 978-8797246931, paperback: ISBN-13: 978-8797246948, Kindle and PDF-file: ISBN-13: 978-8797246917

© Copyrighted material from hardback: ISBN-13: 978-8797246931, paperback: ISBN-13: 978-8797246948, Kindle and PDF-file: ISBN-13: 978-8797246917