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(Physical vacuum relativity and quantum physics)**

**Ether, nonlocal Quantum effects, and new tests of
Fundamental Physics**

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Abstract

The momentum of the electromagnetic (em) fields \mathbf{P}_e appears in several areas of modern physics. In both the equations for matter and light wave propagation \mathbf{P}_e represents the relevant em interaction. According to some modern aether models, the speed of light in moving rarefied media differs from that foreseen by special relativity. As an application of wave propagation properties, a first order optical experiment which tests the speed of light in moving rarefied gases is presented. We recall that \mathbf{P}_e is also the link to the unitary vision of the quantum effects of the Aharonov-Bohm (AB) type and that, besides the traditional classical approaches to the limit of the photon mass m_{ph} , effects of the AB type provide a powerful quantum approach for the limit of m_{ph} . Table-top experiments based on a new effect of the AB type, together with the scalar AB effect, seem capable of yielding the limit $m_{ph} = 9,4 \times 10^{-52}g$, a value that would improve upon the results achieved with other approaches.

**Relativistic Physics in Complex Minkowski Space,
Nonlocality, Ether Model and Quantum Physics**

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Abstract.

Many naturally occurring phenomena require theoretical treatment utilizing complex analysis by methods such as the Cauchy-Riemann relations using hyper-geometrical spaces which treat inherently nonlinear, non-dispersive, collective nonlocal resonant states of a quantum system, so as to be consistent with the nonlinearity inherent in General Relativity. Typical quantum approaches form linear approximations limiting the ability to formulate a quantum consistent Relativity Theory. The fundamental nature of remote connectedness is exemplified by Young's double slit experiment, Bell's Theorem, nonlocality, Mach's Principle and operation of a Foucault pendulum, which may imply the

existence of an aether. We demonstrate that a geometric aether is not precluded by the structure of Relativity, although Einstein excluded a fixed reference aether frame. In fact, certain observable phenomena, such as Mach's Principle, Bell's Theorem and Young's double-slit experiment imply the existence of a fixed geometric spacetime aether. A basic tenet of this aether is the quantum principle of nonlocality understood in terms of the soliton-solitary wave solutions of the Schrödinger equation solved in complex relativistic Minkowski space. Formulation of the complex modified relativistic multidimensional aether allows us to understand the fundamental nature and mechanism of nonlocality allowing experimental designs to further evaluate the properties of nonlocal coherent collective phenomena. The structure of quantum theory using the Schrödinger equation, covariant Dirac equation and sine-Gordon equation are solved in a complex hyper-eight dimensional relativistic geometric space. The symmetry of this space possesses relativistic Lorentz invariance for nonlinear hyper-dimensional geometry, nonlocality, and nonlinear coherent states which are expanded in terms of quantum soliton solutions.

Keywords: Modified Relativity, Complex Minkowski spaces, Nonlocal aether and Quantum Theory

A Classical Dirac Equation

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Abstract

The time evolution of electrons and other fermions is described by the first-order Dirac equation. Although typically interpreted probabilistically, the Dirac equation is fundamentally a deterministic equation for the evolution of physical observables such as angular momentum density. The Dirac equation can be considered as a second-order wave equation if the wave function is a representation of the first derivatives. The conventional Dirac formalism has two serious flaws. First, the conventional derivation of the parity operator is incorrect. Conventional theory holds that the wave function of a Dirac particle is its own mirror image but certain mirrored interactions do not occur. Such mirror particles have never been observed. Experimental evidence, such as beta decay, supports the alternative hypothesis that the mirror image of matter is antimatter. This problem is solved by identifying a flaw in the conventional derivation of the parity operator, then deriving a new parity operator based on the algebraic properties of vectors. Second, the conjugate momenta (p_i) in the free-particle Hamiltonian (H) do not have the proper relation ($p_i = \delta H / \delta \dot{q}_i$) to the time derivatives of coordinates (\dot{q}_i). This problem is solved by replacing the mass term with convection and rotation terms. We then show that the resultant bispinor equation of evolution is equivalent to a classical second-order wave equation for angular momentum density in an elastic solid. The co-existence of forward- and backward-propagating waves along a single axis is the basis of half-integer spin. Wave interference produces both the Lorenz force and the Pauli Exclusion Principle. Mass is associated with radially inward acceleration of the wave such as occurs in a soliton. Angular correlations between spin states are equal to the quantum correlations. Bell's Theorem is not applicable to classical bispinors. Matter and anti-matter are related by spatial inversion, consistent with experimental observations. The classical wave formulation therefore provides a conceptually clear interpretation of fermion dynamics.

Mass and energy in the light of aether theory

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Abstract

The laws of physics dealing with mass and energy are reviewed in the light of the assumption of a preferred aether frame, which relies today on weighty theoretical and experimental arguments [1A,1B,1F,29] and [25-27]. The existence of such a privileged aether frame makes sure that clocks slow down and meter sticks contract, as a function of their speed with respect to this frame. These real physical processes are supported by their ability to rationally account for the *apparent* isotropy of the speed of light. Yet, the information they provide being dependent on their absolute speed, and therefore not invariant, moving standards and clocks give a distorted view of reality. Therefore the physical data are subjected to alterations and need to be corrected. As a result of these corrections, they assume a different mathematical form, which is the real value. In the text which follows we propose to highlight the corrected value of the basic laws dealing with mass and energy. This concerns the mass-energy equivalence law and the variation of mass with speed. The real proper mass of moving bodies is shown to vary as a function of their absolute speed, and the kinetic energy is shown not to be observer dependent. The compatibility of the relativity principle with mass-energy conservation is discussed, and the mass, is shown not to be an intrinsic property of matter, it depends on the presence of the aether. In the appendices, we show by which mechanisms the standard measurement procedures alter the physical data.

Relativistic Physics from Paradoxes to good sense-2

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Abstract

This second part of “Relativistic physics from paradoxes to good sense” complements the topics covered in the second volume of “Ether space-time & cosmology” P 201, which review the results obtained in recent years by the author in relativistic physics. Historically the two theories of relativity were born from the clash of positivism and realism. The former current of thought used relativism as a weapon against ideas of realistic inclination, like Lorentz’s. Paradoxes were the consequence in the new relativistic paradigm of emarginating realism. The recent understanding of the role of the conventional definition of simultaneity in relativistic physics has opened the doors to new lines of thought. Epistemologists have stressed that the coefficient of the space variable x in the Lorentz transformation of time (we call it e_1) has a nonphysical (“conventional”) nature. Therefore, it should be possible to modify e_1 without touching the empirical predictions of the theory. Given that Einstein’s principle of relativity leads necessarily to the Lorentz transformations, such a modification implies however a reformulation of the relativistic idea itself. With respect to this ideal picture, the concrete development of the research has produced some exciting surprises. Nature does not seem to be so indifferent about the value of e_1 , given that several phenomena, in particular those taking place on a rotating platform (Sagnac effect, and all that) converge in a strong indication of the value $e_1 = 0$. This implies absolute simultaneity and a new type of space and time transformations which we call “inertial”. Today we count on six proofs of absolute simultaneity, which are essentially independent of one another (three are contained in this second part of the paper). The cosmological consequences of the new structure of space and time go against the big bang model. After our results relativism, although weakened, is not dead and keeps proposing itself under milder forms.

Relativity Based on Physical Processes, not on Space-Time

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Abstract

At the beginning 20th century, Einstein developed the relativity theory as one of the prominent topics of physics. Einstein gave this subject a very specific direction, when he explained the relativistic phenomena in a geometric way, by specific assumptions about space and time. This approach was accepted as a fact by the physical community. It was never seriously questioned at a later date.

However, relativity theory does not depend on Einstein's assumptions. There are good reasons to go another way. We can explain relativistic effects as a consequence of physical processes, which means as properties of fields and of elementary particles. We then achieve great benefits.

- (1) The formalism to describe relativity, special relativity as well as general relativity, turns out to be much easier.
- (2) The paradoxes and logical conflicts, which come along with Einstein's way of relativity, are avoided.
- (3) We achieve further understanding of other areas of physics. Unresolved open points of present physics get a solution. - Relativity is no longer a separate topic within the total range of physics, but it follows from general physical structures, and it is thus integrated into physics as a whole. This also explains open problems in present physics like the incompatibility between relativity and quantum physics.

About the ether: The model of relativity presented here has to accept an ether in the sense of an absolute frame of reference. This is the only compelling assumption of an ether following from our model.

The exclusive reference of relativity to space-time according to Einstein has historically blocked the further development of physics to a great extent. The aim of this article is to provide a contribution to a way out of this trap.

Dark Matter and Dark Energy

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Abstract

We consider the problem of the flattening of the velocity curves in galactic discs and the consequent postulation of dark matter from three different but converging perspectives—a change in the large scale dimensionality of space, a variation of G and the MOND approach. We argue that all astrophysical data can be satisfactorily explained invoking the dark energy cosmology which underpins the varying G approach.

A Quantum Theory Friendly Cosmology Exact Gravitational Waves

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Abstract

In this paper, it is shown that the cosmological model that was introduced in a sequence of three earlier papers under the title A Dust Universe Solution to the Dark Energy Problem can be expressed in a form which is quantum theory friendly. That is to say, besides not have a cosmological constant problem and also not having a coincidence problem, aspects dealt with in earlier papers and continued in the first part of this paper, it is shown that the dust universe can be expressed in a form having a close resemblance to the Schrodinger equation formalism. This resemblance cannot be seen as an identity of the two systems because the Schrödinger equation is linear and the Friedman equations are non-linear. This aspect is discussed in detail and a precise relation is shown to exist and is demonstrated to hold between cosmology theory structure and the quantum theory linear superposition of eigen-states. This relation describes cosmology's non-linearity relative to Schrodinger linearity and is called, bilinear superposition. However, in spite of not achieving an identity of structure between cosmology and quantum theory, sufficient equivalence can be shown to exist via a comparison of quantum wave motion as described by the Schrodinger equation and gravitational wave motion as described by the Friedman dust universe to suggest that a quantum theory of cosmology and gravity is likely to be possible via this route. An exact non-linear Schrodinger equation description for the model is obtained. In this paper's appendix, it is shown that this Schrodinger equation has an infinite multiplicity of space variable solutions that can be used to remove the usual restriction of cosmology theory to uniform space variation with dependence on epoch time only.

The Physical Origins of Dark Matter and Dark Energy: Exploring Shadows on the Cave Wall

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Abstract

Nearly three decades ago, a physical anomaly that should have shaken physics to its very foundations was observed: The galaxy rotation problem. The new concept of Cold Dark Matter was invoked to explain this anomaly. Alternative explanations such as Modified Newtonian Dynamics and models utilizing specific variations in Newton's Universal Gravitational Constant have been proposed, but altering the basis of Newtonian physics by adding fudge factors to the laws of motion and/or gravity are aesthetically displeasing as well as completely unnecessary. The problem has been further complicated by the recent discovery of Dark Energy, which must be related to Dark Matter at some fundamental level. Both the Dark Matter halo that surrounds galaxies and the Dark Energy that seems to be propelling expansion in the universe at an increasing pace can be easily explained if scientists are willing to accept the physical reality of a fourth dimension of space, which amounts to a fifth dimension of space-time. Although space-like, this new dimension is uniquely different from the normal three dimensions of space. This solution may seem radical, but there is ample evidence in other areas of physics to support the existence of a fourth spatial dimension. What is commonly called Dark Matter is no more nor less than an extrinsic curvature of common space-time that is not directly associated with local matter, but is instead a local variation in the total or global curvature of the universe induced by nearby matter.

Keywords: galactic rotation problem, halo, Dark Matter, CDM, HDM, Dark Energy, General Relativity, Kaluza, five-dimensional, fourth dimension, MOND, Modified Gravity, Randall-Sundrum, Branes, space-time, curvature.

Different Algebras for one Space-time Reality

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Abstract

The most familiar formalism for the description of geometry applicable to space-time physics comprises operations among 4-component vectors and complex real numbers; few people realize that this formalism has indeed 32 degrees of freedom and can thus be called 32-dimensional. We will revise this formalism and we will briefly show that it is best accommodated in the Clifford or geometric algebra $G_{1;3}_C$, the algebra of 4-dimensional spacetime over the complex field. We will then explore other algebras isomorphic to that one, namely $G_{2;3}$, $G_{4;1}$ and $Q \otimes Q \otimes C$, all of which have been used in the past by various authors to formulate their respective approaches to physics. $G_{2;3}$ is the algebra of 3-space with two time dimensions, which Carroll used implicitly in his formulation of electromagnetism in $3 + 3$ spacetime, $G_{4;1}$ was and it still is used by myself in a tentative to unify the formulation of physics and $Q \otimes Q \otimes C$ is the choice of Rowlands for his nilpotent formulation of quantum mechanics. We will show how the equations can be converted among isomorphic algebras and we also examine how the monogenic functions that I use are equivalent in many ways to Rowlands nilpotent entities.

Dynamic Universe and the Conception of Reality

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Abstract

The article gives an overview of the structure and ontological implications of the Dynamic Universe theory. It inquires whether the theory should be taken as a serious candidate for a new theoretical framework, comparable to Newtonian approach in its own time. Classical physics justified the particle-mechanistic outlook and the world was seen as a huge clockwork until the beginning of 20th century when quantum physics and relativity theory challenged the previous metaphysical presuppositions and obscured the common world view. Dynamic Universe decisively breaks out from the particle-mechanistic context and provides an alternative perspective to reality – a new holistic framework with new set of assumptions and legitimate presuppositions applicable to all natural events and things. If we have a theory whose scope and profound simplicity surpasses the capacity of present theories – a theory which manages to handle correctly all the known physical and cosmological phenomena with minimum amount of postulates and with no fitting parameters – it should be carefully studied with all its features and consequences.

Since antiquity the growth in physical understanding of reality has characteristically been related to achieving a proper perspective and further knowledge on the interrelations between such concepts as mass, energy, motion, space and time. Dynamic Universe once more successfully changes the perspective and provides a new connection between these perennial concepts. By introducing a hidden motion into the 4th dimension it reveals an unexpected sight to the internal structure of the universe.

Back to the Ether

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Abstract

In spite of the success of the standard Bohr model, the Positron/Electron has defied precise charting of its own detailed properties in an orbital representation. Evidence from modern high-resolution nanotechnology and mineralogy supports the original Ether concept that the Universe has a regular solid structure where the tetrahedron and octahedron cyclically expand their motifs in flat Euclidean space. Since they are all made of the unit straight line, the Universe is thereby digital. In the present investigation of the classical Euclidean space and law-bound Lie algebra realizations therein updated to the new information, a primary electron module (with positron inverse) occurs in the first, $(2^3)^3$, spherical phase transition root vector lattice expansion in a Cartesian segment diagonally skewed from the cubical 2^3 ground space Neighbourhood of the Nucleon. Over the Nucleon surface the so charged t isospin root vectors of unit length connect to a circuit of length $2\pi \times 2^{1/2}$ and mass number $938.28/(2\pi \times 2^{1/2})$ MeV = 105.59 MeV, identical to the Muon. However, in the extra-Nucleon

continuation of the lattice they step by step outline the sides of the polygonal mesh by triple-coil nodes consisting of two tetrahedra and one octahedron of sum margin length 12. In sheetwise, net 180° axially twisted continuous alignment, 152 such nodes distribute into the $(2^3)^3$ region by a Bohr spectrum layered, Hydrogen-matching space-filling truncated octahedron of mass $938.28/12 \times 152 = 0.514$ MeV in comparison with actual Electron mass 0.511 MeV. In turn, these modules may fuse to honeycombs with proportionally increased pivotal inertia and continuing self-similar exponentially doubling volume expansion cycles to Atoms fitting the periodical system and able to join to molecules with tandem spin and other attributes as in reality as well. Also the organic realm is tessellated by the same bricks with added pentagonal arrangement, too, in conductive aqueous milieu. The Ether is not an alien medium for analogue transmission but the digital hologram processor and display per se.

Torsion Fields, the Extended Photon, Quantum Jumps the Eikonal Equations, the Twistor Geometry of Cognitive Space and the Laws of Thought

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Keywords: Torsion fields, mind apeiron, singularities, eikonal, nilpotence, quantum jumps, quantum potential, spinors, twistors, cognitive space, multivalued logic, mind-matter problem, Klein bottle, time operator, self-reference, perception, Intelligence Code, matrix logic, neurocortex, Cartesian Cut, Kozyrev phenomenae, chronomes, wave genetics .

Abstract:

A geometrical origin of quantum jumps in terms of torsion fields and the propagation of wave-front singularities given by the eikonal equation of geometrical optics, which lies at the basis of Fock's theory of gravitation, is introduced. A discussion on the connection between quantum jumps and a global

time and space coordinates system is presented. The most general form of the solutions of the eikonal and wave equations in a quaternionic setting to obtain the representation of the photon as an extended singularity is formalized, as well as their twistor representations. Matrix logic and its connections to quantum field operators and hypernumbers are elaborated. The torsion geometry of matrix logic and the relations with quantum mechanical observables and quantum superposition, namely: the so called Schrodinger cat problem, the multivalued character of matrix logic and non-orientable surfaces - the Moebius band and the

Klein bottle-, are presented. The plenum zero operator (defined by the matrix with all entries equal to 0), of matrix logic as a logical-quantum ground-state observable (which we shall call the mind apeiron) and its twistor eigenstates are introduced. The relation between the twistor representations of the quaternionic eikonal equation and those of the mind apeiron is discussed, establishing thus a relation between the extended structure of the photon and the eigenstates of the mind apeiron. This gives in principle a solution to the so-called mind-matter problem, surmounting Cartesian duality. We present a connection between the quaternionic structure in matrix logic and some metrics in cosmological models .

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