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New Unified Non Relativistic Quantum Quaternary Physics



(Live experiment proving the link between matter and time, disrupting the relativist space/time)

Abstract :

Despite impressive results, the relativistic Standard Model, remains unrealistic because of quantum incompatibilities. String and GUT theories are exciting, but, far from being validated. To confront these theoretical contradictions and to develop a mathematical model for de Broglie's wave/particle, I proposed an Hypothesis of the Complex Nature of Matter. It was presented in 1994, at the french Academy of Sciences, by Andre Lichnerowicz.

I do extend it, now, by quaternion algebra, to link, without any relativistic postulate, mass and time dilation with Planck/de Broglie's laws, and to take into account spin and helicity. I start with a new interpretation of Michelson's experiment, assuming that its photons are carried by the moving gravitational field of the Earth.

This discards the need for the hypothesis of space contraction, space time and curvature of space. Instead, gravitation can be considered as a tiny residual Coulomb's force between the electrical fields of protons and electrons. This allows a unification of atomic forces and gravitation, leading to a solar system quantified by an extended Bohr's model and a link between the orbital and daily spin of the earth.

A background image of a galaxy with a bright central core and spiral arms, set against a dark blue and purple cosmic background. The text is overlaid in yellow and white.

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Frontiers in Interdisciplinary Theory and phenomena
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Physical and philosophical disrupting the theoretical foundations of 20th century Physics.

Physics needs to solve many urgent challenges facing the new millennium, like carbon-free energy, quantum computing, propulsion power..., but some of its prospects are dark.

Since 50 years, all controlled nuclear fusion experiments have repeatedly failed, world wide (ITER in France is not hoping for its first kwh, till next century). Quantum computing is plagued by low temperature and decoherence. Anti matter is still a mysterious rarity....

The Standard Model developed all along last century has reached its limits. Acclaimed for its well confirmed results, the theory of relativity has its own fundamental principle, proven false. Relativistic symmetrical time dilation is contradicted by Hafele/Keating moving clock experiment, clearly demonstrating that time slowing is restricted to the moving clock, contrarily to the very basic principle of relativity. (paradoxically, most physicists, rightly impressed by the remarkable numerous relativist predictions, take the twin paradox as a check of relativity!)

Already, skeptical about the concept of relativity, Descartes, did write:

“When my neighbor comes running to see me, he is red and breathless not me!”

Modern Physics is, anew, confronted to a remake of the old geocentrism:

Relativity, its major theory, based on a false principle, still yields well verified results.

“Only believe what you know is “Truth”, Descartes's basis of the scientific method, breaks down, when experiments confirm a theory based on false principles or when knowledge is based on wrong interpretations of observations or measurement.

The whole mankind can vouch for the fact that the sun is turning in the sky, but it is not! Even more, amazingly, Relativity can be indispensable for our GPS and still be falsely based.

Many scientific contradictions have been, long, kept under the rug, because relativity did give, so many remarkable predictions and, also, above all, because there was no alternative. Contraction of space, for example, in Lorentz equations is embroiled with moving rule contraction and with quite unrealistic one dimensional contraction of the moving particle in its fictitious inertial frame. Furthermore, Relativity, born 20 years before de Broglie, ignores the wave/particle duality and the major, omnipresent, concept of spin. Relativity is not only incompatible with quantum physics, but it is also unrealistic and not geared to deal correctly with the motion of real particles.

Because, from electrons to planets, all real physical entities are not point-like, linear straight moving, inertial, mathematical concepts. They have a physical structure, a finite 3D extension, they spin and wobble, they emit fields, electric and/or gravitational, have dual wave properties.

They are very far from galilean or lorentzian purely mathematical, coordinated entities.

String and GUT Theories, are not able, either, to provide, now, a tractable alternative.

So, a new physics is, obviously, needed, freed from the iron collar of the concept of relativity which has dominated 20th century Science and Philosophy, paradoxically, because of the amazingly successful predictions it helped to generate, long before, their checking was possible !.

In this short introduction, reintroducing the concept of absolute motion, I present a new complex dual approach, valid for low energy and extend it to quaternions for higher energy, thus proposing to complement the concept of spin by the concept of helicity, missing in today's quantum physics. Helicity might be a major factor of quantum decoherence.

I show below, that the relativist argument that we cannot prove the orbital motion of the earth, is actually disproved by the linking of the daily spin of the earth to its orbital motion.

In practice, the very long period of our sun's rotation around the Milky Way and the likely motion of our galaxy have a negligible influence on our physical measurements.

So our absolute frame of reference remains, in practice, the laboratory.

My new physics, based on the absolute nature of motion has a strong impact on physics, from subatomic to cosmic physics, not just, really, beyond the Standard Model, but outside of it.

Introduction of the basis of a non relativist physics: a dual complex mechanics.

Observations, during my industrial independent scientific career lead me to propose a new approach, non relativist, able to check all verified results and to unify them with duality, able to account for spin and even to introduce helicity, still a missing concept in quantum physics and probably a source of quantum decoherence and of failing nuclear models. I call this new approach heuristic, since it provides a fascinating physical understanding of many counter-intuitive results. But its effects on the Standard atomic and cosmic models are rather devastating!

Hypothesis of the Complex Nature of Matter:

To reconcile Physics relativistic and dual results I proposed complex dual model of matter: *A moving mass is a dual complex entity with a complex mass m^* its rest mass m° being pulled by an imaginary wave-mass $i\tilde{m}$ moving at the speed of light, (since it is a wave/mass, with $i^2=-1$).* It comes out immediately, that:

$$\begin{aligned}m^* &= m^\circ + i\tilde{m} \\m &= \sqrt{m^{\circ 2} + \tilde{m}^2} \\p &= mv = \tilde{m}c \\m &= m^\circ / \sqrt{1 - v^2 / c^2}\end{aligned}$$

In 1994, I asked André Licherowicz a relativist scientist, from the French Academy of Science, to present my **Hypothesis of the Complex Nature of Matter**, at the Academy.

A particle of mass m , moving at speed v , is a complex dual entity, $m^* = m^\circ + i\tilde{m}$, with a complex mass m^* , a complex velocity v^* , a mass m° at rest (the inertial mass of the particle) and an imaginary mass \tilde{m} (the i -mass of the invisible wave) moving always at the speed of light c .

The measurable mass m , is the modulus of m^* .

The measurable velocity v , is the modulus of v^* .

c is the maximum, locally, constant speed of light, carried by the earth gravitational field

Thus, I reinterpret the null result of Michelson's experiment as photons being carried by the gravitational field of the earth, so insensitive to earth velocity (an old Stokes assumption) thus disrupting Lorentz equations.

This does imply the rejection of the principle of relativity. Absolute motion of a particle is due to an imaginary wave-mass, moving at the velocity of light, (carrying the whole momentum), pulling the real inertial mass.

The wave, is **no longer a pilot wave**, as supposed by de Broglie, **but a driving material wave, made of imaginary matter**, which carries the whole momentum p of the whole wave/particle. So, the complex dual particle verifies, at low energy, the following equations:

$$m^* = m^\circ + i\tilde{m}, \quad i^2 = -1, \quad p = mv = \tilde{m}c, \quad m = \sqrt{m^{\circ 2} + \tilde{m}^2} = m^\circ / \sqrt{1 - v^2 / c^2}$$

This shows that the famous so called relativistic properties, actually do not stem from the principle of relativity but result to the dual nature of moving dual wave/particles:

$$E = mc^2 = \sqrt{m^{\circ 2}c^4 + p^2c^2}$$

Dual complex link between Einstein, Planck and de Broglie results:

The special relativistic formulas can be linked with the wave/particle duality and wave properties

$$\lambda = h / mv = h / \tilde{m}c \quad , \quad \lambda = c/f = h / \tilde{m}c \quad \text{so} \quad \tilde{E} = \tilde{m}c^2 = hf$$

The imaginary mass of the dual complex particle has wave properties.

The photon has a pure imaginary mass $m^* = i\tilde{m} = ihf / c^2$

and a real momentum equals to $p = \tilde{m}c$

(Not to confuse with Feinberg's tachyon approach: its photons as faster than light particles)

My presentation at the academy included, also a correct complex treatment of the Compton effect with a vector interaction of the complex masses of the dual electron and of the imaginary photons.

Complex Dual Time but no contraction of space

This complex approach of duality for the mass of the wave particle, led me, later to introduce, also, a complex dual time and to take the surrounding space as a real empty entity, not able to undergo any kind of contraction nor curvature.

So my theory diverges radically with relativity; it rejects entirely space/time in favor of a new link between complex dual mass and complex dual time.

$t^* = t^\circ + i\tilde{t}$ defines a complex time, the real part being the time spend by the real matter to travel the distance L at velocity v and the imaginary part the time spent by the imaginary matter to travel the same distance L , at velocity c.

$$t^* = t^\circ + i\tilde{t} \quad L = c\tilde{t} = vt \quad t^2 = t^{\circ 2} + \tilde{t}^2 \quad t = t^\circ / \sqrt{1 - v^2 / c^2}$$

My non-relativistic complex dual model unifies satisfactorily present experimental results (This treatment is restricted to low energy physics)

The complex forms of matter and time shows link of time with matter, not with space.

Introduction of spin and helicity for particles of higher energy: Quaternary wave/particle

For higher energies, I introduce two more masses, for spin and helicity, thanks to quaternion algebra: the particle is no longer just dual, but quaternary, with a rest mass m° (inertial mass), a

translation mass m_T , a spin mass m_S and a helicity mass m_H moving all velocity c

$$m^\# = m^\circ + i\tilde{m}_T + j\tilde{m}_S + k\tilde{m}_H \quad \text{with} \quad i^2 = j^2 = k^2 = -1$$

$$m^\# = \sqrt{m^{\circ 2} + m_T^2 + m_S^2 + m_H^2}$$

This corresponds to a particle linked to 4 waves of : inertia , translation, spin and helicity Helicity corresponding to a new internal motion, missing in the present quantum mechanics.

The characteristic spin velocity V_S is related to the translation velocity V_T of a planet taken as a filled sphere, by the relation :

$$V_S = \sqrt{5/2} \cdot V_T^{3/2} / c$$

Dual complex Astro-Physics

My new Physics rejects entirely the relativistic astrophysics of the Standard Model, since, from the start, I interpret Michelson's experiment as showing that the photons emitted on earth are carried along by the gravitational field of the earth (as in the old Stokes hypothesis, confirmed by Fizeau's experiment of light transport by moving water).

In my treatment I reject the reality of a curvature of space. I consider gravitation as an attractive residual electric force between the opposite fields of the protons and electrons in matter.

The residual Coulomb's law, identified with Newton's gravitational law becomes:

$$F = \beta^2 e^2 / 4\pi\epsilon_0 r^2 \qquad \beta \sim 10^{-18}$$

With such a field, for an aggregate of particles, de Broglie's law becomes independent of the mass of the aggregate and we can define an astro/de Broglie's wave length as

$$\Lambda = H / V$$

Applied to the solar system, this yields a quantification of the planets by the relation

$$R_n V_n = nH$$

yielding for, Mercury $n=3$, Venus $n=4$, Earth $n=5$, Mars $n=6$, with a rather good approximation. (orbits 1 and 2 being empty)

(This quantification was also obtained, earlier, by Laurent Nottale, with a totally different fractal theoretical approach)

My above formula for the link between the orbital spin and the daily spin for the Earth, yields, with a translation orbital velocity close to 30 km/s, a spin velocity at the equator 0,474 km/s.

It is a close approximation, to the real 0,463 km/s. The earth behaves like an elementary particle!

I define an astro fine structure constant, \mathbf{A} for the solar system: $\mathbf{A} \sim 1/2000$.

Compared to the atomic quantization based on trillions of electrons, the solar system appears, with its dozen of planets, rather satisfactorily quantized with a precision of the order of 10%.

Random asteroids collisions and many body interactions are likely culprits for the low precision.

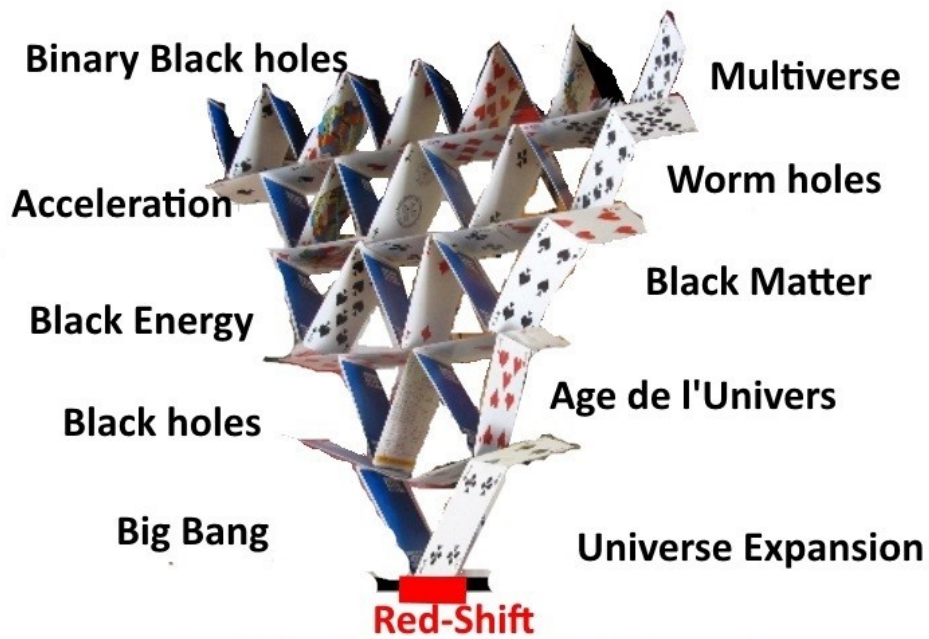
Gravitation can, thus, be at last, unified with sub atomic electric forces.

My re-interpretation of Michelson's experiment by the old Stokes hypothesis backed by Fizeau's experiment, leads me to reinterpret, also, the red-shift. To day it is taken as a relativistic Doppler effect and leads to the Big Bang Theory, to an accelerated expansion, to black matter, black energy, and of black holes the collision of which generate gravitational waves.

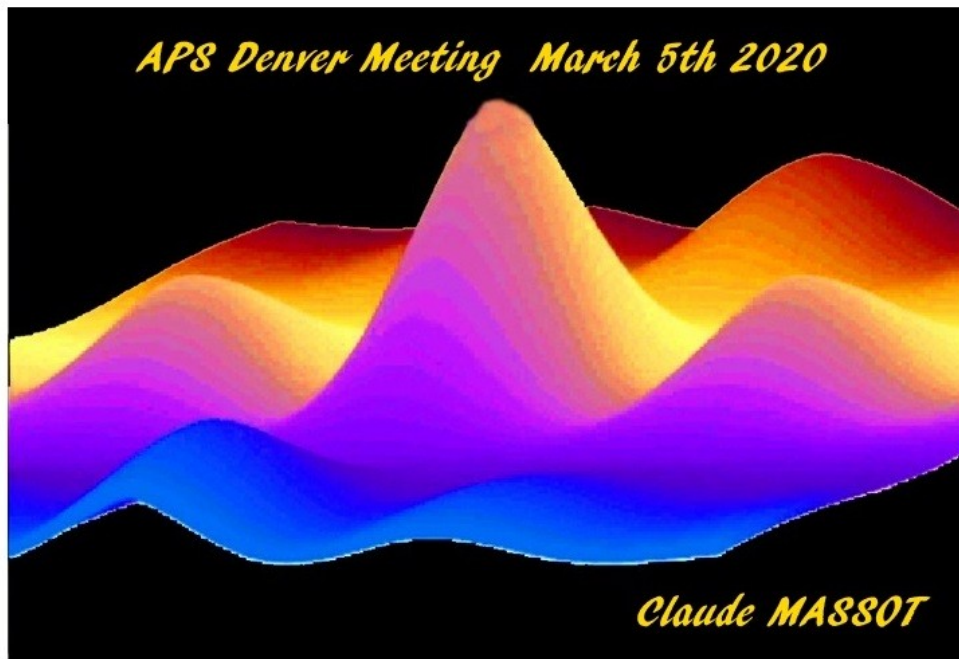
I claim, on the contrary that the redshift, is due to a gravitational accretion of the energy of the photon while leaving the planet. The so called 20 cm, fossil radiation from the Big Bang has a much more practical source, that I will describe in the next April Washington Meeting.

A brand, much quieter World should rise on the remains of the expanding Universe!

After checking on a french dictionary the word “**absoluité**” I coin the american word “**absoluity**” to characterize my new concepts and developments based on the absolute state of motion.



RELATIVISTIC DOPPLER EFFECT
(The weakest point of a Theory lies in its principles!!)
Einstein



Artistic visualization of a quaternary wave particle.