University
Cosmopolitan

Nil sine studio

Lecture by Dr. Enzo Bonacci on a rigorous interpretation of Einstein's theory: the Absolute Relativity

Enzo Bonacci was born in Brescia (Italy) in 1972 and spent there his childhood.

At the end of the 70's his family moved to Latina, city where he still lives and works; his school marks were so excellent to deserve the City Medal conferred by the Mayor.

During his scientific high school he received a prize that used to study in Cambridge (UK), where he was extremely impressed with Newton's manuscripts on maths and physics.

After graduating in Chemical Engineering from "La Sapienza" University of Rome, he spent his university prize to travel the world and to achieve diplomas in numerous foreign languages.

He was chosen to do his national service at the office of the Under Secretary of Defence. In spite of his scientific education he has never neglected his artistic side, writing poems and novels selected by international literary contests and becoming a columnist for some newspapers.

Member of the *ODI* (Italian Order of Engineers) since 2001, he has become technical-scientific consultant for important boards.

After qualifying in *mathematics* and *physics*, he has been teaching at Scientific High School since 2001, holding several posts like *Responsible for Public Relations* and *Secretary of the School Council*.

In November 2003 he became responsible for the scientific project *Evolution of Rational Thinking and Epistemological Problems*. During 2004 he became responsible for the IFTS project *Transformation of Agroindustrial Products*. In January 2005 he was elected *Secretary of AEDE-Latina* (European Association of Teachers).

In October 2007 he got the cover of BLU magazine about his effort to extend Relativity and became member of the *IOP* (Institute of Physics, MInstP).

In 2008 he was selected among the 280 CBEL mathematicians and he was awarded with the Honorary Ph.D. in Theoretical Physics by the Cosmopolitan University.

Absolute Relativity

Mr. Enzo Bonacci (Italy), Honorary Doctor[*]

1   SYNTHESIS

The Absolute Relativity is based on two postulates to you apparently obvious, but up to now disregarded in the physical description:

1) the laws of physics are invariant in all *inertial reference frames* independently from their velocity;

2) in Newton's third law of motion, the *action-reaction* pair it is not necessarily identified with *cause-effect*.

Since its formulation, in far 1905, the *Special Relativity* principle has never been interpreted in its fullness, *i.e.* considering *all* possible speeds, but limitedly to the condition $v<c$.

Such assumption does not have any reason to be and *Absolute Relativity*'s first postulate is just the indistinguishability among inertial reference frames for any speed from $v=0$ to $v=c$.

The dimensional dissimilarity of systems at $v=c$, evidenced by Lorentz equations with a standing still time, involves that the interactions developed there do not follow causality.

Those interactions are not confined to *irf* at $v=c$ only, but, according to *AR*, they are found also in systems at $v<c$, that is for ordinary observers. Hence *quantum precausal correlations* find an original and coherent explanation through the rigorous application of relativity. The existence of interactions free from cause-effect dynamics leads to the *reciprocity* principle, which represents Newton third law's extension where *action* and *reaction* are joint.

Overcoming the scheme cause/effect for the benefit of a perfect logic symmetry and temporal reversibility, the *Absolute Relativity* seems the missing link to unite Relativity and Quantum Mechanics.

This theory's value is not uniquely in the beauty coming from its intrinsic coherence, but also in the explanation of several phenomena through the helical model for matter, whose stability is assured by the Minimum Energy Principle.

2   INTRODUCTION

Keywords: electromagnetic autointeraction, stationary wave, simultaneous ring, reciprocity, covering.

Abstract: *Causality* demands the temporal succession of the events. This principle is considered inescapable in describing nature, because it is *inconceivable* a reference system characterized by atemporality.

Nevertheless, for radiant energy at velocity $v=c$, Lorentz equations indicate that time does not flow. For electromagnetic radiations in a Euclidean space are, thus, admissible interactions devoid of causality.

The *SR's* ambit is generally thought $v<c$, because of the difference between the space-time of an observer *STL* (*Slower Than Light, i.e.* at $v<c$) and the *altered* one attributed to photon, with a standing still time.

The paper proposes to overcome the dimensional prejudice in formulating the relativity principle which therefore assumes an *absoluteness* feature, going from $v=0$ to $v=c$ without continuity solution.

Based on the *Absolute Relativity*, the interactions regarding the electromagnetic radiations at $v=c$ must equally be noticeable in *irf* (*inertial reference frames*) at $v<c$ but there they do not appear subject to the tie of causality by the different temporal frame in which they are inserted.

---

[*] Ph.D. Honoris Causa in Theoretical Physics by Cosmopolitan University

This *AR*'s first consequence explains the presence in nature of some acausal phenomena described by Quantum Mechanics, *e.g.* the electron *preacceleration* that is an acceleration anticipating the moment of the force's application.

A second consideration inherent to the *AR* regards the possibility of the *electromagnetic autointeraction*, with a wave refolding stationarily along its own ridge, magnetic or electric, as a *simultaneous ring* in which the interaction originates between the equal and opposite circular sectors.

Both these electromagnetic structures would be *impossible* in *STL irf* characterized by the temporal concatenation of the events, because a circular sector covered at a certain moment would interact with an opposite one created some time after from the same field in evolution.

The existence of such interactions it is anyway guaranteed by the Absolute Relativity principle, through which what happens in an inertial reference frame must be indistinguishably found in whichever other *irf*.

The autointeracting *simultaneous* rings that arise in *SOL irf* (*at Speed Of Light, i.e.* at $v=c$) are described in *STL irf* through *mass*, *charge* and *spin*. Such intrinsic quantities of particles serve in order to justify the loss of acausality in the passage from *SOL irf* to those *STL*, similarly to the apparent forces which justify the loss of inertia in accelerated reference systems.

If to close the ring it is the electric field, that is *E* acting in the ring's circle (while it turns out B⊥E and therefore *B* is perpendicular to the same ring, being not involved in any interaction), we will define Ω_E such structure. Well, in a *STL irf* the ring Ω_E, simultaneous in *SOL sri*, it is surely developed in the time and can extend in motion also in the space, like a *ring* (rest mass, just hypothetical because lacking of spin) or a *helix* (moving mass).

In the electromagnetic perturbation's winding on its own, the equatorial electric field is interpretable as *electric charge*, while the axial magnetic moment is identified as *spin*.

The *magnetic monopoles* absence in nature it is a consequence of the magnetic field's extreme weakness ($3x10^8$ times medium inferior to that electric according to $E=cB$) in closing the Ω_B ring.

In the rather improbable case that a wave succeeds to refold itself along the own magnetic ridge, the resulting mass would have an equatorial magnetic field, interpretable as magnetic charge, and an axial electric moment identifiable with the *electric spin*.

The *helical* model developed within the *AR* allows models able to describe the matter better than the undulatory and particle extremes between which it dualistically seems to oscillate, since it coherently explains:

1) the nature of *charge*, electric or magnetic according to the type of field engaged in the closing of the ring (*E* or *B*) and more or less intense in accord with the *shape* assumed by the stationary wave, *i.e.* based on the number of wavelengths λ distributed along the circumference (even, in order to enable the autointeraction);

2) the *quantization* of charge, the possible stationary wave's *profiles* being discreet and not continuous;

3) the *independence* of charge from the mass it is associated with, being the *shape* of the stationary wave independent from its radius;

4) the *conservation* of charge, from the impossibility to change the *shape* assumed by the stationary wave without losing the particle's identity;

5) the *quantization* of the masses at rest, whose classical radius coincides with the quantized one of the stationary waves on equal wavelength λ;

6) the *neutrality* of some particles, turning out of complex structures in which an even number of stationary waves expressing equal and opposite charges they are arranged alternated and concentrically; an example is the neutron, with the electron inner stationary wave that interacts with the proton external one by annulling its electric field;

7) the essence of *spin*, magnetic or electric, as result of the perpendicular field to that one engaged in the closing of the ring (*E* or *B*);

8) the mechanism of *exchange* between mass and radiant energy, with the helix pitch increasing and lessening;

9) the speed *c unreachability* for the mass, from condition $v_x < v_t$ in the helical motion;

10) the *inadmissibility of immobile mass*, based on the conservation of the spin.

The helix pattern, consistent with the geometric description of the particle's momentum state and in particular of the *zitterbewegung*, can be reiterated *ad infinitum* according to the *covering* hypothesis: every time the energy amount exceeds a certain threshold, the helix interacts with its own to form one new helical structure in which the initial one behaves as a wrapped thread to spiral.

Based on the *covering* hypothesis as well, the same radiant energy that in our scheme is the fundamental constituent of departure, could in its turn be the result of a potentially limitless number of successive twisting by fields of force unknown but surely *FTL* (*Faster Than Light*, *i.e.* at *v>c*) for the inequality between the speed of the helix pitch and the tangential velocity, which manifest as electromagnetic field at our observation level.

Considering valid also the negative solutions of Maxwell's equations, for each electromagnetic field developing along the time's arrow, there must exist an equal and temporarily opposite one, emitted from the same source and assuming invariant, regarding time, the tendency to pass from radiant energy to the helical structure, we find the formation of ordinary matter at expense of the *antimatter* with pasting time.

Such violation of CP symmetry is perfectly reversible, so that, going backwards in time to a remote past the percentage of antimatter should prevail on the ordinary matter's.

The violation of *causality* in nature consents the passage from the *action-reaction* principle to that one of *reciprocity* so that, as an example, the General Relativity assertion: «mass generates the space-time curvature» around, can be reversed in the symmetrical: «the space-time curvature generates the mass». The matter itself, like both radiation and mass, it would be just a *ripple* in the continuum and not necessarily the *cause* of space-time deformations.

Furthermore, the reciprocity involves an *esadimensional* continuum, that is a (3,3) space-time which describes nature through an only one *6x6* source tensor.

Therefore *Absolute Relativity* represents a connection between Quantum Theory and Einstein's Relativity, constituting also a landing point for the dream of a *unitary description* of the existing.

The *helix*, cross-sectional scheme to the scientific disciplines, it plays a key role in the human experience rising to universal archetype and offering the possibility that the electromagnetic field, or even *a unique* field, is it that *EM* or a primordial *FTL* that has generated it for *covering*, it forms the entire cosmos by pirouetting.

3 DEFINITIONS

3.1 Let *inertia* be the condition of *immobility or uniform rectilinear motion*.

3.2 Let *interaction* be any not inertial condition.

3.3 Denote *irf* the acronym for *inertial reference frame*.

3.4 Denote *EM* the acronym for *electromagnetic*.

3.5 Denote *AR* the acronym for *Absolute Relativity*.

3.6 Denote *UHM* the acronym for *Uniform Helical Motion*, *i.e.* the constant-pitch cylindrical helix.

3.7 Let p_e be the helix constant pitch in the *UHM*.

3.8 Let v_x be the helix advancing velocity in the *UHM*.

3.9 Let r_e be the helix radius in the *UHM*.

3.10 Let v_t be the helix tangential velocity in the *UHM*.

3.11 Let a_e be the helix centrifugal acceleration in the *UHM*.

3.12 Let *c* be the speed of light in vacuo.

3.13 Denote *STL* the acronym for *Slower Than Light*, *i.e.* at *v<c*.

3.14 Denote *SOL* the acronym for *Speed Of Light*, *i.e.* at *v=c*.

3.15 Denote *FTL* the acronym for *Faster Than Light*, *i.e.* at *v>c*.

3.16 Denote *ZBW* the acronym for *zitterbewegung*, *i.e.* the helical or circular motion of elementary particles.

3.17 Let *matter* be everything but vacuum.

3.18 Let *mass* be the matter at *v<c*.

3.19 Let *electromagnetic wave* be the matter at *v=c*, γ being the symbol of photon.

3.20 Denote Ω_E the *EM* wave stationarily folded as a ring, by electric autointeraction, in *SOL irf*.

3.21 Let *electromass* be the temporal development, circular or helical, of Ω_E in *STL irf*.

3.22 Let *electric charge* q_E and *magnetic spin* s_B be the quantities characterizing the electroparticles.

3.23 Denote Ω_B the *EM* wave stationarily folded as ring, by magnetic autointeraction, in *SOL irf*.

3.24 Let *magnetomass* be the temporal development, circular o helical, of Ω_B in *STL irf*.

3.25 Let *magnetic charge* q_B and *electric spin* s_E be the quantities characterizing the magnetoparticles.

3.26 Let *covering* bet the helical model iterating when certain energetic thresholds are overcome.

3.27 Let *reciprocity* be the acausal extension of the action-reaction principle.

3.28 Denote $\Psi=u+iv$ the wave-function in the complex plane *(u,v)*; being $\Psi=e^{i\mathbf{P}\cdot\mathbf{x}/\hbar}$ the particle's momentum state.

3.29 Denote $G_{\mu\nu}=kT_{\mu\nu}$ the Einstein's *field equations*.

4   HYPOTHESES

4.1   *Causality demands the temporal succession between the events.*
Explanation. According to the logical point of view, causes must precede their effects.

4.2   *Reciprocity is the acausal extension of Newton's third law with action and reaction joint.*
Expl. The *reciprocity* hypothesis allows a physical description free from the binomial cause-effect for the benefit of a perfect logical symmetry and temporal reversibility; the principle expresses the invariance, in physical description, following the substitution between subject (cause) and direct object (effect) within a well-formulated proposition.

4.3   *Inertial reference frames are indistinguishable independently from the speed, included v=c.*
Expl. It is the hypothesis of *absolute* relativity, independently from eventual logical paradoxes.

4.4   *In a Euclidean space-time any inertial reference frame is subject to Lorentz equations.*
Expl. According to Special Relativity.

4.5   *In a Euclidean space-time for an inertial reference frame at v=c the events are simultaneous.*
Expl. According to Hypothesis 4.4, by Lorentz equations at $v=c$ the time stands still ($\Delta t=\infty$).

4.6   *For the interactions in an inertial reference frame at v=c the causality principle is not valid.*
Expl. By Hypotheses 4.1 and 4.5, atemporal interactions are necessarily acausal.

4.7   *In a Euclidean space-time the electromagnetic field is described through Maxwell equations.*
Expl. Classic model of electromagnetic wave with E⊥B and *c=E/B*. The *polarized* scheme:
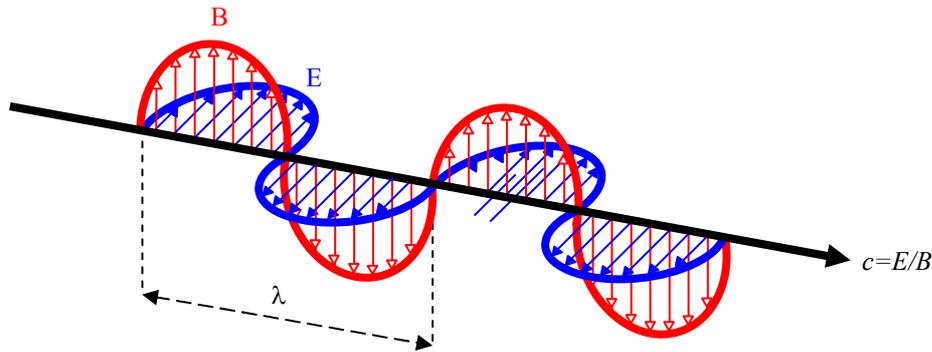
4.8   *The Uniform Helical Motion is a constant-pitch cylindrical helix.*
Expl. The quantities describing the UHM are:

r_e=helix radius
p_e=helix pitch
v_t=tangential speed of the spiral
v_x=helix speed of advance
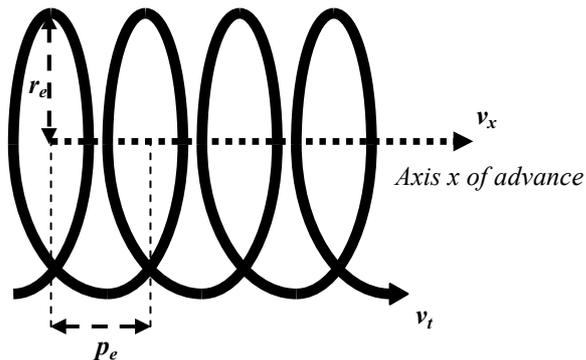a_e=helix centrifugal acceleration

Relation between the velocities:
$v_t=v_x*[1+(2\pi r_e/p_e)^2]^{(1/2)}$, thus $v_t>v_x$

Relation radius-pitch:
$r_e=(p_e/2\pi)*[(v_t/v_x)^2-1]^{(1/2)}$

Centrifugal acceleration:
$a_e=(2\pi/p_e)^2*r_e*v_x^2$

4.9 ***The EM wave can close to simultaneous ring Ω_E by electric autointeraction.***

Expl. EM wave stationarily closed on itself, through the electric field, by a whole number of wavelengths λ. For an observer at $v=c$ such ring Ω_E it is simultaneous. The interaction originates between opposite circular sectors, *i.e.* between equal and opposite portions of electric field, and it is indicated with the thick dotted blue double arrow:
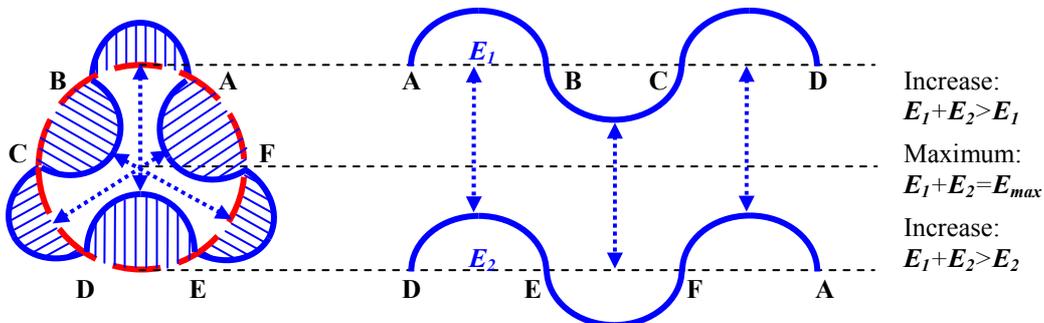

Stationary wave Ω_E

Simultaneous ring Ω_E
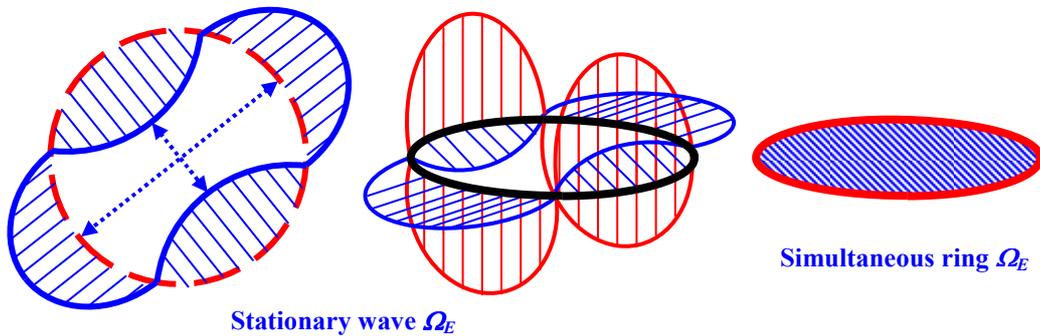
4.9.1 ***The ring Ω_E with even number of wavelengths λ it is stable.***

Expl. The even number of wavelengths allows equal and opposite circular sectors, which are mutually compensated, supplying a result smaller than the single interacting portions of wave. Inside the ring Ω_E the electric field's strength it is therefore *inferior* regarding the circumference and the same consequently happens to the field's energy (proportional to field intensity's square). At the centre of the ring, field and energy are annulled. Such structure is *stable* by the Minimum Energy Principle. In the diagram there is the representation of what happens in Ω_E and the *rectified* outline:
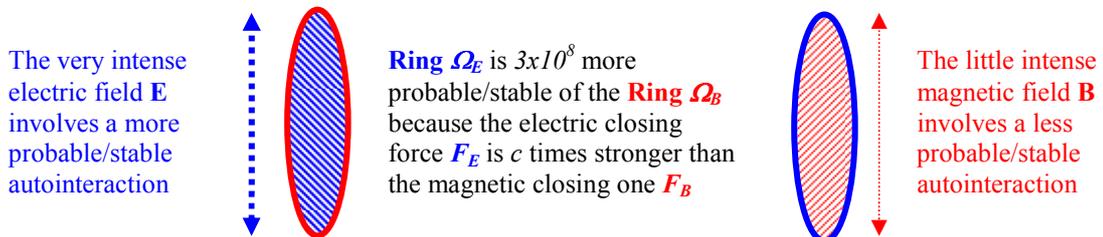

Lessening:
$E_1+E_2<E_1$

Cancellation:
$E_1+E_2=0$

Lessening:
$E_1+E_2<E_2$
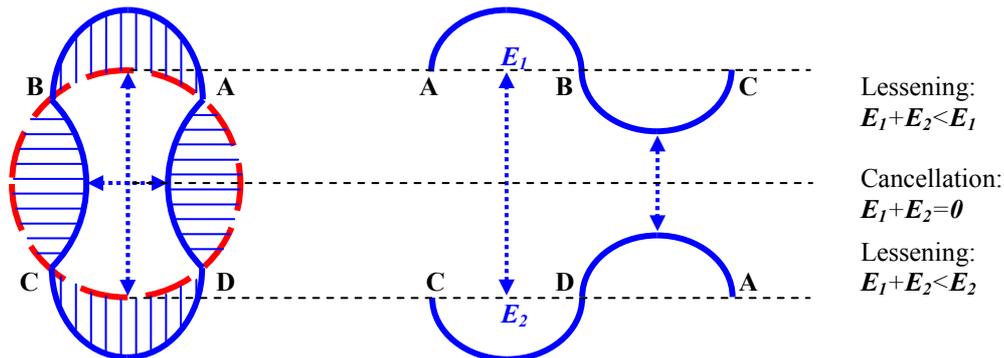
4.9.2 ***The ring Ω_E with odd number of wavelengths λ it is unstable.***

Expl. The odd number of wavelengths allows equal and equiversal circular sectors, which are mutually amplified, supplying a result greater than the single interacting portions of wave. Inside the ring Ω_E the electric field's strength it is therefore *greater* regarding the circumference and the same consequently happens to the field's energy (proportional to field intensity's square). At the centre of the ring, field and energy are maximum. Such structure is *unstable* by the Minimum Energy Principle. In the diagram there is the representation of what happens in Ω_E and the *rectified* outline:

Increase:
$E_1+E_2>E_1$

Maximum:
$E_1+E_2=E_{max}$

Increase:
$E_1+E_2>E_2$

4.10 *The EM wave can close to simultaneous ring Ω_B by magnetic autointeraction.*
Expl. *EM* wave stationarily closed on itself, through the magnetic field, by a whole number of wavelengths λ. For an observer at $v=c$ such ring Ω_B it is simultaneous. The interaction originates between opposite circular sectors, *i.e.* between equal and opposite portions of magnetic field, and it is indicated with the thin dotted red double arrow:

Stationary wave Ω_B

Simultaneous ring Ω_B
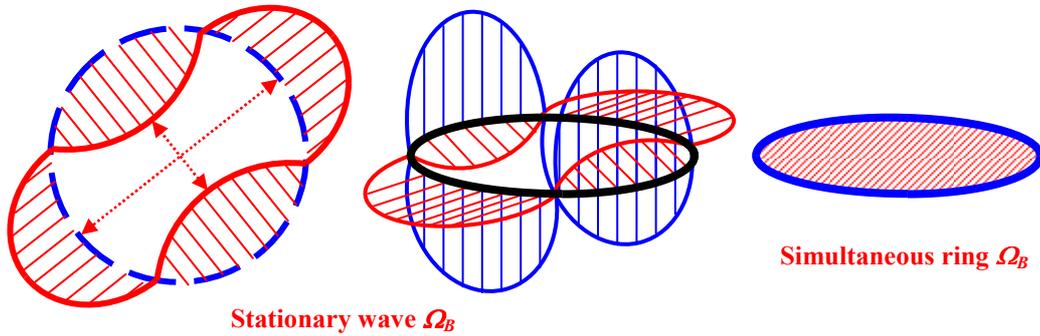
4.10.1 *The ring Ω_B with even number of wavelengths λ it is stable.*
Expl. Similarly to Hypothesis 4.9.1, the even number of wavelengths allows equal and opposite circular sectors, which are mutually compensated, supplying a result smaller than the single interacting portions of wave. Inside the ring Ω_B the magnetic field's strength it is therefore *inferior* regarding the circumference and the same consequently happens to the field's energy (proportional to field intensity's square). At the centre of the ring, field and energy are annulled. Such structure is *stable* by the Minimum Energy Principle.

4.10.2 *The ring Ω_B with odd number of wavelengths λ it is unstable.*
Expl. Similarly to Hypothesis 4.9.2, the odd number of wavelengths allows equal and to equiversal circular sectors, which are mutually amplified, supplying a result greater than the single interacting portions of wave. Inside the ring Ω_B the magnetic field's strength it is therefore *greater* regarding the circumference and the same consequently happens to the field's energy (proportional to field intensity's square). At the centre of the ring, field and energy are maximum. Such structure is *unstable* by the Minimum Energy Principle.

4.11 *The electric ring Ω_E prevails on the magnetic one Ω_B by the factor $c=3x10^8$.*
*Expl.* The *EM* wave's force of closing on its own it depends on the nature of the autointeracting field, both the electric force F_E and the magnetic one F_B being proportional to the respective fields E and B. Since medium $E/B=c$, the electric field E it is $3x10^8$ times more intense than magnetic induction field B; consequently the formation of the ring Ω_E is $3x10^8$ times more probable than that one of the ring Ω_B, *i.e.* the electrically originated ring Ω_E is $3x10^8$ times more stable than that one magnetically originated Ω_B:


The very intense electric field **E** involves a more probable/stable autointeraction

Ring Ω_E is $3x10^8$ more probable/stable of the **Ring Ω_B** because the electric closing force F_E is c times stronger than the magnetic closing one F_B

The little intense magnetic field **B** involves a less probable/stable autointeraction

4.12 *Quantization of the Ω_E and Ω_B rings' radius on equal wavelength for an observer at v=c.*
Expl. The rings Ω_E and Ω_B are *EM* waves closing on themselves, whose circumference must have an even multiple of the wavelength according to Hypotheses 4.9.1 and 4.10.1. In fact, to the quantization due to stationarity, *i.e.* $2\pi r_n=n\lambda$, it must be added the autoattraction tie between identical and opposite circular sectors distributed along the circumference, by which the number of the wavelengths must be even: $2\pi r_n=2n\lambda$. We get the quantized radius from such relation: $r_n=n\lambda/\pi$, being $n\in\mathbf{Z}^+$.

4.12.1 *Quantization of the Ω_E ring's radius.*

| $r_1=\lambda/\pi$ | $r_2=2\lambda/\pi$ | $r_3=2\lambda/\pi$ | $r_4=4\lambda/\pi$ |
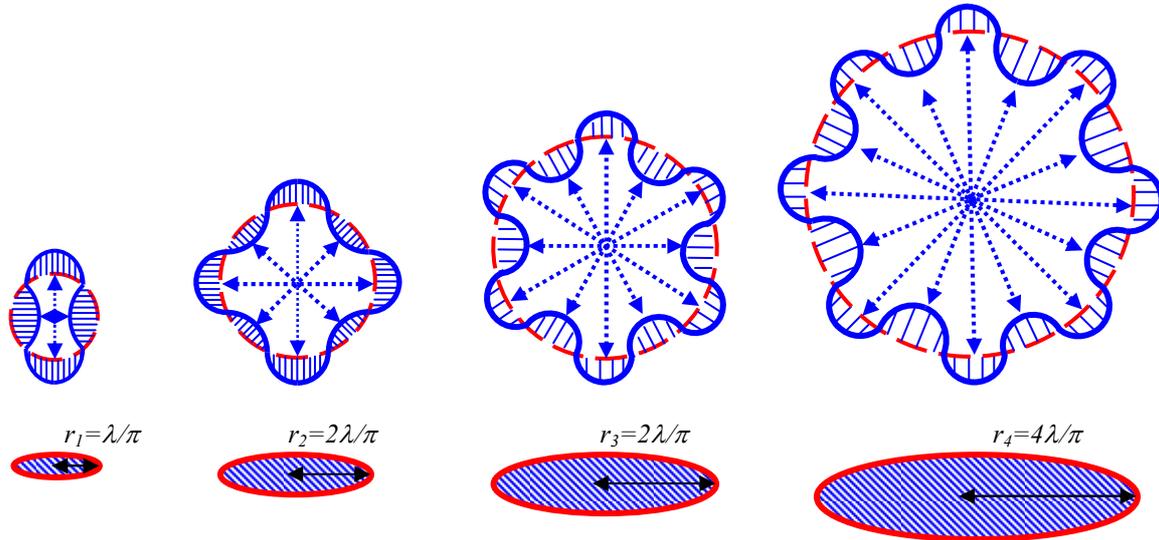
4.12.2 *Quantization of the hypothetical Ω_B ring's radius.*

| $r_1=\lambda/\pi$ | $r_2=2\lambda/\pi$ | $r_3=2\lambda/\pi$ | $r_4=4\lambda/\pi$ |
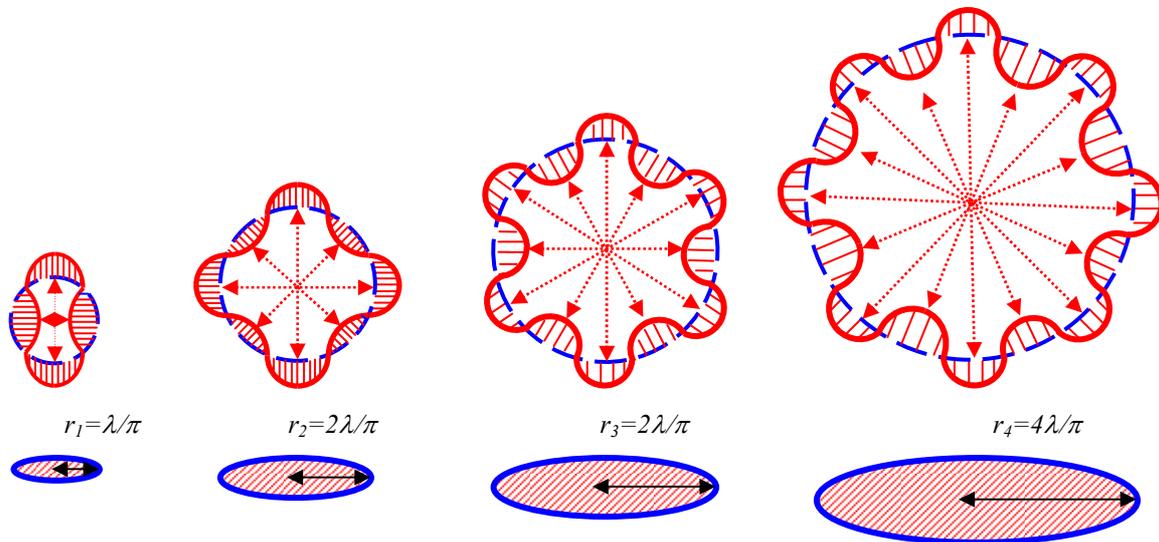
4.13 ***The Ω_E ring emits a radial electric field and an axial magnetic field.***

Expl. For an observer at $v=c$ the simultaneous stationary wave is characterized by two fields $E \perp B$. The electric autoattraction makes E coplanar, so that B is perpendicular to the disc where interaction develops. If such wave were linearly rectified it would be *polarized*.
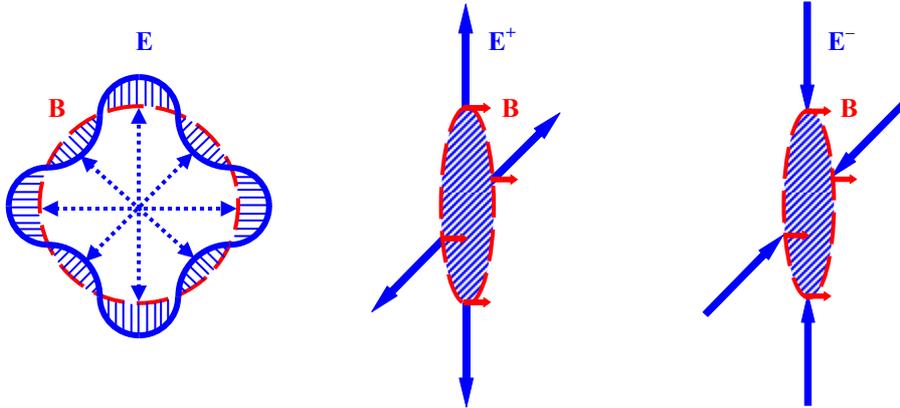

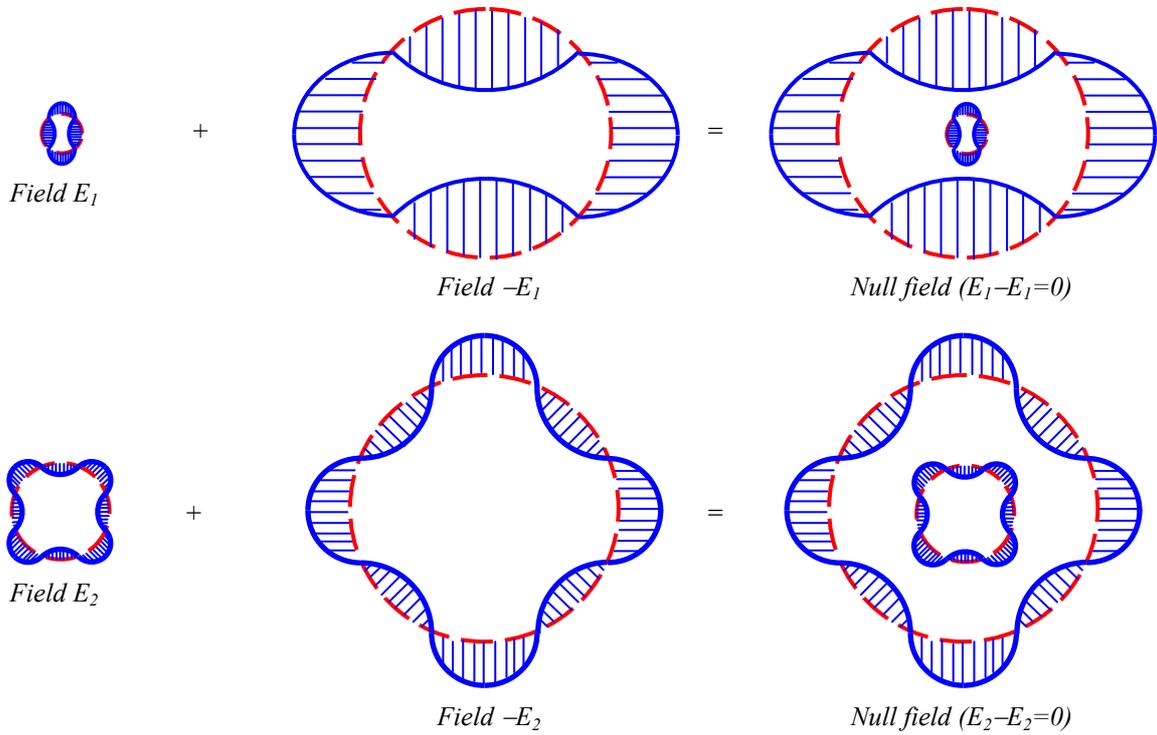The field E is positive or negative: Positive ring Ω_E^+ Negative ring Ω_E^-

4.14 ***The Ω_B ring emits a radial magnetic field and an axial electric field.***

Expl. For an observer at $v=c$ the simultaneous stationary wave is characterized by two fields $E \perp B$. The magnetic autoattraction would make B coplanar, so that E would be perpendicular to the disc where interaction develops. If such wave were linearly rectified it would be *polarized*.
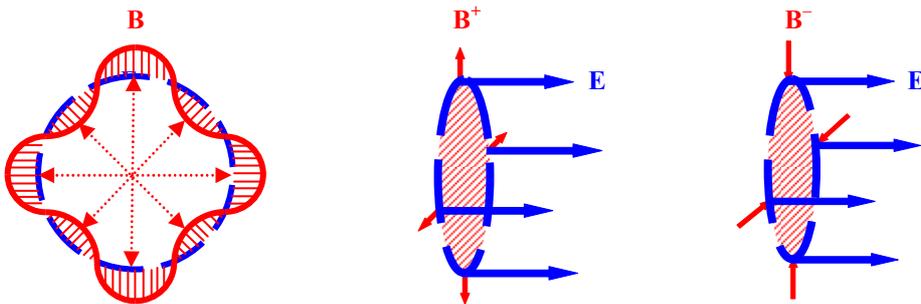
The field B is positive or negative: Positive ring Ω_B^+ Negative ring Ω_B^-

4.15 ***Ω_E and Ω_B rings' radial fields depend on stationary wave's shape only.***

Expl. The radial field's intensity is proportional to the number of wavelengths on the circumference, *i.e.* it only depends on the profile of the stationary wave that generates the simultaneous ring.
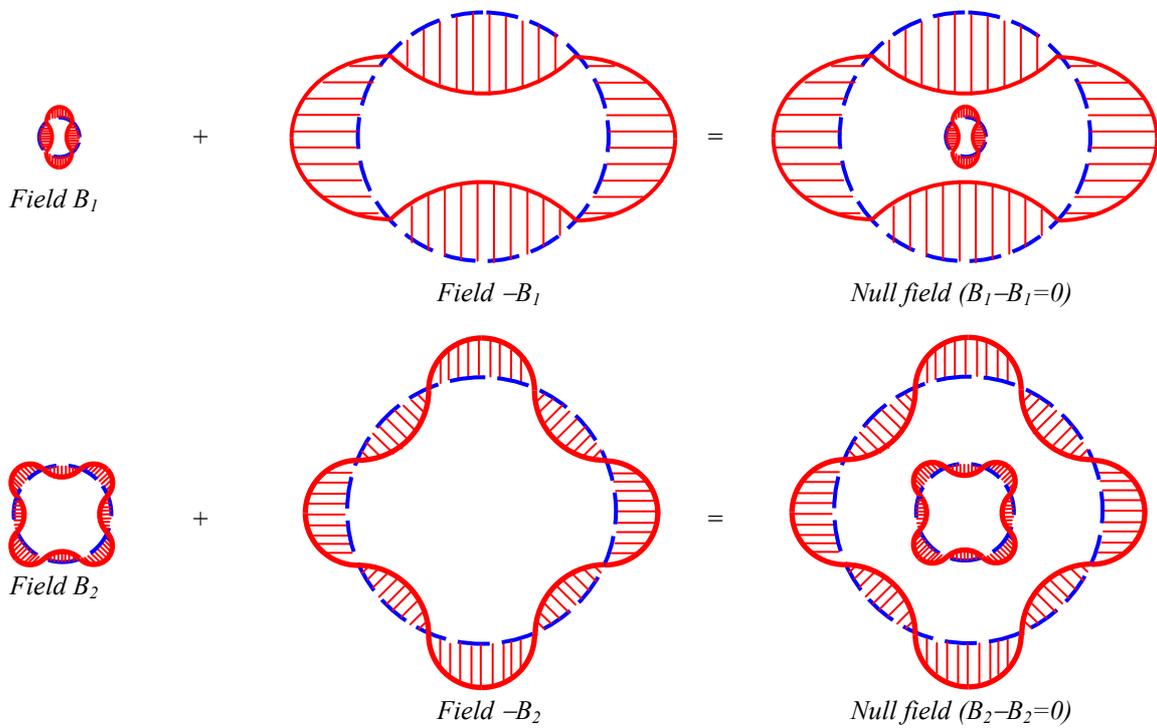

Field E_1 E_2 E_3

Field B_1 B_2 B_3
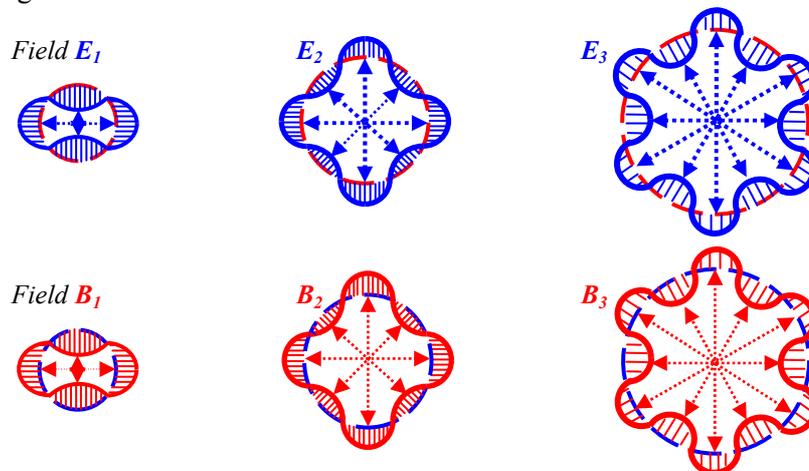
4.16   *Originated by concentrical stationary waves with the same shape, opposite fields cancel out.*
Expl. By Hypothesis 4.15, stationary waves with the same profile they emit same intensity fields; if two fields are opposite then their result is null.

4.16.1   *Examples of neutralization for the radial electric field.*

Field E₁   +   Field –E₁   =   Null field (E₁–E₁=0)

Field E₂   +   Field –E₂   =   Null field (E₂–E₂=0)

4.16.2   *Examples of neutralization for the radial magnetic field.*

Field B₁   +   Field –B₁   =   Null field (B₁–B₁=0)

Field B₂   +   Field –B₂   =   Null field (B₂–B₂=0)

12

4.17 *On equal shape, the radius r_n of the ring and its wavelength λ they are proportional.*
Expl. By Hypothesis 4.12, $r_n=(n/\pi)*\lambda$, being $n \in \mathbf{Z}^+$.
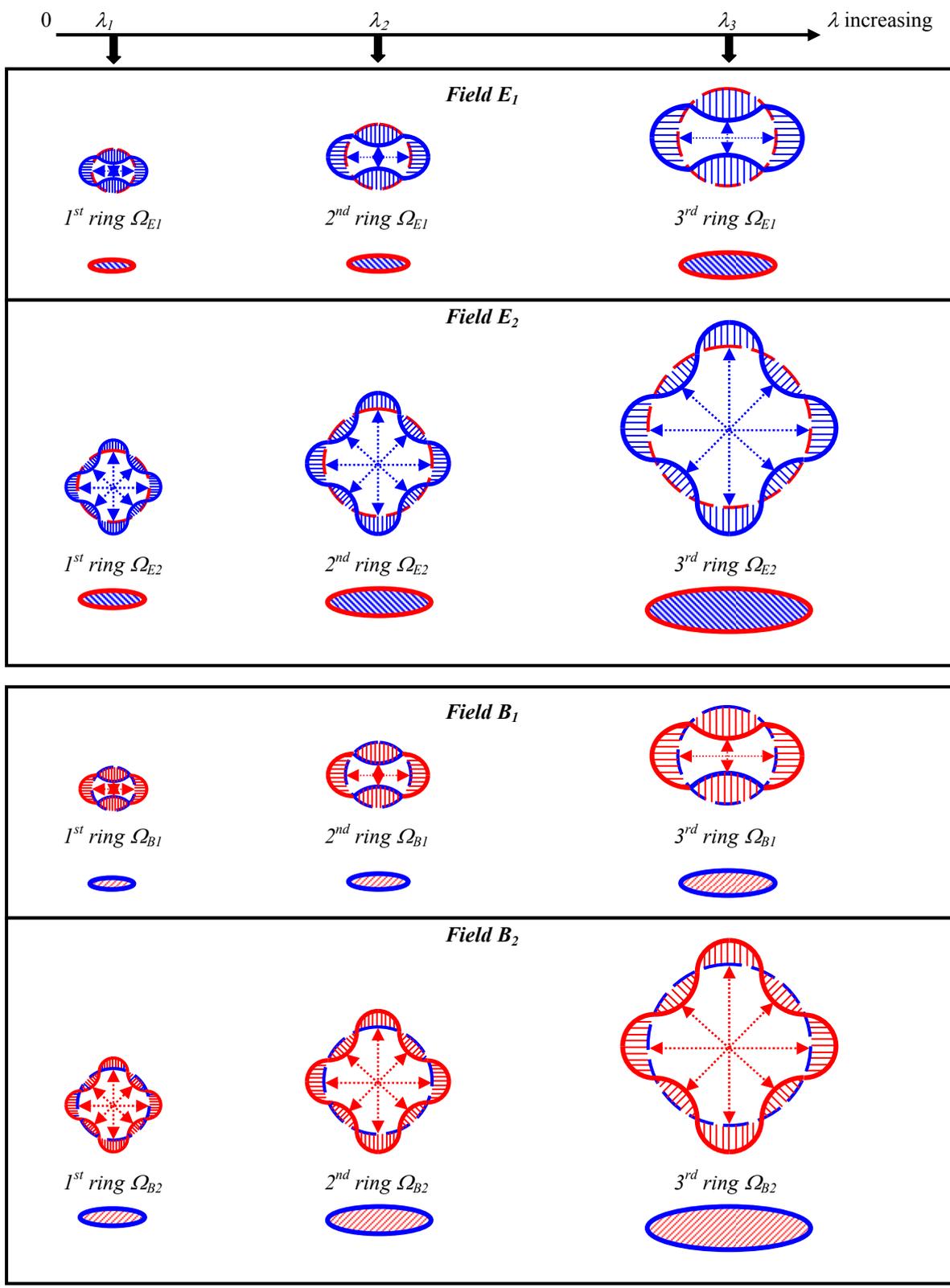
5 PROPOSITIONS

5.1 *The acasual interactions developed in SOL irf they have correspondings in STL irf.*

Explanation. By Hypothesis 4.3, otherwise there would be a distinction between the *irf* at $v=c$, where such interactions are possible, and those at inferior speed or at rest where they seem paradoxical.

5.2 *The autointeracting electric ring Ω_E it generates the electroparticles in STL irf.*

Expl. The autointeracting electric ring Ω_E at $v=c$ it is possible because *simultaneous*.

In any inertial reference at $v<c$ such structure extends along time (circular trajectory covered in successive moments) or also in space (helical trajectory covered in successive moments) generating mass, both at rest and in motion, with electric charge q_E and magnetic spin s_B. The generation of such *electroparticles* is following:

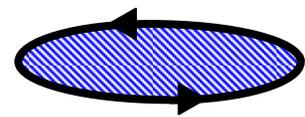### 5.2.1 *Hypothetical generation of electrically charged rest mass.*
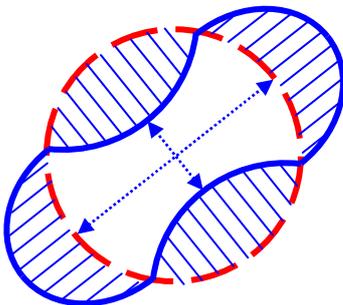
In SOL irf: In STL irf: In STL irf:
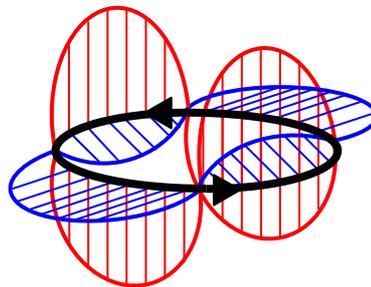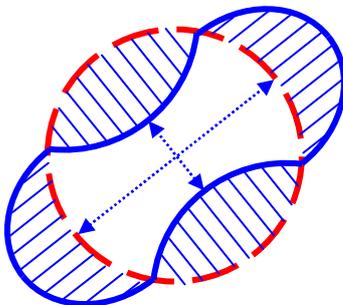

Instantaneous ring Ω_B Circular trajectory

Hypothetical mass at rest
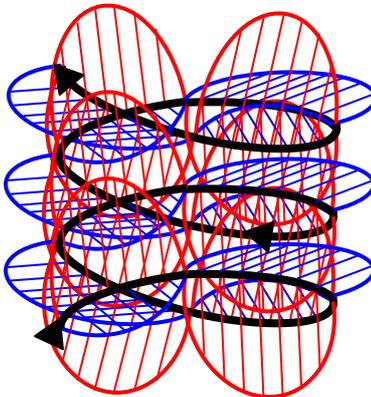with electric charge q_E
but without spin ($s_B=0$).

5.2.2 *Generation of electrically charged moving mass.*
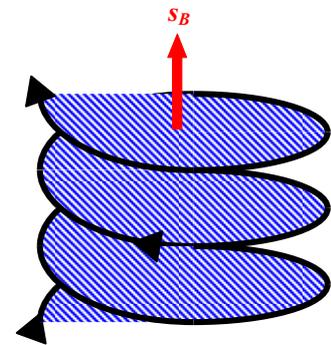
In SOL irf: In STL irf: In STL irf:

s_B

Quasi-instantaneous ring Ω_E
(the discrepancy with the ring
is infinitesimal, the closing
is almost perfect).

Helical trajectory

Moving mass,
with electric charge q_E
and magnetic spin s_B in
the advancing direction.

14

5.3 **The autointeracting magnetic ring Ω_B would generate the magnetoparticles in STL irf.**

Expl. The autointeracting magnetic ring Ω_B at $v=c$ it is possible because *simultaneous*, but its constitution is a three hundred million times less probable/stable than Ω_E according to Hypothesis 4.11. In any inertial reference at $v<c$ such structure would extend along time (circular trajectory covered in successive moments) or also in space (helical trajectory covered in successive moments) generating mass, both at rest and in motion, with magnetic charge q_B and electric spin s_E. The generation of such *magnetoparticles* is following:
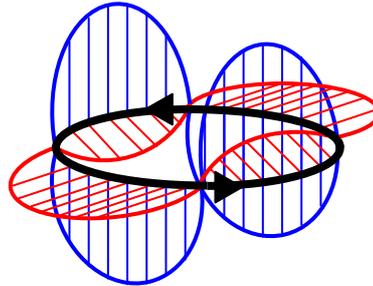
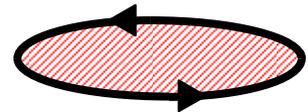**5.3.1** *Hypothetical generation of magnetically charged rest mass.*
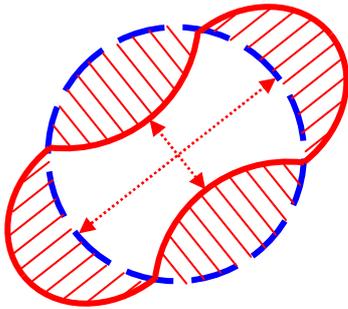
In SOL irf: In STL irf: In STL irf:

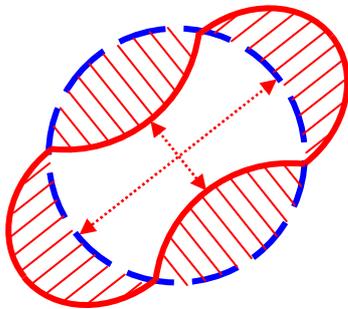Instantaneous ring Ω_B Circular trajectory

Hypothetical mass at rest with magnetic charge q_B but without spin ($s_E=0$).
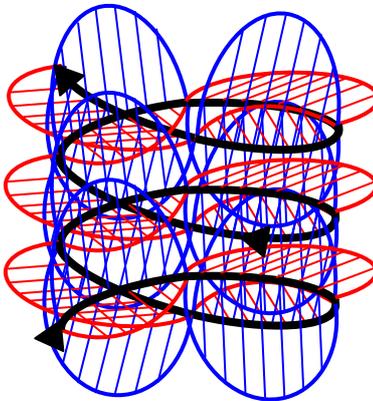
5.3.2 *Generation of magnetically charged moving mass.*
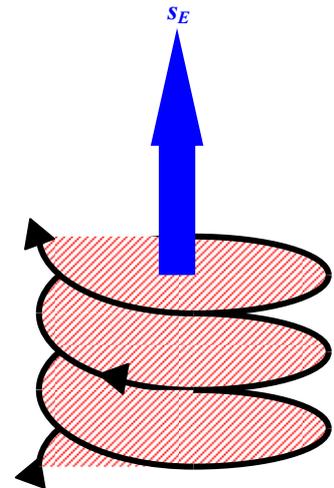
In SOL irf: In STL irf: In STL irf:

s_E

Quasi-instantaneous ring Ω_B (the discrepancy with the ring is infinitesimal, the closing is almost perfect).

Helical trajectory

Moving mass, with electric charge q_B and magnetic spin s_E in the advancing direction.

5.4   ***The rest mass is impossible, since immobility would violate the spin conservation.***
Expl. By Props. 5.2 and 5.3, the spin of the electromagnetic helix arises in its direction of motion. In movement absence the fields developed perpendicularly to the ring's two faces are perfectly balanced, carrying to a null result that is a *non-existent spin*, in contradiction with the conservation of s_B and s_E.
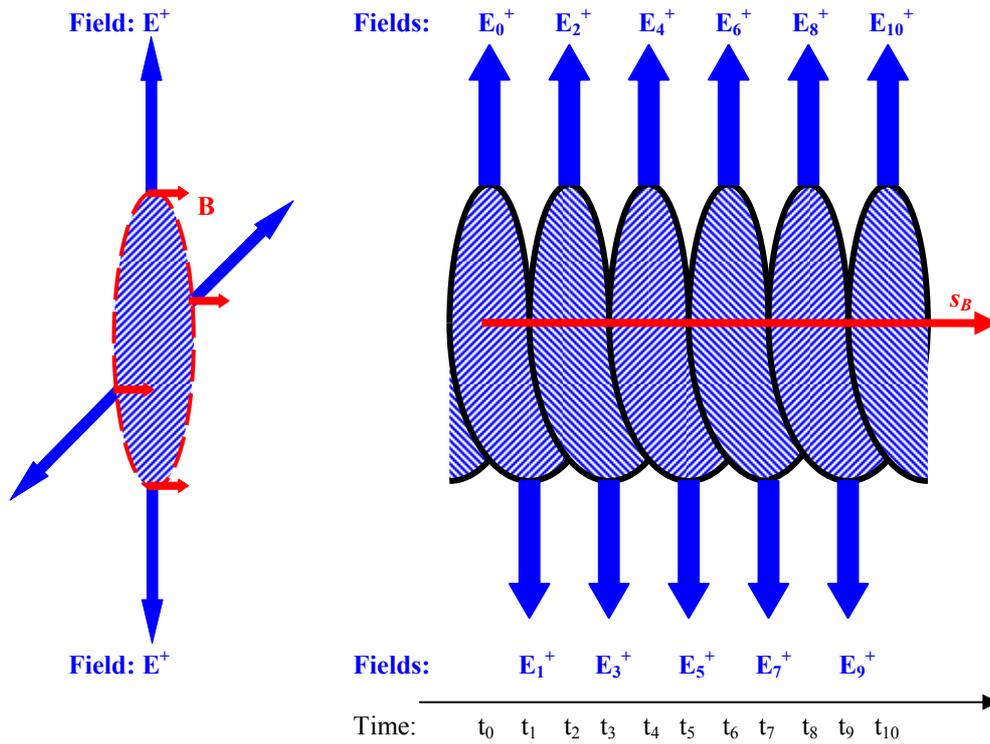
Impossible electromass at rest:

Impossible magnetomass at rest:
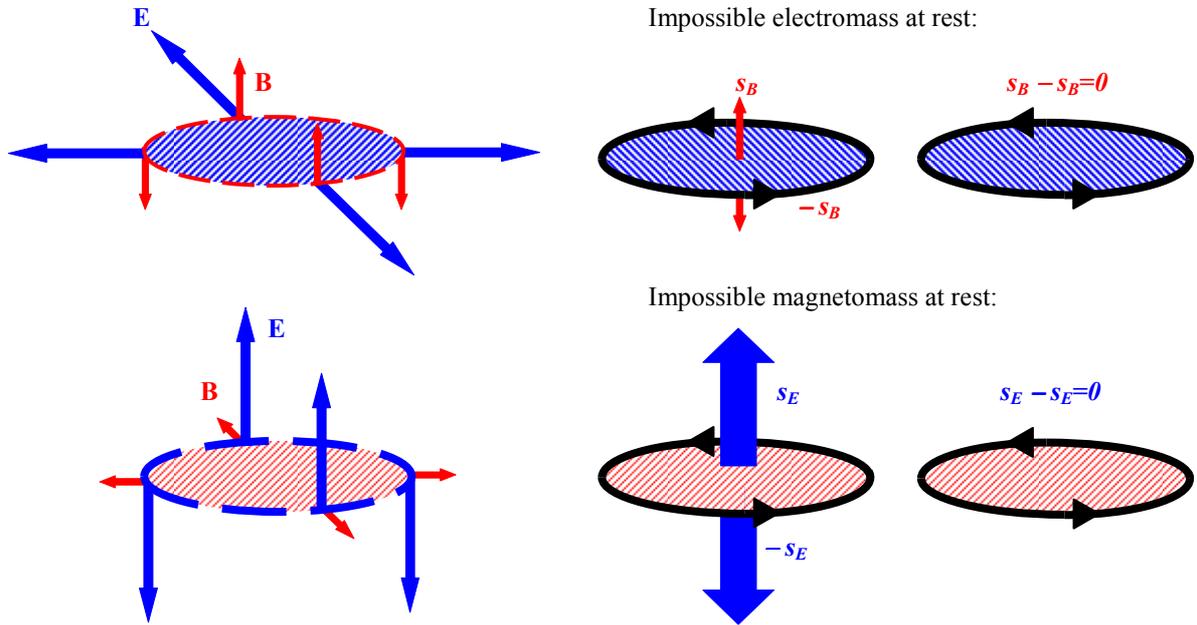
5.5   ***The electric charge q_E and the hypothetical magnetic monopole q_B they are quantized.***
Expl. By Hypothesis 4.15, the charge associated with the particle is proportional to the radial field, whose intensity depends on stationary wave's shape only. Since the wave's profile is not continuous but discreet, also the charge is quantized, both the real electric one and the hypothetical magnetic one.

Charge 1

Charge 2

Charge 3

Charge 4

Profile 1   *Profile 2*   *Profile 3*   *Profile 4*
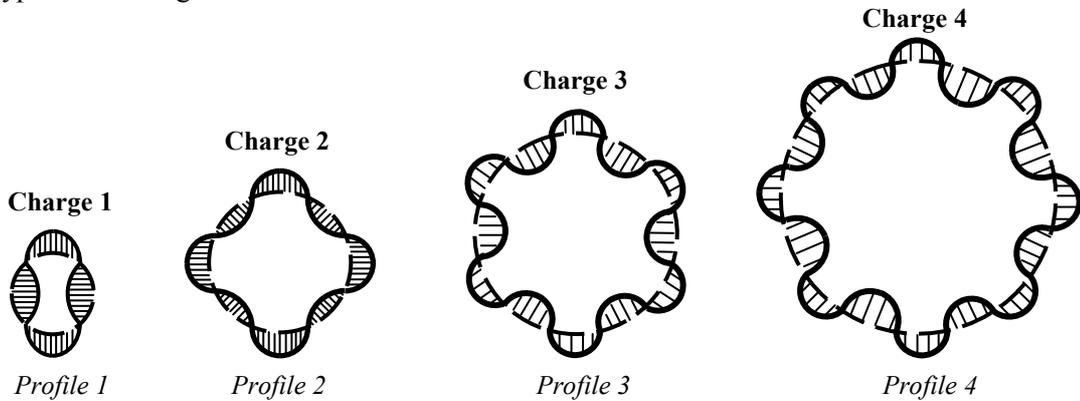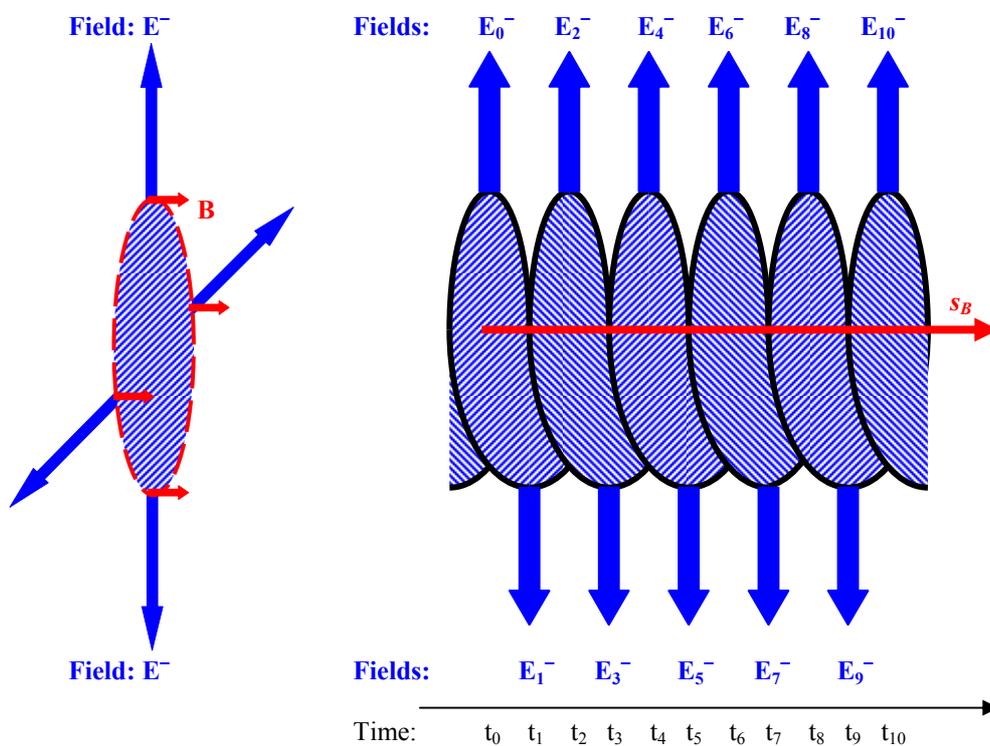
5.6   ***The electric charge is $3x10^8$ times more probable/stable than the magnetic charge.***
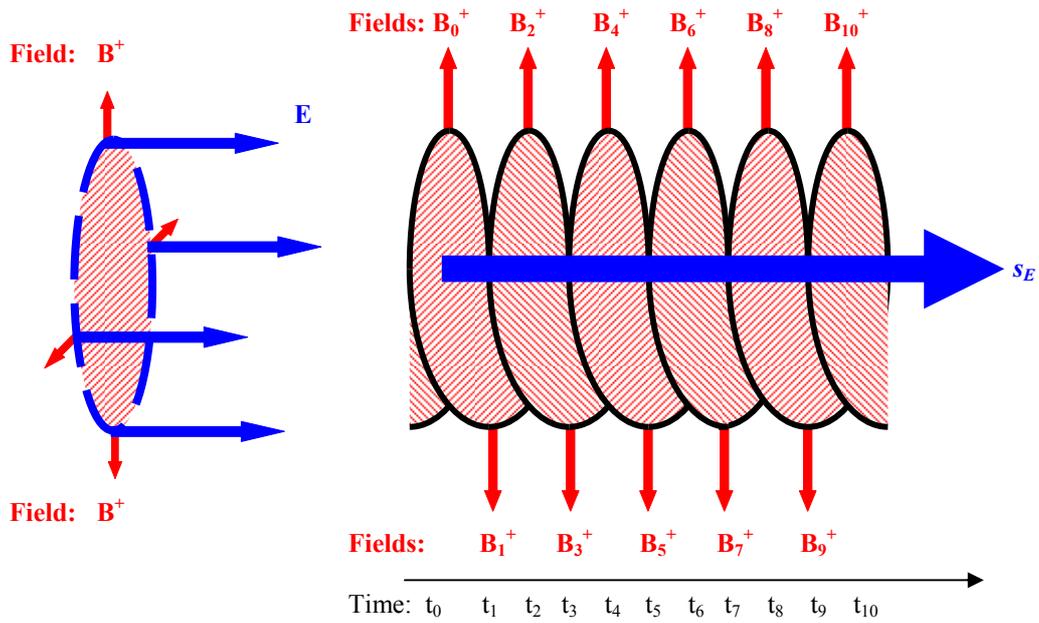*Expl*. By Hypothesis 4.11, because ring Ω_E is c times more probable/stable than ring Ω_B.

s_B

Real electroparticle q_E is $3x10^8$ times more probable/stable than the hypothetical magnetoparticle q_B

s_E

t_0 t_1 t_2

t_0 t_1 t_2

16
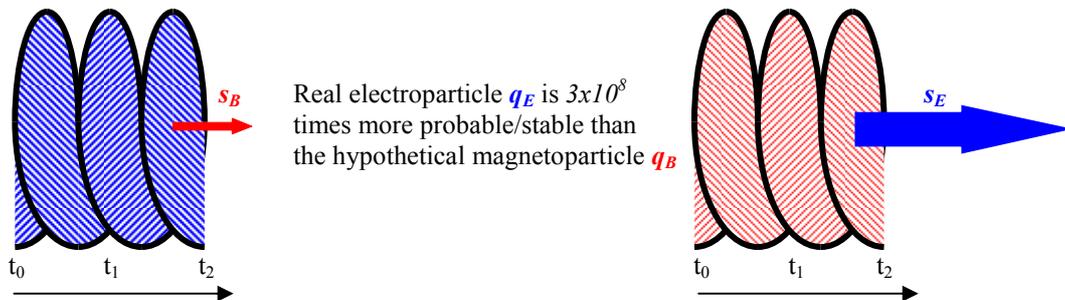
5.7   ***In STL irf the ring Ω_E^+ is an electric positive charge with magnetic spin.***
Expl. The ring Ω_E^+ in *SOL irf* it is a space-time extended helix in *STL irf*:

Field: E^+

Field: E^+

Fields: E_0^+ E_2^+ E_4^+ E_6^+ E_8^+ E_{10}^+

s_B

Fields: E_1^+ E_3^+ E_5^+ E_7^+ E_9^+

Time: t_0 t_1 t_2 t_3 t_4 t_5 t_6 t_7 t_8 t_9 t_{10}
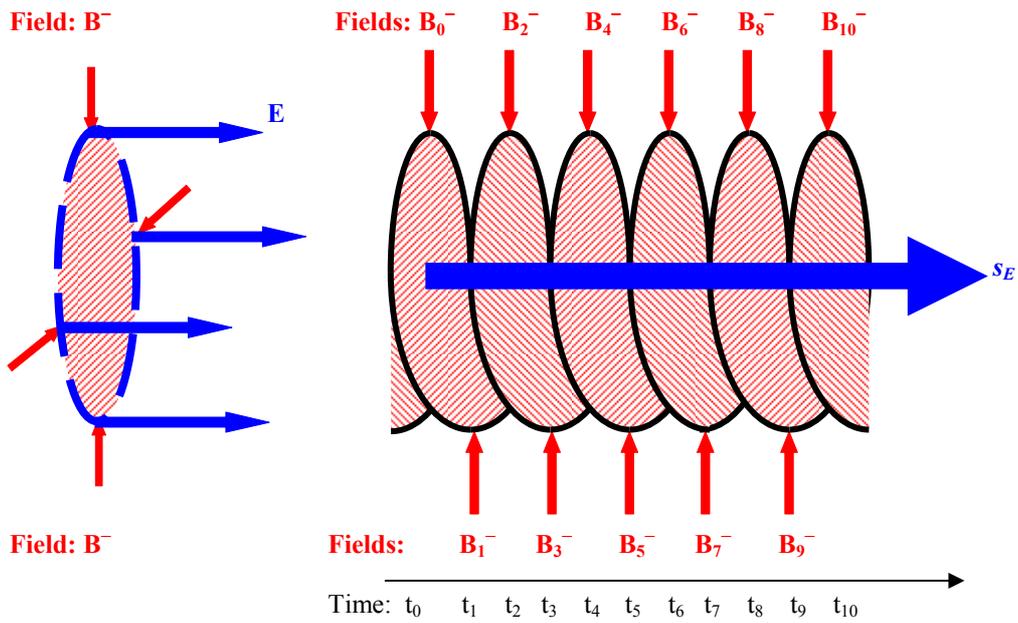
5.8   ***In STL irf the ring Ω_E^- is an electric negative charge with magnetic spin.***
Expl. The ring Ω_E^- in *SOL irf* it is a space-time extended helix in *STL irf*:

Field: E^-

Field: E^-

Fields: E_0^- E_2^- E_4^- E_6^- E_8^- E_{10}^-

s_B

Fields: E_1^- E_3^- E_5^- E_7^- E_9^-

Time: t_0 t_1 t_2 t_3 t_4 t_5 t_6 t_7 t_8 t_9 t_{10}

17

5.9 *In STL irf the hypothetical ring $\Omega_B{}^+$ is a magnetic positive monopole with electric spin.*
Expl. The ring $\Omega_B{}^+$ in *SOL irf* it is a space-time extended helix in *STL irf*:

Field: B⁺

Fields: $B_0{}^+$ $B_2{}^+$ $B_4{}^+$ $B_6{}^+$ $B_8{}^+$ $B_{10}{}^+$

Field: B⁺

E

s_E

Fields: $B_1{}^+$ $B_3{}^+$ $B_5{}^+$ $B_7{}^+$ $B_9{}^+$

Time: t_0 t_1 t_2 t_3 t_4 t_5 t_6 t_7 t_8 t_9 t_{10}

5.10 *In STL irf the hypothetical ring $\Omega_B{}^-$ is a magnetic negative monopole with electric spin.*
Expl. The ring $\Omega_B{}^-$ in *SOL irf* it is a space-time extended helix in *STL irf*:

Field: B⁻

Fields: $B_0{}^-$ $B_2{}^-$ $B_4{}^-$ $B_6{}^-$ $B_8{}^-$ $B_{10}{}^-$

E

s_E

Field: B⁻

Fields: $B_1{}^-$ $B_3{}^-$ $B_5{}^-$ $B_7{}^-$ $B_9{}^-$

Time: t_0 t_1 t_2 t_3 t_4 t_5 t_6 t_7 t_8 t_9 t_{10}

18

5.11 *The helical model effectively describes the relations between velocity and radius of particles.*
Expl. According to Hypothesis 4.8, by applying the UHM quantities to the particle's model:

$r_p = r_e$ = radius of the particle, *i.e.* of the helix
p_e = pitch of the helix associated with the particle
$v_t = c$ = tangential speed of the spiral
$v_p = v_x$ = advancing velocity of the particle
a_e = helix centrifugal acceleration

Velocity of the particle:
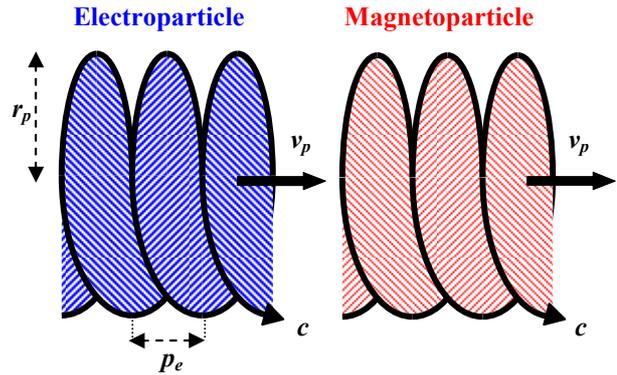$v_p = c/[1+(2\pi r_p/p_e)^2]^{(1/2)}$, thus $v_p < c$

Radius of the particle:
$r_p = (p_e/2\pi)*[(c/v_p)^2-1]^{(1/2)}$

Centrifugal acceleration:
$a_e = (2\pi/p_e)^2 * r_p * v_p^2$

Let us notice how the electromagnetic helix (mass) it always advances slower than the linear wave (energy) generating it: $v_p < c$.

5.12 *The helical model effectively describes the energy exchanges in particle-photon interaction.*
Expl. By Prop. 5.11, there is a relationship between the pitch of helix associated with the particle and its advancing velocity: $v_p = v_p(p_e)$. By Special Relativity, there is a bond between the energy of the particle and its speed: $E = E(v_p)$. By solving the system of equations and after eliminating v_p we get: $E = E(p_e)$.
The relations are $v_p = c/[1+(2\pi r_p/p_e)^2]^{(1/2)}$ and $E = E_0/[1+(v_p/c)^2]^{(1/2)}$.
Denote $\Delta = E-E_0$, the difference between the particle's effective energy and its value at rest, by calculations we get: $p_e^2 = (2\pi r_p/E_0)^2 * \Delta^2 + (8\pi^2 r_p^2/E_0)*\Delta$. Thus, there is a *quasi-linear* link between the energetic increase and the particle's pitch increase: $p_e \, \alpha \, \Delta$.

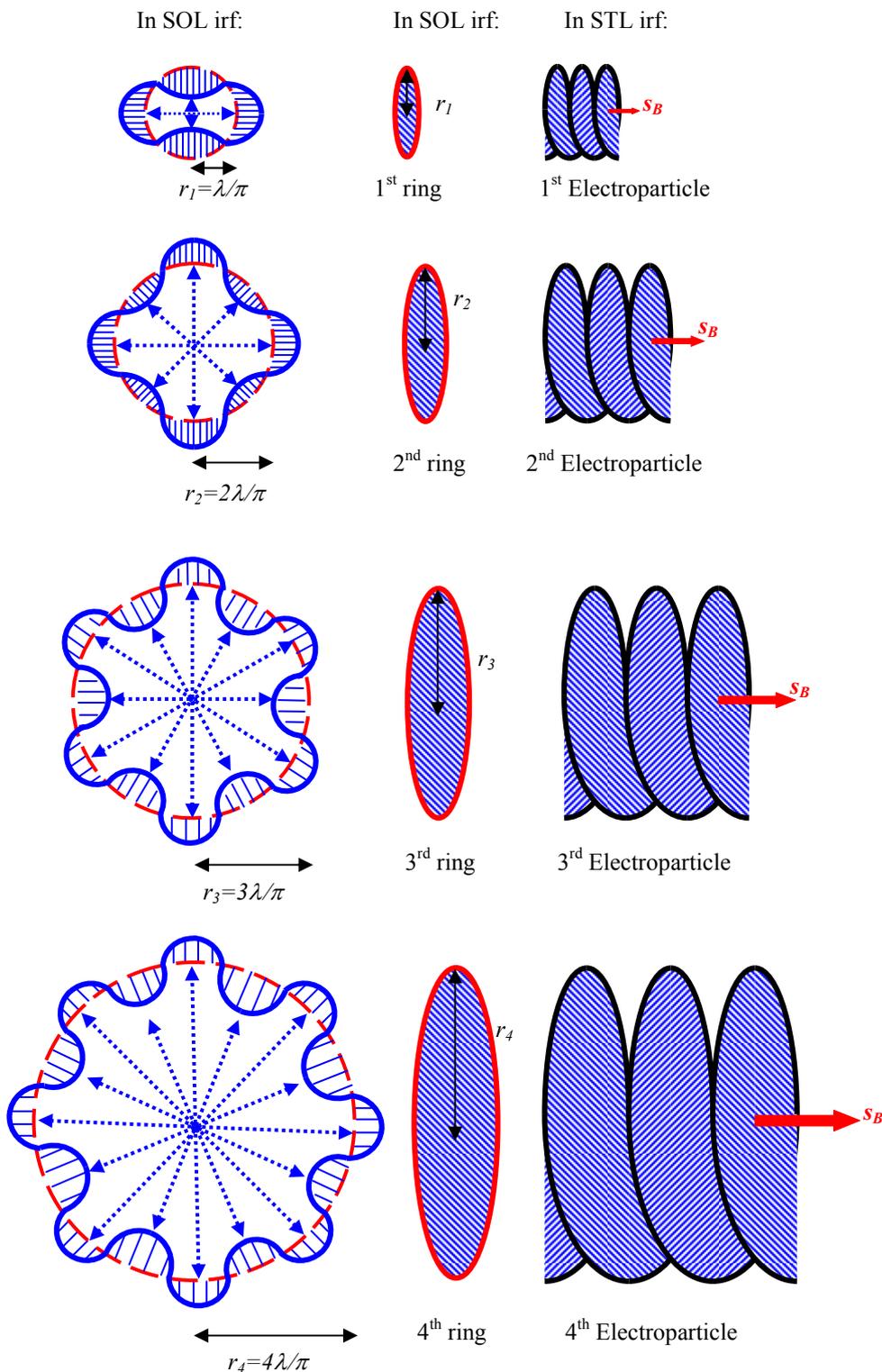**5.12.1** *Electroparticle-photon energetic exchanges.*
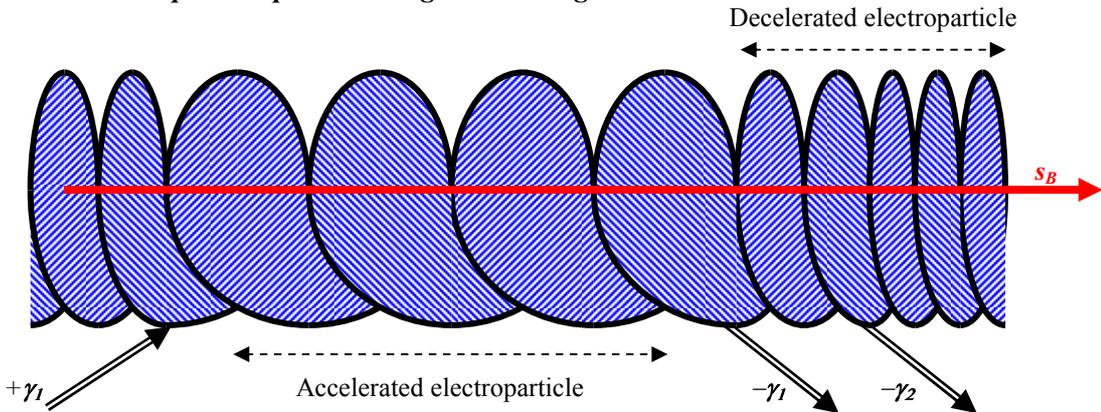
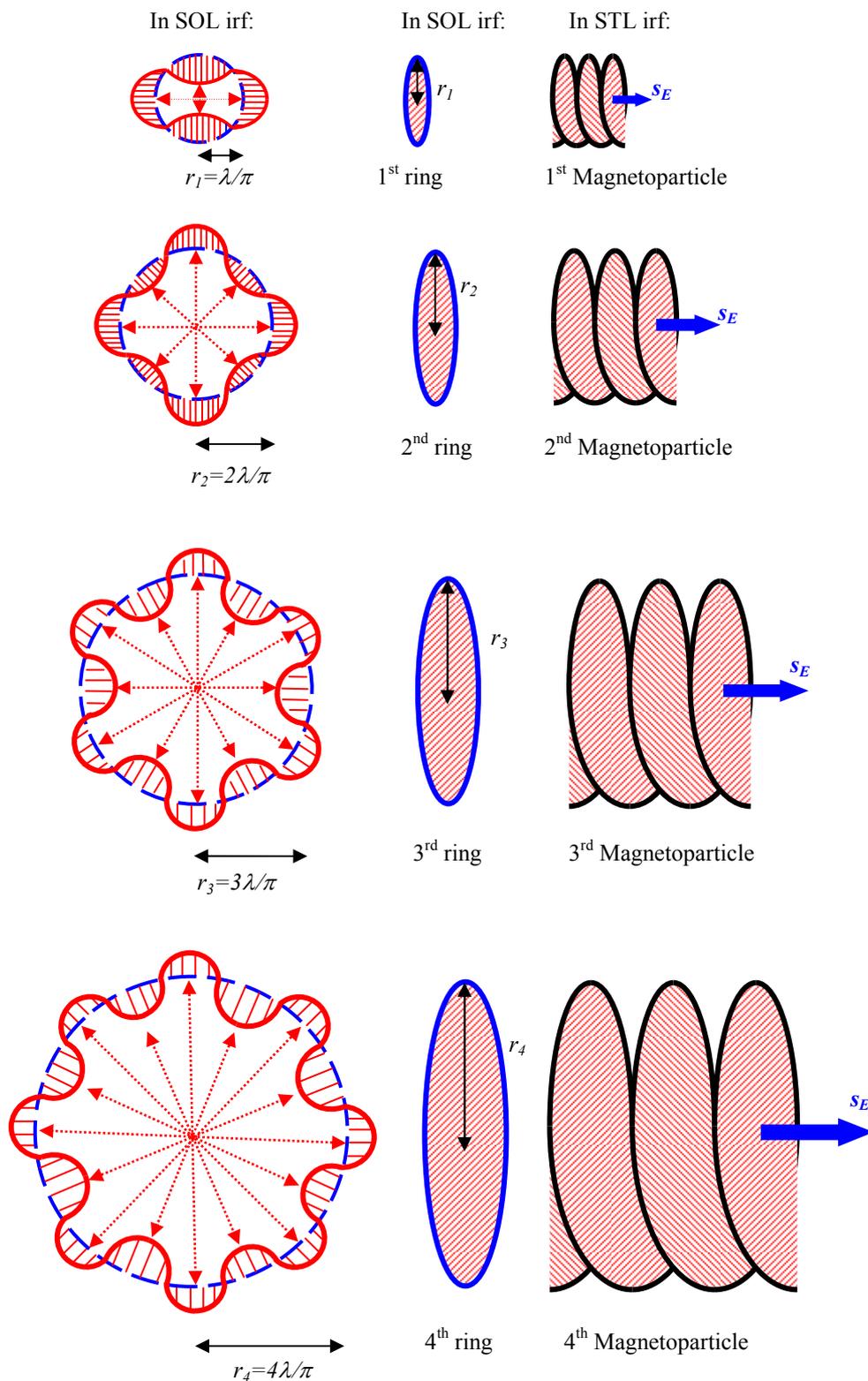**5.12.2** *Hypothetical magnetoparticle-photon energetic exchanges.*
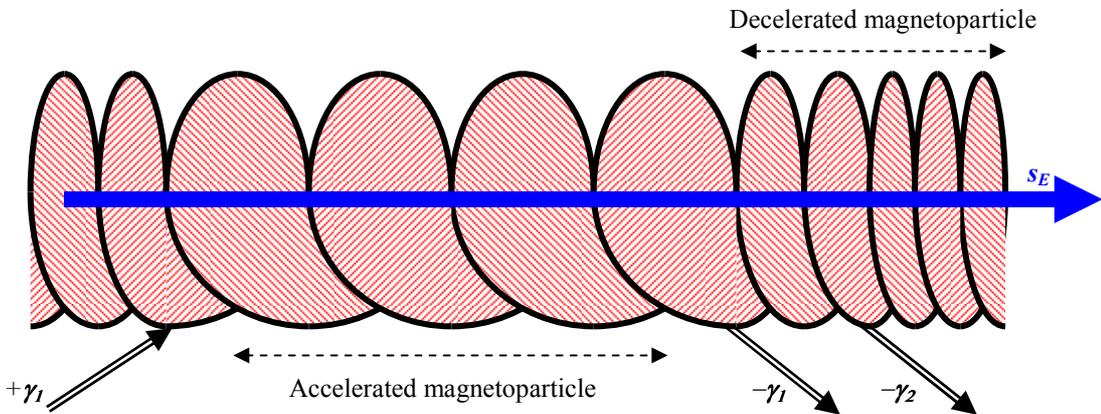
5.13 *Quantization of the electroparticle's radius on equal wavelength for a STL observer.*

Expl. By Hypothesis 4.12, the stable stationary waves have an even number of wavelengths: $2\pi r_n = 2n\lambda$. The stationary waves' quantized radius corresponds to the particles': $r_p = r_n = n\lambda/\pi$, being $n \in \mathbf{Z}^+$.

In SOL irf:	In SOL irf:	In STL irf:

$r_1 = \lambda/\pi$ 1st ring   1st Electroparticle

$r_2 = 2\lambda/\pi$ 2nd ring   2nd Electroparticle

$r_3 = 3\lambda/\pi$ 3rd ring   3rd Electroparticle

$r_4 = 4\lambda/\pi$ 4th ring   4th Electroparticle

5.14 *Quantization of the magnetoparticle's radius on equal wavelength for a STL observer.*

Expl. By Hypothesis 4.12, the stable stationary waves have an even number of wavelengths: $2\pi r_n = 2n\lambda$. The stationary waves' quantized radius corresponds to the particles': $r_p = r_n = n\lambda/\pi$, being $n \in \mathbf{Z}^+$.

In SOL irf:	In SOL irf:	In STL irf:

$r_1 = \lambda/\pi$ r_1 1st ring   1st Magnetoparticle

$r_2 = 2\lambda/\pi$ r_2 2nd ring   2nd Magnetoparticle

$r_3 = 3\lambda/\pi$ r_3 3rd ring   3rd Magnetoparticle

$r_4 = 4\lambda/\pi$ r_4 4th ring   4th Magnetoparticle

21

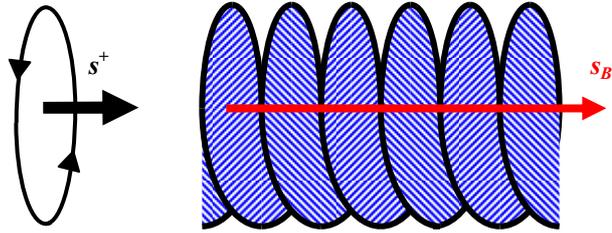**5.15** *The helical model is consistent with the particle wave function.*

Expl. Denote $\Psi = u + iv$ the wave function of a particle in the complex plane *(u,v)*.
The particle's momentum state $\Psi = e^{iP\cdot x/\hbar}$ it is described just by a helix in the real direction *x*.
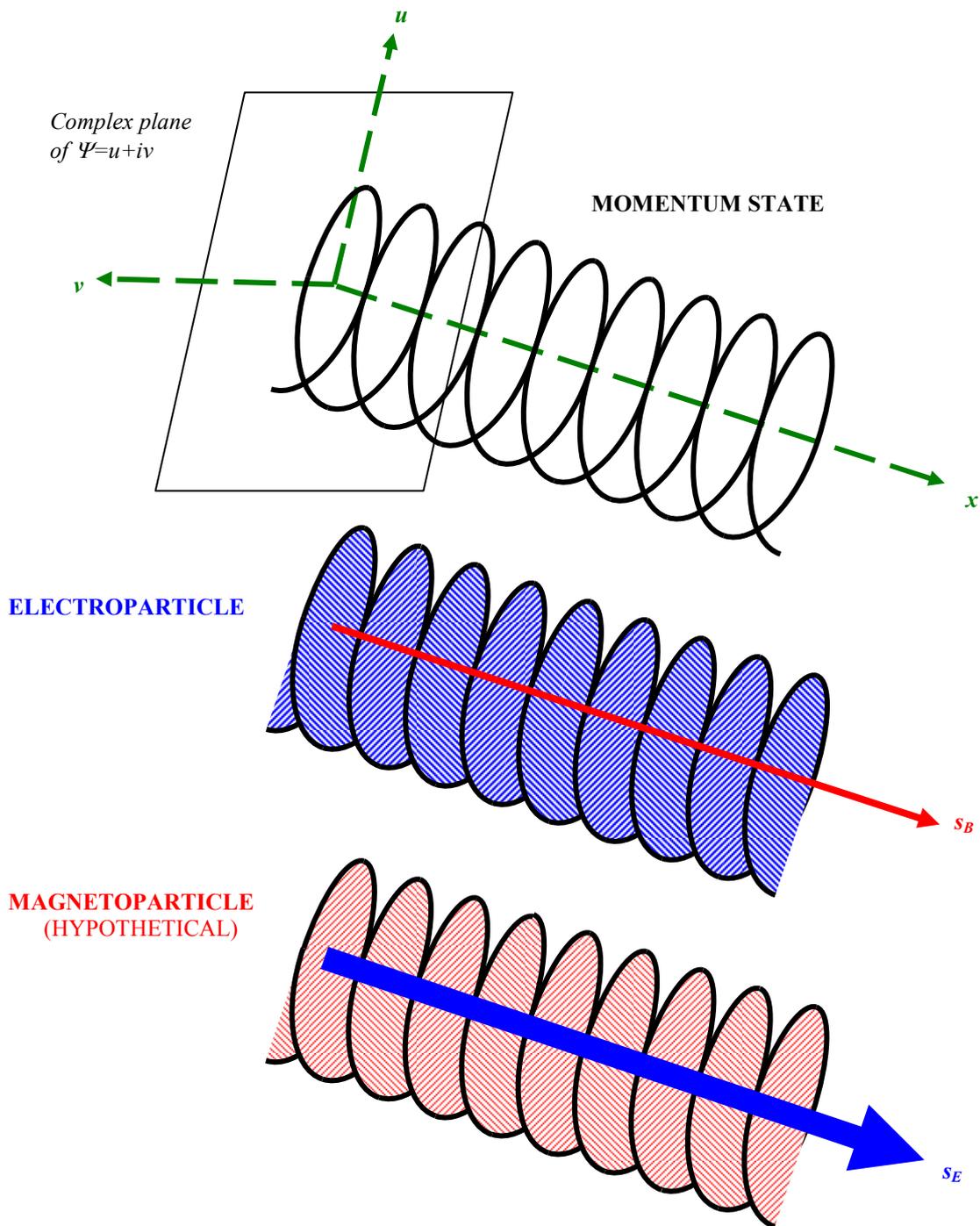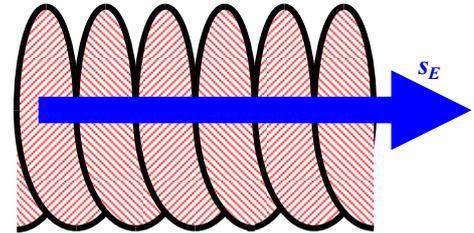
5.16   *The helical model is consistent with a particle's helicity.*
   Expl. Helicity is determined by momentum and spin orientation of a particle; the helical model provides a geometric explanation based on *chirality* for the helicity's positive or negative sign.
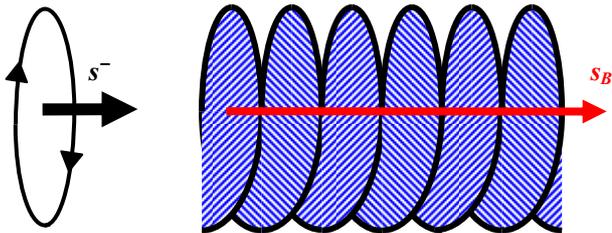
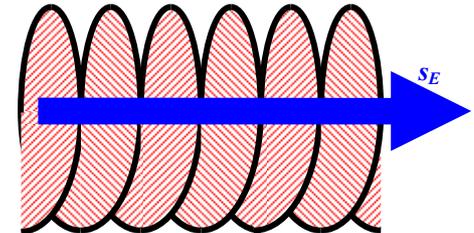Right-handed spin: Electroparticle with positive helicity: Magnetoparticle with positive helicity:

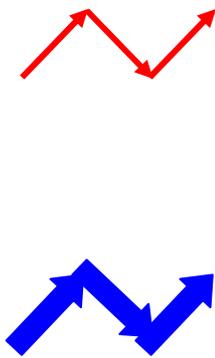Left-handed spin: Electroparticle with negative helicity: Magnetoparticle with negative helicity:
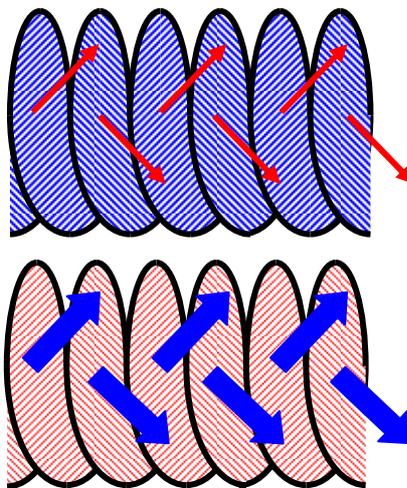

5.17   *The helical model is consistent with a particle's ZBW.*
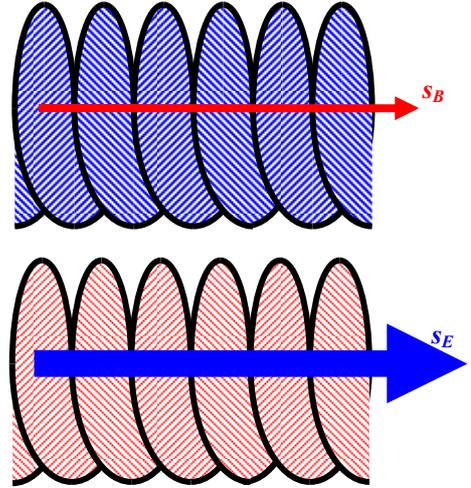   *Expl.* Spin is the result of the zigzag associated with different inclinations of the helix spirals.
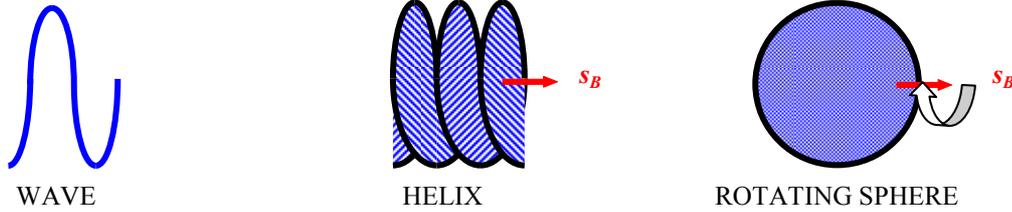
Zitterbewegung: Zigzag oriented spin: Resulting spin:

5.18   *Origin of the wave-particle duality for a STL observer.*

Expl. The helical model is intermediate between the undulatory and the particle one, by manifesting features now like one now like the other according to experimental conditions.

5.18.1   *Electric charge with magnetic spin.*

| WAVE | HELIX | ROTATING SPHERE |

5.18.2   *Hypothetical magnetic charge with electric spin.*

| WAVE | HELIX | ROTATING SPHERE |
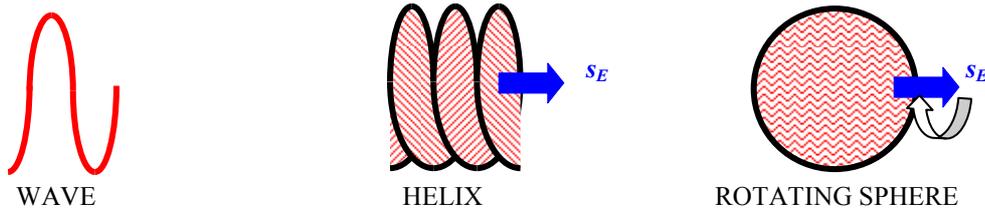
5.19   *The principle of reciprocity explains matter as space-time's ripple.*

Expl. By Hypothesis 4.2, action and reaction they are *joint*. Hence, Einstein's field equations $G_{\mu\nu}=kT_{\mu\nu}$ can be interpreted both in the conventional direction:

$T_{\mu\nu} \Rightarrow G_{\mu\nu}$ (the presence of <u>matter</u> generates a space-time <u>curvature</u>),

and in the reversal: $G_{\mu\nu} \Rightarrow T_{\mu\nu}$ (the space-time <u>curvature</u> generates a presence of <u>matter</u>).

Thus there is not anymore a cause (the source tensor $T_{\mu\nu}$) and an effect (the Einstein tensor $G_{\mu\nu}$), but the two entities are interchangeable in physical description.
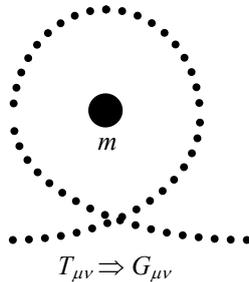
Since 1916, in *GR* has been considered the scenery on the left only, with energy tensor causing the geometrical one. Reciprocity permits the opposite scenery, on the right, with mass and energy geometrically interpretable as space-time ripples.

$T_{\mu\nu} \Rightarrow G_{\mu\nu}$ $G_{\mu\nu} \Rightarrow T_{\mu\nu}$
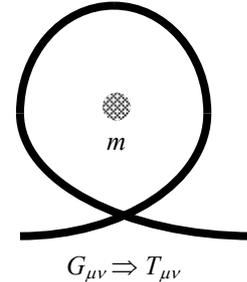
5.20   *The principle of reciprocity explains the space-time's esadimensionality (3,3) and requires a source tensor 6x6.*

Expl. By Hypothesis 4.2, in a Euclidean space-time (flat) the *Fitzgerald contraction* must be interpretable both in the conventional direction:

$0<v<c \Rightarrow \Delta x < \Delta x_0$ (the <u>speed</u> of the body generates the <u>length's contraction</u> in the movement direction), and in the reversal:

$\Delta x < \Delta x_0 \Rightarrow 0<v<c$ (the <u>length's contraction</u> in a certain direction generates the <u>speed</u> of the body). Similarly, based on reciprocity and time's tridimensionality, in a Euclidean space-time (flat) the *time dilation* can be read both in the conventional direction:

$0<v<c \Rightarrow \Delta t > \Delta t_0$ (the <u>speed</u> of the body generates the <u>time dilation</u> in the movement direction), and in the reversal:

$\Delta t < \Delta t_0 \Rightarrow 0<v<c$ (the <u>time dilation</u> in a certain direction generates the <u>speed</u> of the body).

If time were not three-dimensional, the second interpretation would not be possible; in fact, without a *direction* identifying Δt, a temporal dilation could not be associated with a specific vector velocity **v**.

In a 6d space-time, the source tensor $T_{\mu\nu}$ must be esadimensional as well, *i.e.* $\mu, \nu = 1,2,3,4,5,6$.

5.21 *Origin of the electric charge conservation and of mass stability.*

Expl. The invariance of both the dimension of the particle, from a quantized radius to the successive, and of its radial shape, from a profile to the successive, it is due to the stationarity of the wave generating the ring Ω_E.

5.21.1 *Invariant shape, i.e. conservation of electric charge.*

Profile 1   Profile 2   Profile 3   Profile 4

NO   NO   NO
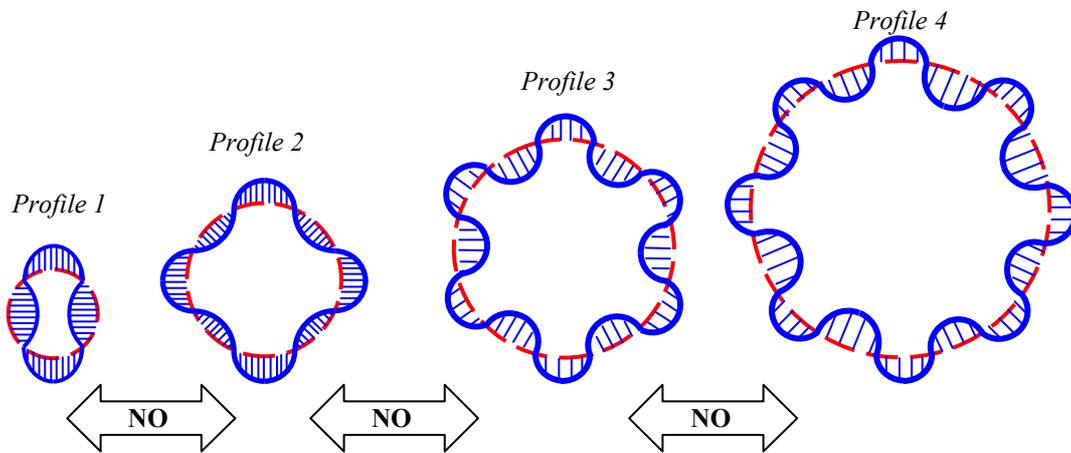
5.21.2 *Invariant radius, i.e. electromass stability.*

r_1 r_2 r_3 r_4

NO   NO   NO

5.21.3 *Invariant electroparticle's dimensions.*

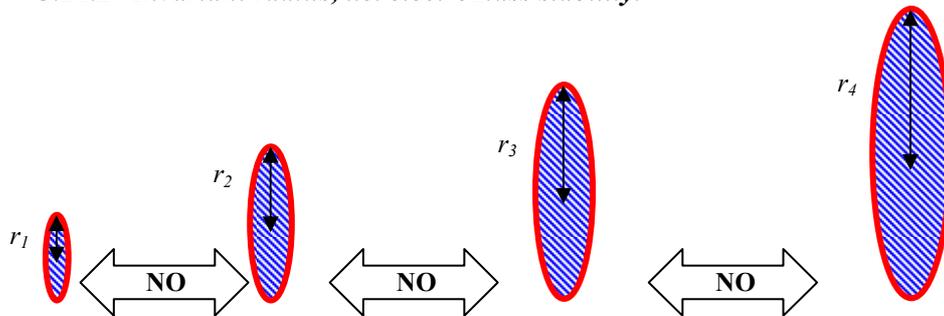m_1 m_2 m_3 m_4

NO   NO   NO

25
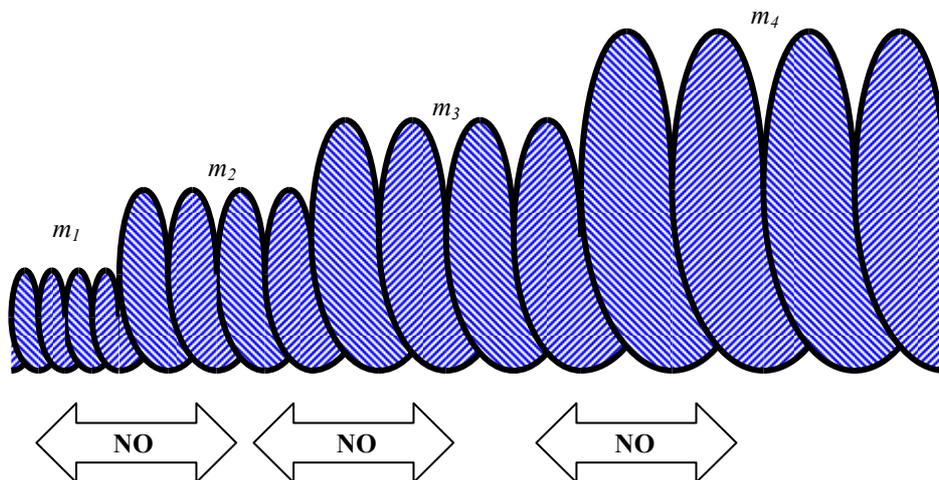
5.22 *Origin of the magnetic charge conservation and of mass stability.*

Expl. The invariance of both the dimension of the particle, from a quantized radius to the successive, and of its radial shape, from a profile to the successive, it is due to the stationarity of the wave generating the ring Ω_B.

5.22.1 *Invariant shape, i.e. conservation of magnetic charge.*

Profile 1 *Profile 2* *Profile 3* *Profile 4*

NO   NO   NO
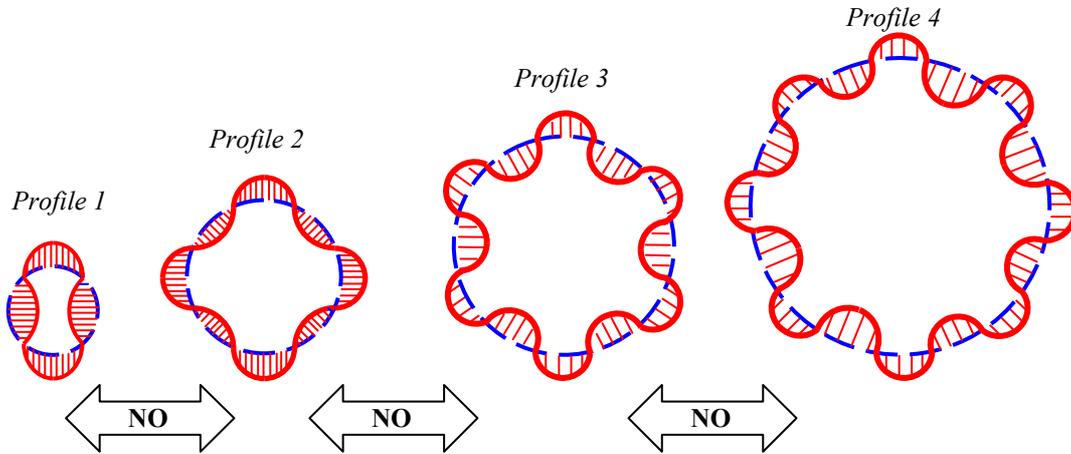
5.22.2 *Invariant radius, i.e. magnetomass stability.*

r_1 r_2 r_3 r_4

NO   NO   NO
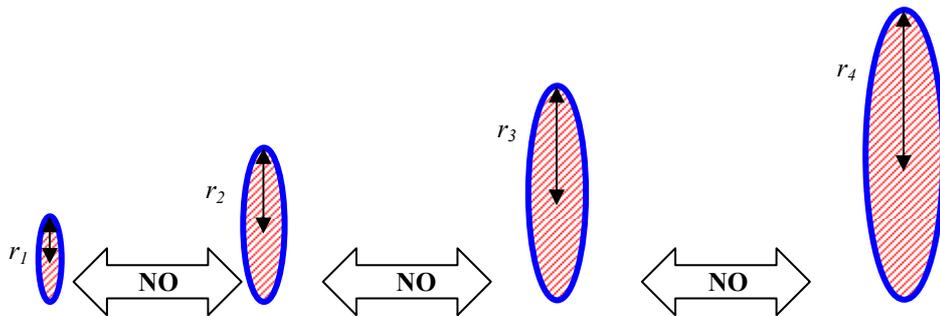
5.22.3 *Invariant magnetoparticle's dimensions.*

m_1 m_2 m_3 m_4

NO   NO   NO

26

5.23 *The same charge can be associated with different masses.*

Expl. The total charge depends on the radial field, which depends on the shape of the stationary wave that generates the simultaneous ring according to Hypothesis 4.15.
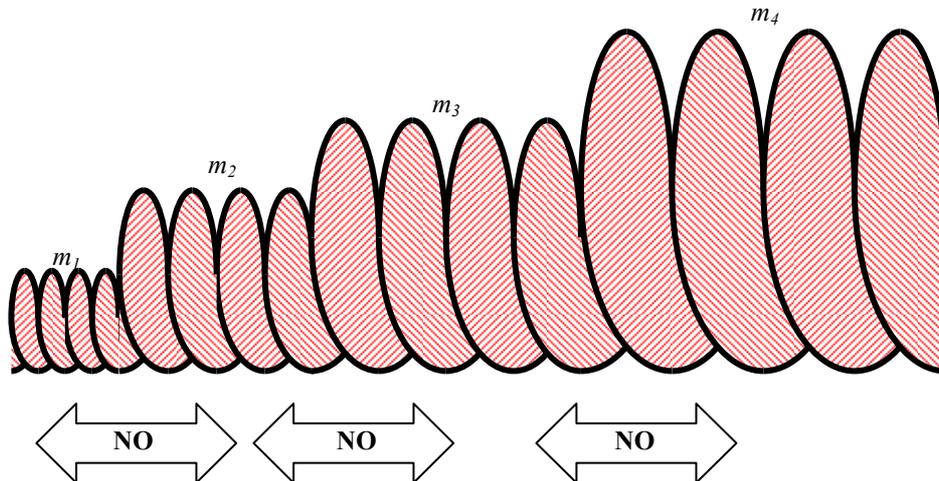
5.24 *Opposite fields originated from concentrical stationary waves with same shape they cancel out.*
Expl. By Prop. 5.23 and by Hypothesis 4.15, the total charge depends on the radial field, which depends on the stationary wave's profile only.

5.24.1 *Examples of radial electric field's neutralization.*

Field E_1   +   *Field $-E_1$*   =   *Null field ($E_1-E_1=0$)*   *Neutral electroparticle*

Field E_2   +   *Field $-E_2$*   =   *Null field ($E_2-E_2=0$)*   *Neutral electroparticle*
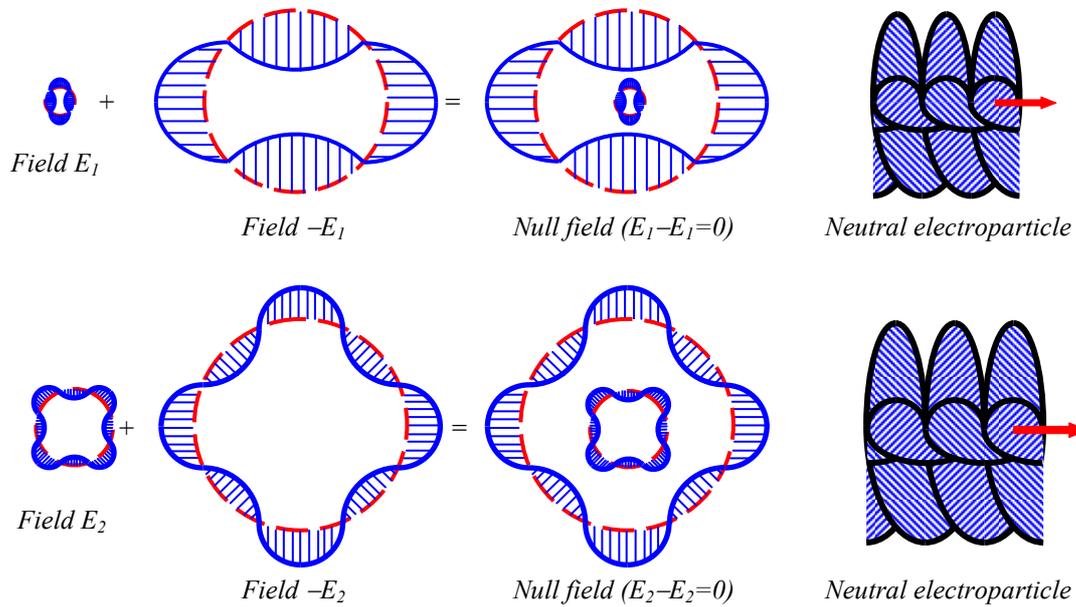
5.24.2 *Examples of radial magnetic field's neutralization.*

Field B_1   +   *Field $-B_1$*   =   *Null field ($B_1-B_1=0$)*   *Neutral magnetoparticle*

Field B_2   +   *Field $-B_2$*   =   *Null field ($B_2-B_2=0$)*   *Neutral magnetoparticle*
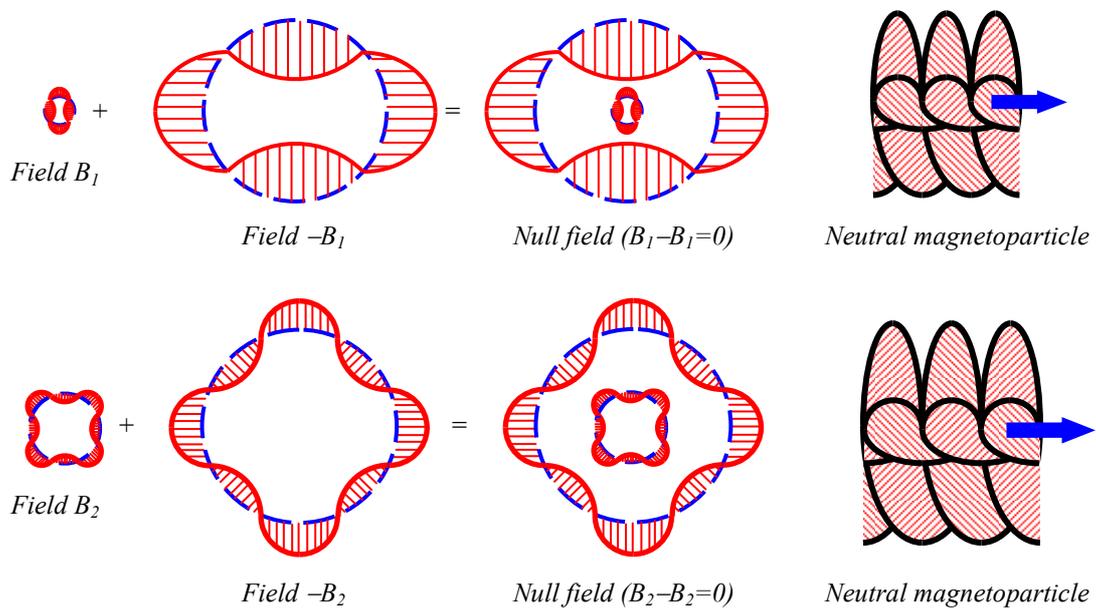
6 THESES

6.1 *The AR explains the acausal correlations.*
Explanation. By Prop. 5.1, the atemporal interactions in *SOL irf* they have acausal correspondings in *STL irf*.

6.2 *The AR explains the origin of mass.*
Expl. By Props. 5.2 and 5.3, the analytic model of the *EM* helix describes all the mass features.

6.3 *The AR explains the origin of charge and spin.*
Expl. By Props. 5.2, 5.3, 5.5÷5.10, the charge can be electric or magnetic according to the field engaged in closing the ring (*E* or *B*) and it is more or less intense according to the *shape* assumed by the stationary wave, *i.e.* according to the number of wavelengths λ distributed along the circumference (even, in order to permit the autointeraction). The spin is resulting from the field not involved in closing the ring and perpendicular to it and its direction coincides with the helix advancing axis.

6.4 *The AR explains the unreachability of the condition at rest for the mass.*
Expl. By Prop. 5.4, an immobile mass would be without spin, so violating the conservation law.

6.5 *The AR explains the charge quantization.*
Expl. By Prop. 5.5, the possible stationary wave's profiles being discreet and not continuous.

6.6 *The AR explains the magnetic monopoles absence.*
Expl. By Prop. 5.6, it is a consequence of magnetic field's extreme weakness as closing force of the ring Ω_B ($3x10^8$ times inferior than the electric one according to $E=cB$).

6.7 *The AR explains the unreachability of the velocity c for the mass.*
Expl. By Prop. 5.11, according to the condition $v_x<v_t$ in the helical motion.

6.8 *The AR explains the exchange mechanism between mass and radiant energy.*
Expl. By Prop. 5.12, through the quasi-linear relation between helix pitch and particle's energy.

6.9 *The AR explains the quantization of stable masses.*
Expl. By Props. 5.13 and 5.14, the particle's classic radius coincides with the quantized one of the stationary waves on equal wavelength λ.

6.10 *The AR explains the geometrical aspects of the spinorial model.*
Expl. By Props. 5.15÷5.17, the helical model explains momentum state, helicity and *ZBW*.

6.11 *The AR explains the wave-particle duality.*
Expl. By Prop. 5.18, the helix being intermediate between a wave and a rotating sphere.

6.12 *The AR provides a merely geometrical interpretation of the material reality.*
Expl. By Prop. 5.19, mass and energy are interpretable as space-time ripples.

6.13 *The AR proves the esadimensional space-time (3,3) and source tensor $T_{\mu\nu}$ with $\mu,\nu=1,2,...,6$.*
Expl. By Prop. 5.20, space and time must be each tridimensional so that their continuum is six-dimensional; consequently the source tensor $T_{\mu\nu}$ must be esadimensional as well.

6.14 *The AR explains the charge conservation and the mass stability.*
Expl. By Props. 5.21 and 5.22, the particle's identity is assured by the stationary wave's invariant shape.

6.15 *The AR explains the independence of charge from the mass it is associated with.*
Expl. By Prop. 5.23, the stationary wave's profile being independent from the radius.

6.16 *The AR explains the neutrality of some particles.*
Expl. By Prop. 5.24, neutrality comes from complex structures, whose wavelengths' even number expresses equal and opposite charges arranged in an alternated and concentrical way.

6.17 *The AR is a link between Einstein's Relativity and Quantum Theory.*
Expl. By Theses 6.1÷6.16, the *AR* provides a coherent quantum description starting from relativistic presuppositions.

7   CONJECTURES

7.1   *The helical pattern could be recursive according to the energy supplied to the system.*
Explanation. It is the conjecture of *covering*, an iterative helical model where the passage from a helix to the following should happen when the energy overcomes a certain threshold.
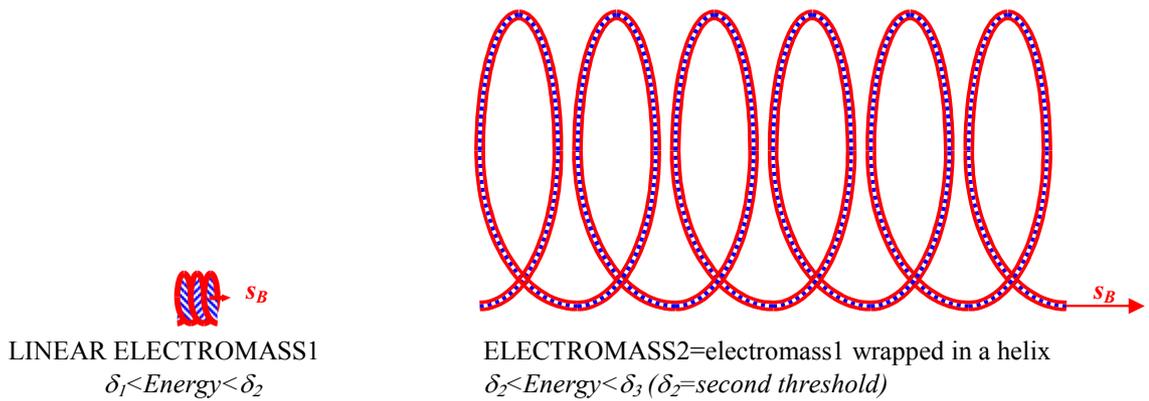
7.2   *The covering can regard the electromass.*
Expl. Starting from the linear *EM* field, the model is reiterable *ad infinitum*.

7.2.1   *First covering: electromagnetic wave wrapped in a simple helix through the field E.*

LINEAR EM FIELD
$0<Energy<\delta_1$

ELECTROMASS1=EM field wrapped in a helix
$\delta_1<Energy<\delta_2$ (δ_1=first threshold)
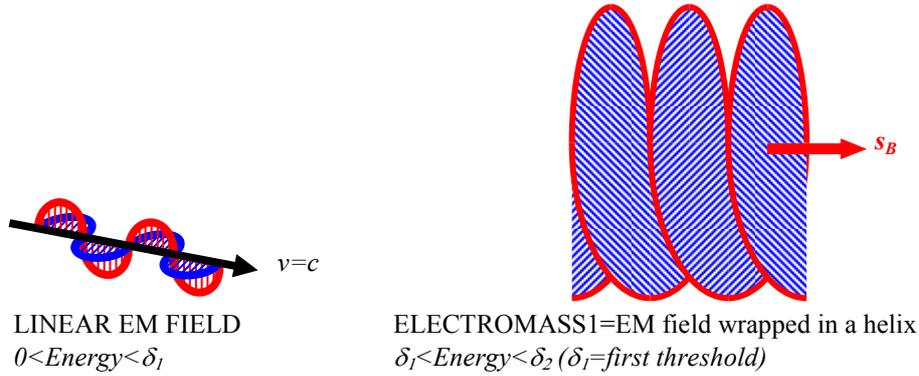
7.2.2   *Second covering: helix of the electric helix of the electromagnetic wave.*

LINEAR ELECTROMASS1
$\delta_1<Energy<\delta_2$

ELECTROMASS2=electromass1 wrapped in a helix
$\delta_2<Energy<\delta_3$ (δ_2=second threshold)

7.2.3   *Third covering: helix of the helix of the electric helix of the electromagnetic wave.*

LINEAR ELECTROMASS2
$\delta_2<Energy<\delta_3$

ELECTROMASS3=electromass2 wrapped in a helix
$\delta_3<Energy<\delta_4$ (δ_3=third threshold)
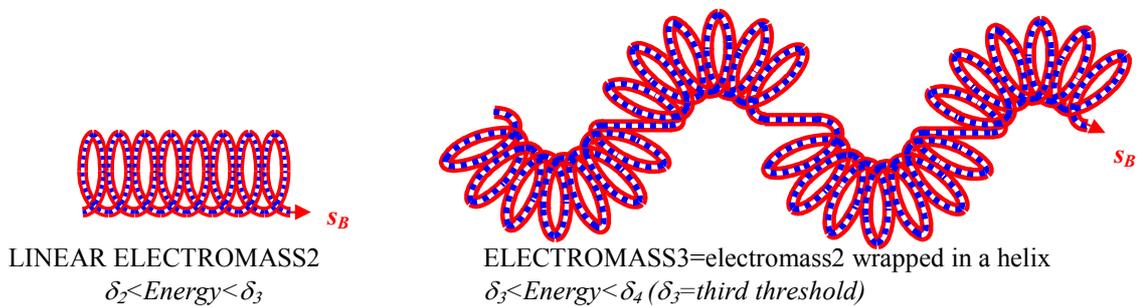
7.3 ***The covering can regard the hypothetical magnetomass.***
Expl. Starting from the linear *EM* field, the model is reiterable *ad infinitum*.

7.3.1 ***First covering: electromagnetic wave wrapped in a simple helix through the field B.***
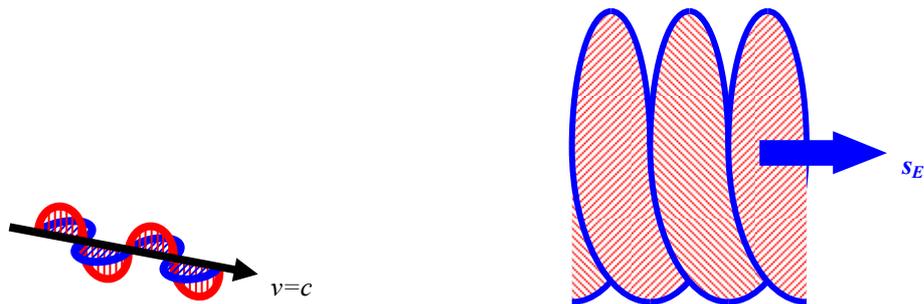
LINEAR EM FIELD
$0<Energy<\delta_1$

MAGNETOMASS1=EM field wrapped in a helix
$\delta_1<Energy<\delta_2$ (δ_1=first threshold)

7.3.2 ***Second covering: helix of the magnetic helix of the electromagnetic wave.***
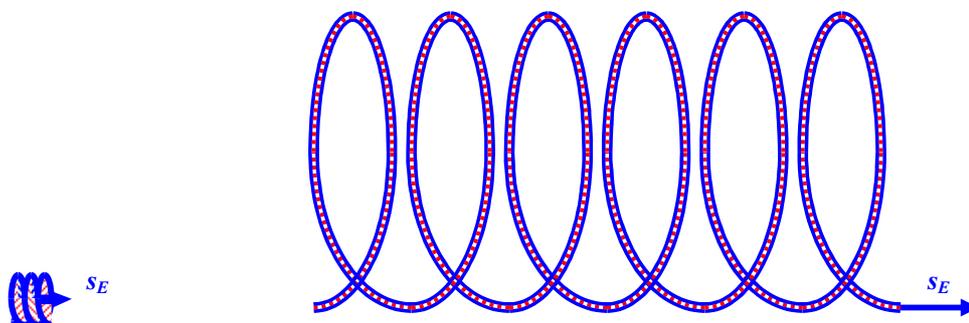
LINEAR MAGNETOMASS1
$\delta_1<Energy<\delta_2$

MAGNETOMASS2=magnetomass1 wrapped in a helix
$\delta_2<Energy<\delta_3$ (δ_2=second threshold)

7.3.3 ***Third covering: helix of the helix of the magnetic helix of the electromagnetic wave.***
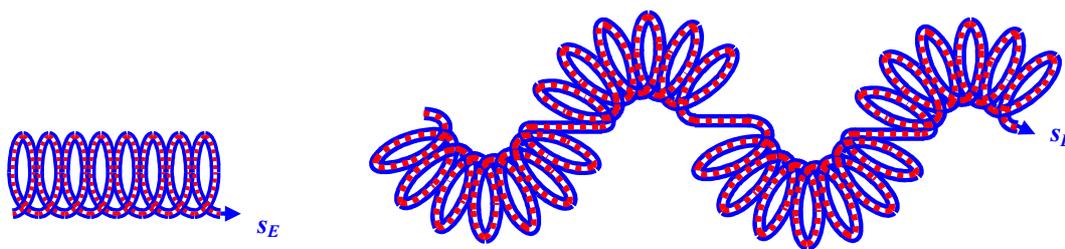
LINEAR MAGNETOMASS2
$\delta_2<Energy<\delta_3$

MAGNETOMASS3=magnetomass2 wrapped in a helix
$\delta_3<Energy<\delta_4$ (δ_3=third threshold)

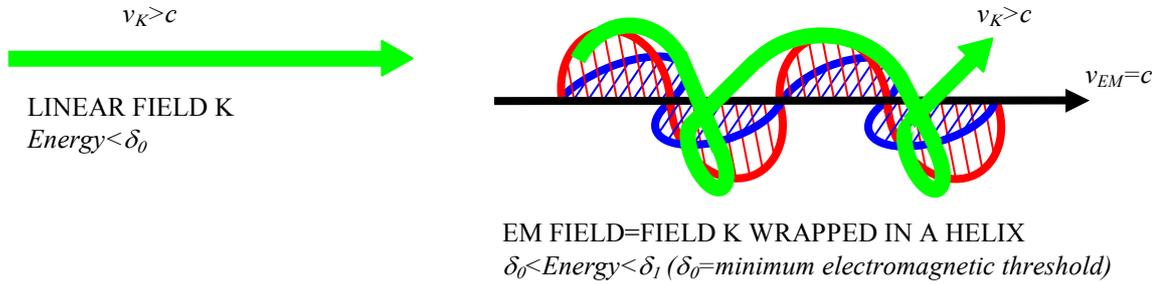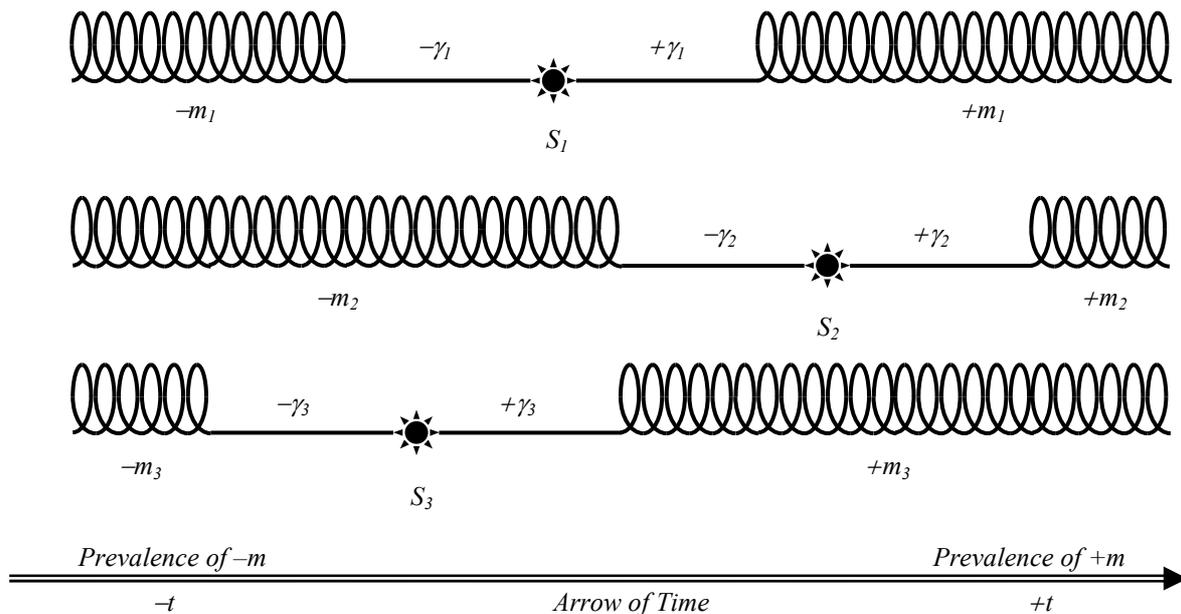**7.4**   ***The electromagnetic field could be generated from another primordial field by covering.***

Expl. In such case it would just be an intermediate in the potentially limitless chain of successive coverings and the immediately previous field, denominated *K*, should travel at $v_K > c$ (because in the helical motion the helix velocity of advance, in this case *c*, it is always minor than the tangential speed v_K).

$v_K > c$

LINEAR FIELD K
Energy$<\delta_0$

$v_K > c$

$v_{EM} = c$

EM FIELD=FIELD K WRAPPED IN A HELIX
$\delta_0 <$Energy$<\delta_1$ (δ_0=minimum electromagnetic threshold)

7.5   ***Violation of the matter-antimatter symmetry along time's arrow.***

Expl. Assuming valid also the negative solutions of Maxwell's equations, for each electromagnetic field $+\gamma$ developing along time's arrow, there must exist an equal and temporally opposite $-\gamma$, emitted from the same source *S* and assuming invariant, with respect to time, the tendency to pass from radiant energy to the helical structure, there is the formation of ordinary matter $+m$ at expense of *antimatter* $-m$ with pasting time. Such violation of the CP symmetry it is perfectly reversible, so that going backwards in time to a remote past the percentage of antimatter should prevail on the ordinary matter's:

$-\gamma_1$ $+\gamma_1$

$-m_1$ $+m_1$

S_1

$-\gamma_2$ $+\gamma_2$

$-m_2$ $+m_2$

S_2

$-\gamma_3$ $+\gamma_3$

$-m_3$ $+m_3$

S_3

Prevalence of $-m$ *Prevalence of $+m$*

$-t$ *Arrow of Time* $+t$

7.6   ***Calculation of the helical pitch for the electron in a hydrogen atom.***

Expl. The electron velocity in an atom it is $v_e = \alpha c / n$, being α=fine structure constant and *n*=principal quantum number. With the hydrogen atom such formula leads to: $v_e = 2.42 \ 10^6$ *(m/s)*, while the classical electron radius is: $r_e = 2.82 \ 10^{-15}$ *(m)*. After replacing these values in the formula linking the particle's radius to the pitch of the associated helix from Prop. 5.11, we get:
$p_e = 2\pi r_p / [(c/v_p)^2 - 1]^{(1/2)} = 2\pi (2.82 \ 10^{-15}) / [(3 \ 10^8 / 2.42 \ 10^6)^2 - 1]^{(1/2)} = 1,43 \ 10^{-16}$ *(m/s)*
Hence the ratio between the electron radius in an H atom and the pitch of the associated helix it is: $r_e / p_e = 19.71$. The electronic pitch is round 1/20 of electronic radius.

7.7   *Correspondence shape-charge according to the currently available information.*

Expl. By assigning the *minimum* charge ±1/3e to the minimal profile (stationary wave with two wavelengths), and the charge ±2/3e to the successive profile (stationary wave with four wavelengths), we get:


| Quarks d,s,b | Quarks u,c,t | Electron, Proton | Hypothetical Diquarks |
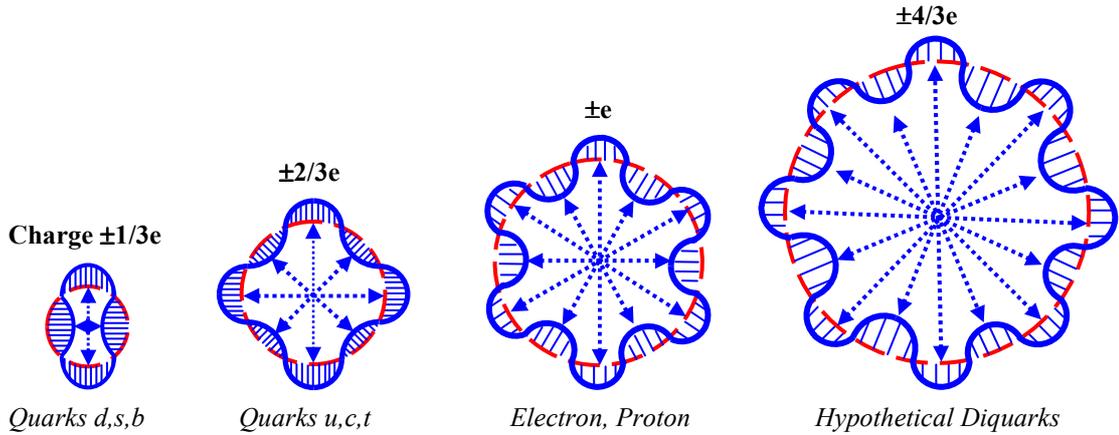
7.8   *In SOL irf the neutron is obtained by overlapping a ring protonic Ω_p and electronic Ω_{e^-} .*

Expl. Proton and neutron have the same charge in absolute value, thus, by Hypothesis 4.15 and by Conjecture 7.6, their stationary waves have the same shape with six wavelengths. The following diagram is qualitative and it has an indicative purpose only:

Electron in SOL irf   Proton in SOL irf   Neutron in SOL irf   Neutron in STL irf
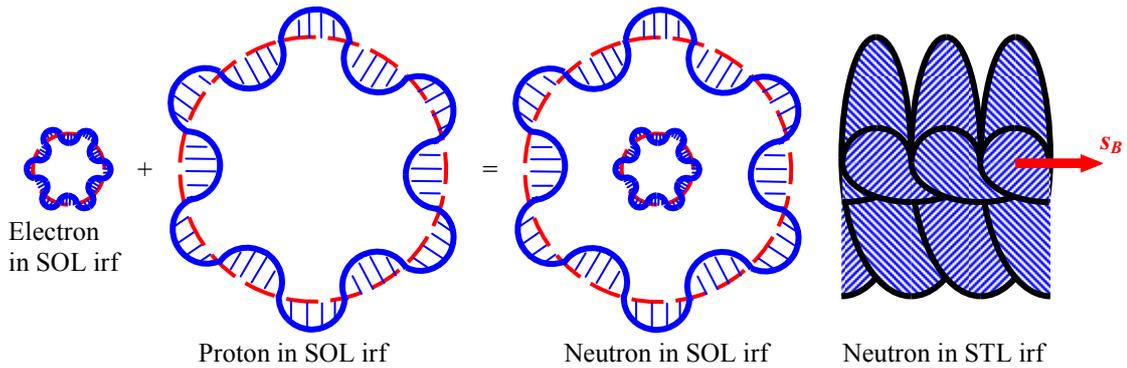
7.9   *In SOL irf, between neutron's rings protonic Ω_p and electronic Ω_{e^-} the radial ratio is 12,25.*

Expl. According to particles' classical description and by assuming the particles' radius to be equivalent with the radius of the generating waves by Prop. 5.11, the neutron composite structure is represented by the inner electronic stationary wave interacting with the protonic external one in order to annul the total electric field:

Exact proportions of neutron in SOL irf:
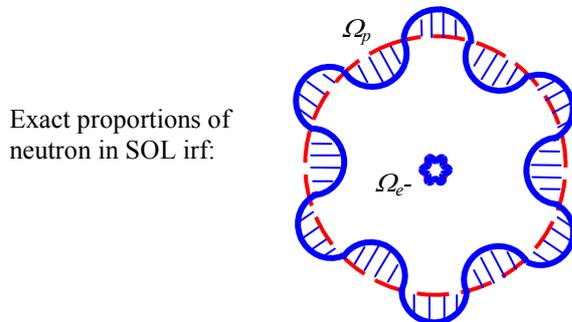
7.10 *The electromagnetic field could be the only material reality.*
Expl. If matter is *radiant energy*, *i.e. EM* linear field, and *mass*, *i.e. EM* helical field based on *AR*, everything but vacuum is however electromagnetic field. There are two alternatives:

7.10.1 *A unique electromagnetic field could be the only material reality.*
Expl. A unique photon moves in the universe, interacting only with itself but in moments that for observers at $v<c$ are different and therefore originated by apparently different entities. The *Lord's pencil* would be a unique *EM* field γ drawing the entire existing, with a continuous and *closed* stroke which seems *open* in the limited cosmic portion observed. Let us notice how the mass can not *stop* in such model, according to Prop. 5.4:
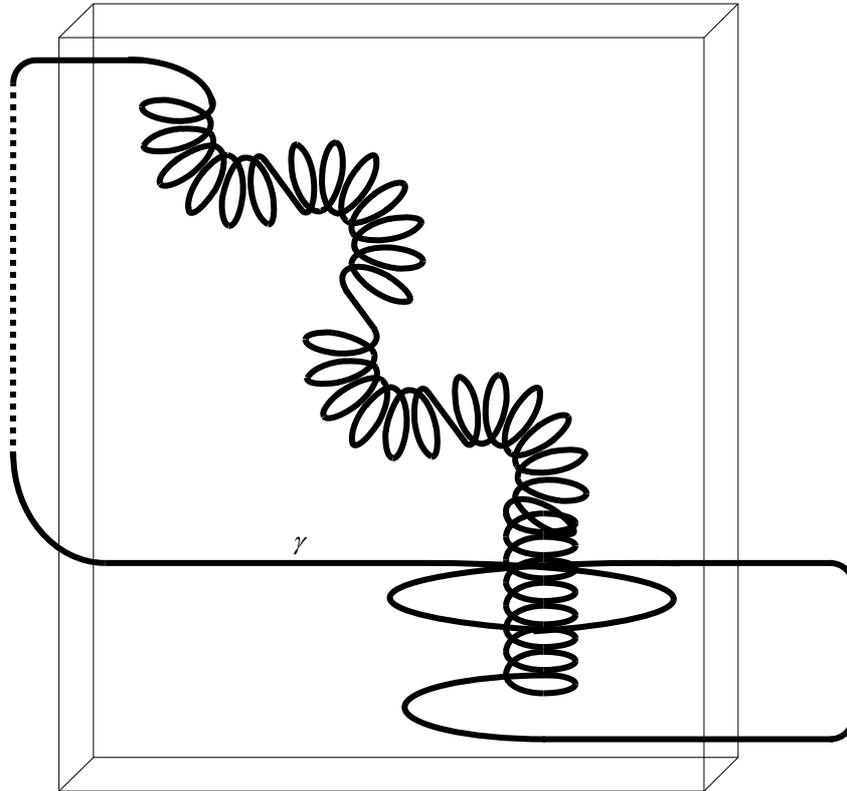
7.10.2 *More electromagnetic fields interacting by induction could be the only material reality.*
Expl. The interaction among different photons it is a still controversial topic. If it is possible, the *EM* fields can attract or repulse and they can create complex structures, by *induction*, similarly to the *domino effect*:
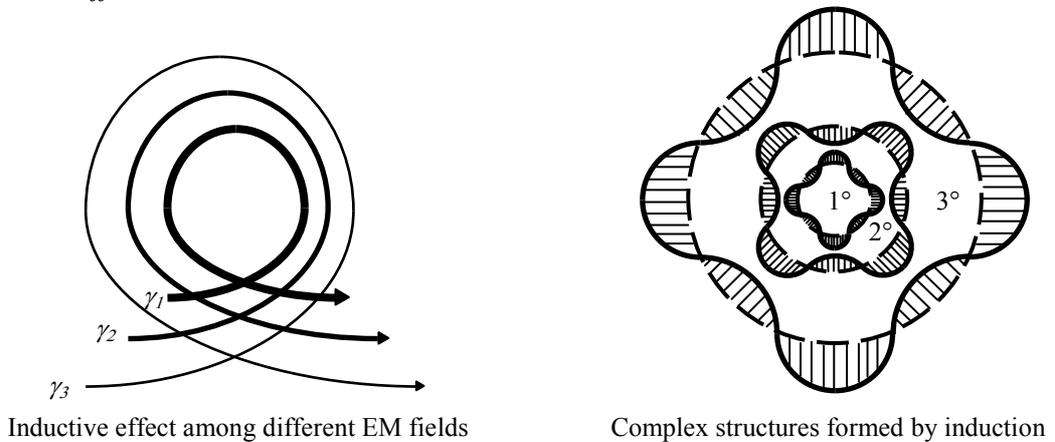
Inductive effect among different EM fields   Complex structures formed by induction

8   CONCLUSIONS

The *Absolute Relativity* contemplates the literal application of the Special Relativity principle, by which all the inertial reference frames they must be indistinguishable *to prescind* from their speed (*i.e.* included the limit case *v=c*) and independently from eventual paradoxical consequences. Therefore the interactions devoid of causality, generally permissible in *SOL irf* by the atemporal condition and specifically for the electromagnetic waves, must be found also in *STL irf*. That renders account of the acausal correlations already evidenced in Quantum Mechanics and makes possible the hypothesis that the radiant energy, closed to helix by autointeraction, generates electric or magnetic charge if it respective refolds along its own electric or magnetic ridge.

Supporting the effectiveness of such model, consistent with particles' spinorial description, there is the explanation of the stable masses' quantization, the charge conservation and its independence from the mass it is associate with, the neutrality of some particles, the essence of spin, the exchange mechanism between mass and radiant energy, the unreachability of both the speed *c* and the immobility for the mass and the absence of magnetic monopoles.

The Minimum Energy Principle favours only those structures that diminish the total energy and the electromagnetic helix fully respects it, by supplying an inner field inferior to the one on the lateral surface. You may notice like it clarifies an aspect never explored from the discovery of mass-energy equivalence: why radiation should be converted in an energetically *concentrated* structure like mass, and, the still most arduous one to believe, why some particles are *stable*.

According to the *covering* hypothesis, the helical model can be imagined recursive *ad infinitum* through discreet energy thresholds.

Assuming the double sign for the solutions of Maxwell equations, we get a coherent explanation of the ordinary matter's preponderance on antimatter that would grow along the temporal axis, while it should invert if going backwards in time.

In the conjecture, finally, than photons they can interact each other, it is plausible the existence of an *induction* that would lead more electromagnetic waves to behave in a similar way for mutual influence like *domino effect*.

The causality violation it allows a reformulation of Newton's third law of motion in order to contemplate the *reciprocity*. The principle consists in the possibility to substitute subject (cause) and direct object (effect) within a well-formulated proposition by keeping unchanged its effectiveness in terms of physical description. A first interesting consequence resides in a *double sense* interpretation of Einstein field equations $G_{\mu\nu}=kT_{\mu\nu}$, by which it is true both that a mass creates a curving space-time around it and, on the contrary, that a curving space-time creates mass inside. Furthermore, applied to space-time the *reciprocity* supports time's tridimensional essence and the necessity of a source tensor *6x6*.

The *AR* makes possible a unitary description of reality based on the single electromagnetic field in its twofold morphology *linear* at *v=c* and *helical* at *v<c*, but it opens also the perspective on currently unknown sceneries, where the matter is only the intermediate ring of a long, or even limitless, chain of successive helical evolutions by *FTL* fields of force.

To the probable objections that the proposed model is too much simplistic, not contemplating the possibility of interactions different from those electromagnetic or gravitational (*e.g. colour* forces), and that the 6d space-time has been too briefly described, one sends back to the paper *General Relativity Extension* (Academic Lecture by Cosmopolitan University, 2009). It demonstrates time's three-dimensionality through a diode-photodiode ideal experiment and proposes a new space-time's supersymmetry, so that the variety of the perceived interactions does not depend on numerous sources of field, but from the manifestation of the same energetic tensor *6x6* in an esadimensional frame. For the eventual accusation of having neglected the problem of the *neutrino*, not to have mentioned the *missing mass* or having taken for granted the *arrow of time*, it is remembered that such topics have been deepened in the paper *Special Relativity Extension* (Academic Lecture by Cosmopolitan University, 2009).

BIBLIOGRAPHY

Abraham, M., Becker, R., *Theorie der Elektrizität*, Leipzig, Berlin, B. G. Teubner, 1930

Adair, R.K., et al., "Search for Particles with Fractional Charge >~4/3e in Cosmic Rays," *Phys. Rev.* n. 20 (1968), p. 217

Afriat, A., *The Paradox of Einstein, Podolsky and Rosen in Atomic, Nuclear and Particle Physics*, Plenum, 1998

Aharonov, Y., et al., "Time Symmetry in the Quantum Process of Measurement," *Physical Review* n. 134B (1964), p. 1417

Bell, J.S., "On the Einstein-Podolsky-Rosen paradox," *Physics* 1 (1964), p. 195

Bennett, C.H., et al., "Teleporting an unknown quantum state via dual classical and EPR channels," *Phys. Rev.* n. 70 (1993), p. 1895

Bennett, C.L., "Precausal quantum mechanics," *Physical Review* A36 (1987), p. 4139

Bennett, C.L., "Evidence for microscopic causality violation," *PRA* n. 35 (1987), p. 2409

Bennett, C.L., "Further evidence for causality violation," *PRA* n. 35 (1987), p. 2420

Bilaniuk, O.M., Sudarshan, G., "Particle beyond the light barrier," *Physics Today* n. 22 (1969), p. 43

Bjorken, J.D., Drell, S.D., *Relativistic Quantum Mechanics*, McGraw Hill, 1965

Bonacci, E., *Special Relativity Extension*, Carta e Penna, 2006

Bonacci, E., *General Relativity Extension*, Carta e Penna, 2006

Bonacci, E., *Absolute Relativity*, Carta e Penna, 2006

Bonacci, E., "Einstein and Fermat according to Bonacci," *Blumagazine* n. 8 (2006), p. 54

Bonacci, E., "Extension of Einstein's Relativity," Pisa, *93rd IPS Congress* (2007), Atticon3691 I-C-1

Bonacci, E., "Extension of Einstein's Relativity," *Blumagazine Video* (2007), Pisa

Bonacci, E., "Absolute Relativity," *Blumagazine* n. 8 (2007), p. 52

Bonacci, E., *Extension of Einsten's Relativity*, Rome, Aracne n. 42, 2007

Bonacci, E., *Beyond Relativity*, Rome, Aracne n. 43, 2007

Bonacci, E., "Beyond Relativity," *Lectio Magistralis*, «L. Da Vinci» Terracina 2008, Auditorium

Bonacci, E., "Praeter Relativitatem," *Lectio Magna*, «G.B. Grassi» Latina 2008, Aula Magna

Bonacci, E., "Condensed matter properties in 6d," Rome, *Europhysics Conference Abstracts* Vol. 32F (2008), p. 74

Bonacci, E., "The Principle of Reciprocity in Physics," *Il Salotto degli Autori* n. 23 (2008), p. 18

Bonacci, E., "The meaning of Absolute Relativity," *Il Salotto degli Autori* n. 23 (2008), p. 24

Bonacci, E., "On the General Relativity Extension," *Salotto degli Autori* n. 24 (2008), p. 23

Cox, A.J., et al., "Search for 4/3e Charged Diquarks in the Cosmic Radiation at 2750-m Altitude," *Phys. Rev.* D6 (1972), p. 1211

D'Agostino, S., *L'elettromagnetismo classico*, Sansoni, 1975

De Broglie, L., "Ondes et Quanta," *Compt. Rend. Acad. Sci.* n. 177 (1923), p. 507

Critchley, R., "The Trace Anomaly: Results For Spinor Fields In Six-Dimensions," *J. Phys.* A11 (1978), p. 113

Critchley, R., "Trace Anomaly for Gravitons," *Phys. Rev.* D18 (1978), p. 1849

Dicke, R.H., "Interaction-free quantum measurements: a paradox?," *American Journal of Physics* n. 49 (1981), p. 925

Dirac P.A.M., "The Quantum Theory of Dispersion," *Proc. Roy. Soc.* A114 (1927), p. 243

Dirac P.A.M., "The Quantum Theory of the Electron," *Proc. Roy. Soc.* A117 (1928), p. 610; A118 (1928), p. 351

Dowker, J.S., "Single-loop divergences in six dimensions," *J. Phys.* A10 (1977), L63

Einstein, A., "Uber einen die Erzeugung und Verwandlung des Lichtes betreffenden heuristischen Gesichtspunkt," *Annalen Der Physik*, March 17 1905

Einstein, A., "Zur Elektrodynamik bewegter Körper," *Annalen Der Physik*, June 30 1905

Einstein, A., "Ist die Trägheit eines Körpers von seinem Energieinhalt abhängig?," *Annalen Der Physik*, Sept. 27 1905

Einstein, A., "Die Grundlage der allgemeinen Relativitätstheorie," *Annalen Der Physik* n. 49 (1916), p. 769

Einstein, A., *The Meaning of Relativity*, Methuen, 1951

Einstein, A., *Relativity*, Routledge Classics, 2001

Einstein, A., et al., *Can quantum-mechanical description of physical reality be considered complete?*, Princeton, 1983

Feynman, R.P., "The Theory of Positrons," *Physical Review* n. 76 (1949), p. 749

Feynman, R.P., Wheeler, J.A., "Interaction with the Absorber as the Mechanism of Radiation," Rev. Mod. Phys. n. 17 (1945), p. 157

Gold, T., "The Arrow of Time," *American Journal of Physics*, n. 30 (1962), p. 403

Haag, R., *Local Quantum Physics: Fields, Particles, Algebras*, Springer Verlag, 1992

Hanbury Brown, R., Twiss, R.Q., "Correlation between photons in 2 coherent beams of light," *Nature* n. 177 (1956), p. 27

Hawking, S.W., Penrose, R., *The Nature of Space and Time*, Princeton, 1996

Hestenes, D., "The Zitterbewegung Interpretation of Quantum Mechanics," *Foundation Physics* n. 20 (1990), p. 1213

Huang, K., "On the Zitterbewegung of the Dirac Electron," *American Journal of Physics* n. 20 (1952), p. 479

Jackson, J.D., *Classical Electrodynamics*, John Wiley & Sons, 1962

Kane, G., *Supersymmetry: Unveiling the Ultimate Laws of Nature,* Perseus Publishing, 2001

Kerr, R.P., "Gravitational Field of a Spinning Mass as an Example of Algebraically Special Metrics," *Ph. Rev.* L11 (1963), p. 237

Lawson, H.B., Michelson, M.L., *Spin Geometry*, Princeton, 1990

Lounesto, P., *Clifford Algebras and Spinors*, Cambridge, 2001

Majorana, E., "Teoria simmetrica dell'elettrone e del positrone," *Nuovo Cimento* n. 14 (1937), p. 171

Maxwell, J.C., *Treatise on Electricity and Magnetism*, Dover, 1954

Nielsen, M.A., Chuang, I.L., *Quantum Computation and Quantum Information*, Cambridge, 2000

Noether, E., "Invariante Variationsprobleme," *Nachr. v. d. Ges. d. Wiss. zu Göttingen* (1918), p. 235

Pauli, W., *Theory of Relativity*, Pergamon, 1958

Penrose, R., *The Road to Reality: A Complete Guide to the Laws of the Universe*, Alfred A. Knopf, 2005

Purcell, E., "The Question of Correlation Between Photons in Coherent Light Rays," *Nature* n. 178 (1956), p. 1449

Russell, H.N., "On Majorana's Theory of Gravitation," *Astrophysical Journal* n. 54 (1921), p. 334

Salam, A., "Gauge Unification of Fundamental Forces," *Review of Modern Physics* n. 52 (1980), p. 525

Schwarzschild, K., *Über das Gravitationsfeld eines Massenpunktes nach der Einsteinschen Theorie*, Sitz. K. Pr. Ak. Wiss, 1916

Schrödinger, E., *Space-Time Structure*, Cambridge, 1950

Schwinger, J., *Quantum Electrodynamics*, Dover, 1958

Sciama, D.W., *The Physical Foundation of General Relativity*, Heinemann, 1972

Selleri, F., *Paradossi e Realtà*, Laterza,1987

Sudarshan, G., Dhar, J., "Quantum Field Theory of Interacting Tachyons," *Phys. Rev.* n. 174 (1968), p. 1808

Von Neumann, J., *Mathematical Foundations of Quantum Mechanics*, Princeton, 1955

Zee, A., *Quantum Field Theory in a Nutshell*, Princeton, 2003

Zeh, H.D., "On the interpretation of measurement in quantum theory," *Found. Phys.* n. 1 (1970), p. 69

Zinn-Justin, J., *Quantum Field Theory and Critical Phenomena*, Oxford, 1996

Wheeler, J.A., Zurek, W.H., *Quantum Theory and Measurement*, Princeton, 1983

Wootters, W.K., Zurek, W.H., "A single quantum cannot be cloned," *Nature* n. 299 (1982), p. 802

WEBGRAPHY

Alkofer, R., Greensite, J., http://aps.arxiv.org/abs/hep-ph/0610365

Bars, I., http://arxiv.org/abs/hep-th/0606045v2

Bastianelli, F., et al., http://arxiv.org/PS_cache/hep-th/pdf/0001/0001041v2.pdf

Bastianelli, F., et al., http://arxiv.org/abs/hep-th/9911135

Bauer, W.D., http://arxiv.org/vc/physics/papers/0401/0401151v2.pdf

Bertolami, O., et al., http://arxiv.org/abs/gr-qc/0602016v2

Bertone, G., et al., http://aps.arxiv.org/abs/hep-ph/0404175

Bonacci, E., http://xoomer.alice.it/enzobonacci/index.html

Bonacci, E., http://atticon.sif.it/onlinepdf/atticon3691.pdf

Bonacci, E., http://it.dada.net/freeweb/enzobonacci/

Howe, P.S., http://arxiv.org/PS_cache/hep-th/pdf/0008/0008048v1.pdf

Intriligator, K., http://arxiv.org/PS_cache/hep-th/pdf/0001/0001205v2.pdf

Lunsford, D.R., http://doc.cern.ch//archive/electronic/other/ext/ext-2003-090.pdf

Manvelyan, R., Petkou, A.C., http://arxiv.org/PS_cache/hep-th/pdf/0003/0003017v4.pdf

Morgan, C.W., et al., http://aps.arxiv.org/abs/0707.0305v1

Nassif, C., et al., http://aps.arxiv.org/abs/0706.2553

Podkletnov, E., Modenese, G., http://aps.arxiv.org/abs/physics/0108005

Searl, J.R.R., http://searleffect.com/

Sokatchev, E., et al., http://arxiv.org/abs/hep-th/0107084

Sparling, G.A.J., http://arxiv.org/PS_cache/gr-qc/pdf/0610/0610068v1.pdf

Turler, M., et al., http://aps.arxiv.org/abs/astro-ph/0401275