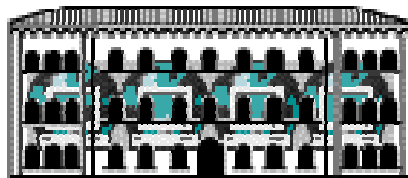




**Research paper by  
Dr. Enzo Bonacci  
about New Ideas on  
Theoretical Physics**

**Cosmopolitan  
University**



**Courses & Research**



**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* (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.

# New Ideas on Theoretical Physics

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# Special Relativity Extension

## 1 SYNTHESIS

The violation of CP symmetry matter-antimatter, the dark matter's presence in the Universe, the quantum time arrow and the nature of neutrinos explained by a new gauge theory based upon an extension of Lorentz equations in order to complete the Relativity.

## 2 INTRODUCTION

**Keywords:** transmass, cismass, nilmass, cismatter, cisantimatter, nilmatter, nilantimatter.

**Abstract:** Particle's time-interval  $\Delta t$ , its length  $\Delta x$  and its mass  $m$  are linked to their respective values at rest by Lorentz equations:  $\gamma = \Delta t / \Delta t_0 = \Delta x_0 / \Delta x = m / m_0$ .

The relativistic factor  $\gamma$  is linked to  $\beta = v/c$  so that it's impossible to get a time-contraction, a space-stretching and an energy decreasing below its own mass at rest, because condition  $\gamma < 1$  requires complex velocities.

Lorentz equations usually depend on term  $\beta$ , ratio between particle's velocity and speed of light, but we are allowed to choose as independent variable  $\alpha = m/m_0$ , ratio between particle's moving and rest mass.

Paper's main hypothesis is the existence of a particle's energy level, defined *cismass*, whose total energy absolute value is lower than mass at rest, where Lorentz equations intended as  $\alpha = m/m_0 = \Delta t / \Delta t_0 = \Delta x_0 / \Delta x$  are still valid, changing only the relationship between velocity and mass  $\beta = \beta(\alpha)$ .

*Transmass* defines the ordinary energy condition, i.e.  $|m| > |m_0|$ .

*Cismass* energy level is "Lorentz-invariant" because variations of  $\Delta x / \Delta x_0$  and  $\Delta t / \Delta t_0$  in function of  $\alpha$  are described by the same proportionality principles (respectively direct and inverse) without discontinuities in  $m_0$ .

Assuming conserved their corresponding *transparticles' charge* and *spin*, *cisparticles' mass* is  $|m| < |m_0|$ .

By *algebraic symmetry*, equation  $\beta^2 = 1 / (1 - \alpha^2)$  for *cismass* replaces the ordinary equation  $\beta^2 = 1 - (1/\alpha)^2$  for *transmass*, so completing the range of real velocities with the interval between  $v=c$  and  $v=\infty$  missing in Theory of Relativity.

Although described by real *mass*, *charge*, *spin* and *velocity*, *cisparticles* do not belong to our ordinary Universe, i.e. *STL (Slower Than Light)*, because are *tachyons*, i.e. *FTL (Faster Than Light)*.

As far as *kinetic energy* is concerned, while *transparticles' mass* grows to infinite when its *velocity* increases to unattainable limiting  $c$ , *cisparticles' velocity* grows to infinite when its *cismass* increases to unreachable  $m_0$ .

As *transmass* consists of *matter* and *antimatter*, analogously *cismass* is divided into *cismatter* and *cisantimatter*, whose own times pass respectively by the ordinary direction and its opposite.

For energies between  $-m_0c^2$  and  $+m_0c^2$  the unique particle belonging also to our Universe is the one at  $v=c$ , i.e. whose mass is  $m=0$ , although its rest mass is  $m_0 \neq 0$ .

This *nilmass* should conserve the *spin* of reference particle (usually  $\pm 1/2$ ) and its eventual *charge*, so that we may distinguish between *nilparticles* and *nilantiparticles*.

Null charged *nilmass* shows the same features of already known *neutrino* and *antineutrino*.

This theory is "gauge invariant" because admitted transformations *transmatter*  $\leftrightarrow$  *cisantimatter*, *transmatter*  $\leftrightarrow$  *nilantimatter*, *transantimatter*  $\leftrightarrow$  *cismatter* and *transantimatter*  $\leftrightarrow$  *nilmatter* are absolutely *reversible* exactly as *matter*  $\leftrightarrow$  *antimatter*.

The transformations *transmatter*  $\leftrightarrow$  *cismatter*, *transmatter*  $\leftrightarrow$  *nilmatter*, *transantimatter*  $\leftrightarrow$  *cisantimatter* and *transantimatter*  $\leftrightarrow$  *nilantimatter* are forbidden by *violation of spin*.

We get a coherent explanation of four big enigmas of contemporary physics:

- 1) the violation of CP symmetry matter-antimatter observed in the Universe;
- 2) the presence of gravitational inexplicable effects, nowadays ascribed to the so called *dark matter*;
- 3) the nature of *neutrinos* and *antineutrinos*;
- 4) the existence of a quantum time arrow.

The last one is measured at cosmic level by matter's percentage increasing compared to antimatter's; therefore it is not linked to macroscopic thermodynamic statistic, even if its direction coincides with entropy-arrow.

A possibility descending directly by the above theory is the *teleportation* of matter and antimatter as photons.

Some practical applications are the following:

- 1) generators of *nilparticles' and cisparticles' beams*;
- 2) engines by *gravitational attraction* using nilparticles' beam;
- 3) *neutralizers of nilmatter and cismatter* into radiant energy.

Hence cismass is an alternative energy source more efficient and less polluting than any else ever found.

The propulsion system must however be revolutionized with motion in the same direction of expelled nilparticles' beam which creates a space-time deformation dragging the aircraft forwards.

Engines by *tachyons' propulsion* using *cisparticles' beams* are subordinated to a *conjectured* conservation of movement quantity also for mixed *transmass-cismass* systems.

In this case the propelling system would be the classic one, *i.e.* aircraft moving in direction opposite to beam's with the same movement quantity of expelled cisparticles.

Cismass would be an unlimited source of energy rather easy to use, because even *a single* cisparticle could push any mass at any velocity, so that we might conclude: "*give me a positron and I will move the Earth*".

### 3 DEFINITIONS

- 3.1 Let  $\Delta t_0$  be the time-interval at rest, *i.e.* measured when not moving.
- 3.2 Let  $\Delta t$  be the time-interval measured in movement, *i.e.* at velocity  $v$ .
- 3.3 Let  $\Delta x_0$  be the space-interval at rest, *i.e.* measured when not moving.
- 3.4 Let  $\Delta x$  be the space-interval measured in movement's direction, *i.e.* at velocity  $v$ .
- 3.5 Let  $m_0$  be the mass at rest, *i.e.* measured when not moving.
- 3.6 Let  $m$  be the total mass, *i.e.* measured at velocity  $v$ .
- 3.7 Let  $c$  be the speed of light in vacuo.
- 3.8 Denote  $\beta=v/c$  the ratio between particle's velocity and speed of light.
- 3.9 Denote  $\alpha=m/m_0$  the ratio between particle's moving and rest mass.
- 3.10 Let  $\alpha=1$  be the *rest* condition:  $m=m_0$ .
- 3.11 Let  $|\alpha|>1$  be the *transmass* condition:  $|m|>|m_0|$ .
- 3.12 Let  $0<|\alpha|<1$  be the *cismass* condition:  $|m|<|m_0|$ .
- 3.13 Let  $\alpha=0$  be the *nilmass* condition:  $m=0, m_0\neq 0$ .
- 3.14 Denote *matter* the state of *transmass* with total *positive* mass:  $m>m_0>0$ .
- 3.15 Denote  $a$  the generic *transparticle*, with charge  $C$  and spin  $\pm\frac{1}{2}$ .
- 3.16 Denote *antimatter* the state of *transmass* with total *negative* mass:  $m<-m_0<0$ .
- 3.17 Denote  $\bar{a}$  the generic *transantiparticle*, with charge  $-C$  and spin  $\pm\frac{1}{2}$ .
- 3.18 Denote *cismatter* the state of *cismass* with total *positive* mass:  $0<m<m_0$ .
- 3.19 Denote  $\bar{a}$  the generic *cisparticle*, with charge  $C$  and spin  $\pm\frac{1}{2}$ .
- 3.20 Denote *cisantimatter* the state of *cismass* with total *negative* mass:  $-m_0<m<0$ .
- 3.21 Denote  $\bar{a}$  the generic *cisantiparticle*, with charge  $-C$  and spin  $\pm\frac{1}{2}$ .
- 3.22 Denote *nilmatter* the state of *nilmass* with *positive* rest mass:  $m=0^+, m_0>0$ .
- 3.23 Denote  $\check{a}$  the generic *nilparticle*, with charge  $C$  and spin  $\pm\frac{1}{2}$ .
- 3.24 Denote *nilantimatter* the state of *nilmass* with *negative* rest mass:  $m=0^-, m_0<0$ .
- 3.25 Denote  $\hat{a}$  the generic *nilantiparticle*, with charge  $-C$  and spin  $\pm\frac{1}{2}$ .
- 3.26 Let *tachyon* be any particle faster than light:  $v>c$ .
- 3.27 Let *STL* be the acronym for *Slower Than Light*:  $v<c$ .
- 3.28 Let *FTL* be the acronym for *Faster Than Light*:  $v>c$ .
- 3.29 Let *SP* be the acronym for *Super Partes* compared to *STL* and *FTL*.

#### 4 PROPOSITIONS

4.1  $|\alpha| > 1 \Rightarrow \alpha = \gamma$ .

*Explanation.* Comparing relativistic mass equation  $m = \gamma m_0$  to Def. 3.9  $m = \alpha m_0$  we have  $\gamma = \alpha$ .

4.2  $|\alpha| > 1 \Rightarrow \beta^2 = 1 - (1/\alpha)^2$ .

*Expl.* According to Proposition 4.1, by isolating  $\beta$ .

4.3  $|\alpha| > 1 \Rightarrow v = c \cdot [1 - (m_0/m)^2]^{1/2}$ .

*Expl.* By Definitions 3.8 and 3.9 and according to Proposition 4.2.

4.4  $|\alpha| > 1 \Rightarrow \alpha = \Delta t / \Delta t_0 = \Delta x_0 / \Delta x$ .

*Expl.* By Prop. 4.1 and according to Lorentz equations:  $\gamma = \Delta t / \Delta t_0 = \Delta x_0 / \Delta x = m / m_0$ .

4.5 ***The possible particles energy states are: rest, transmass, cismass, nilmass.***

*Expl.* Definitions 3.10, 3.11, 3.12 e 3.13 regard all possible values of  $\alpha$ .

4.6 ***Transmass shows a space-contraction and a time-stretching compared to rest condition.***

*Expl.* By Defs. 3.9 and 3.11 and according to Prop. 4.4:  $\Delta x < \Delta x_0$ ,  $\Delta t > \Delta t_0$ .

## 5 HYPOTHESES

5.1  $|\alpha| < 1 \Rightarrow \beta^2 = 1/(1-\alpha^2)$ .

*Explanation.* Extension of Lorentz equations justified, in general, by:

- 1) recovery of velocities' range between  $v=c$  and  $v=\infty$  excluded by Relativity.
- 2) heuristic value of consequent theory, providing an organic explanation of some cosmic enigmas.

and specifically by:

- 3) algebraic symmetry, after substituting  $\beta$  by  $\alpha$  in Prop. 4.1:  $\beta^2 = 1 - (1/\alpha)^2$ .
- 4) geometric symmetry respect to bisecting line  $\beta = \alpha$  in diagram  $\beta = \beta(\alpha)$ .

5.2  $|\alpha| < 1 \Rightarrow v = c/[1 - (m/m_0)^2]^{1/2}$ .

*Expl.* By Definitions 3.8 and 3.9 and according to Hypothesis 5.1.

5.3  $|\alpha| < 1 \Rightarrow \alpha = \Delta t / \Delta t_0 = \Delta x_0 / \Delta x$ .

*Expl.* Extension of Lorentz equations, no more depending on relativistic factor  $\gamma$ , i.e. to velocity:

$$\gamma = \Delta t / \Delta t_0 = \Delta x_0 / \Delta x = m / m_0;$$

but in function of  $\alpha$ , i.e. linked directly to particles' mass:

$$\Delta t / \Delta t_0 = \Delta x_0 / \Delta x = m / m_0 = \alpha.$$

5.4 ***Cismass shows a space-stretching and a time-contraction compared to rest condition.***

*Expl.* By Definition 3.12 and according to Hypothesis 5.3:  $\Delta x > \Delta x_0$ ,  $\Delta t < \Delta t_0$ .

5.5 ***The conservation of spin, charge, and energy-momentum is valid to SP observers as well.***

*Expl.* Extension of conservation principles valid to STL observers.

5.6 ***The quantum energy  $E = h\nu$  is valid to SP observers as well.***

*Expl.* Extension of quantum energy brought by photons valid to STL observers.

5.7 ***Cisparticles have the same spin and charge of the corresponding particles.***

*Expl.* Extension of conservation principles valid to STL observers.

5.8 ***Nilparticles have the same spin and charge of the corresponding particles.***

*Expl.* Extension of conservation principles valid to STL observers.

5.9 ***Cisantiparticles have the same spin and charge of the corresponding antiparticles.***

*Expl.* Extension of conservation principles valid to STL observers.

5.10 ***Nilantiparticles have the same spin and charge of the corresponding antiparticles.***

*Expl.* Extension of conservation principles valid to STL observers.

5.11 ***Cisparticles and cisantiparticles are tachyons.***

*Expl.* Cismass is faster than light.

5.12 ***Nilparticles and nilantiparticles are noticeable to any STL, FTL and SP observer.***

*Expl.* Nilmass goes at speed of light.

5.13 ***Transformation transmatter  $\leftrightarrow$  cisantimatter is gauge-invariant.***

*Expl.* Extension of gauge-invariant transformation:  $matter \leftrightarrow antimatter$ .

5.14 ***Transformation transmatter  $\leftrightarrow$  nilantimatter is gauge-invariant.***

*Expl.* Extension of gauge-invariant transformation:  $matter \leftrightarrow antimatter$ .

5.15 ***Transformation transantimatter  $\leftrightarrow$  cismatter is gauge-invariant.***

*Expl.* Extension of gauge-invariant transformation:  $matter \leftrightarrow antimatter$ .

5.16 ***Transformation transantimatter  $\leftrightarrow$  nilmatter is gauge-invariant.***

*Expl.* Extension of gauge-invariant transformation:  $matter \leftrightarrow antimatter$ .

## 6 THESES

### 6.1 ***Transformation matter → cismatter is impossible.***

*Expl.* This transformation violates spin conservation to SP observers.

SP observed impossible transformation of particle into cisparticle:

$a \neq \gamma + \tilde{a}$  (Charge conserved:  $C=0+C$ ; Spin violated:  $\frac{1}{2} \neq 1 + \frac{1}{2}$ ),

is FTL observed as impossible creation from nothing of cisparticle-photon pair.

### 6.2 ***Transformation cismatter → matter is impossible.***

*Expl.* This transformation violates spin conservation to SP observers.

SP observed impossible transformation of cisparticle into particle:

$\gamma + \tilde{a} \neq a$  (Charge conserved:  $0+C=0$ ; Spin violated:  $1 + \frac{1}{2} \neq \frac{1}{2}$ ),

is FTL observed as impossible disappearance to nothingness of cisparticle-photon pair.

### 6.3 ***Transformation matter → nilmatter is impossible.***

*Expl.* This transformation violates spin conservation to SP observers.

SP and STL observed impossible annihilation of pair particle-nilparticle into photon:

$a \neq \gamma + \tilde{a}$  (Charge conserved:  $-C=0-C$ ; Spin violated:  $\frac{1}{2} \neq 1 + \frac{1}{2}$ ),

is FTL observed as impossible creation from nothing of nilparticle-photon pair.

### 6.4 ***Transformation nilmatter → matter is impossible.***

*Expl.* This transformation violates spin conservation to SP observers.

SP and STL observed impossible transformation of nilparticle into particle:

$\gamma + \tilde{a} \neq a$  (Charge conserved:  $0-C=-C$ ; Spin violated:  $1 + \frac{1}{2} \neq \frac{1}{2}$ ),

is FTL observed as impossible disappearance to nothingness of photon-nilparticle pair.

### 6.5 ***Transformation cismatter → nilmatter is impossible.***

*Expl.* This transformation violates spin conservation to SP observers.

SP and FTL observed impossible transformation of cisparticle into nilparticle:

$\tilde{a} \neq \gamma + \tilde{a}$  (Charge conserved:  $-C=0-C$ ; Spin violated:  $\frac{1}{2} \neq 1 + \frac{1}{2}$ ),

is STL observed as impossible creation from nothing of nilparticle-photon pair.

### 6.6 ***Transformation nilmatter → cismatter is impossible.***

*Expl.* This transformation violates spin conservation to SP observers.

SP and FTL observed impossible transformation of nilparticle into cisparticle:

$\gamma + \tilde{a} \neq \tilde{a}$  (Charge conserved:  $0=C-C$ ; Spin violated:  $1 + \frac{1}{2} \neq \frac{1}{2}$ ),

is STL observed as impossible disappearance to nothingness of photon-nilparticle pair.

### 6.7 ***Transformation antimatter → cisantimatter is impossible.***

*Expl.* This transformation violates spin conservation to SP observers.

SP observed impossible transformation of antiparticle into cisantiparticle:

$\tilde{a} \neq \gamma + \tilde{a}$  (Charge conserved:  $-C=0-C$ ; Spin violated:  $\frac{1}{2} \neq 1 + \frac{1}{2}$ ),

is FTL observed as impossible creation from nothing of photon-cisantiparticle pair.

### 6.8 ***Transformation cisantimatter → antimatter is impossible.***

*Expl.* This transformation violates spin conservation to SP observers.

SP observed impossible transformation of cisantiparticle into antiparticle:

$\gamma + \tilde{a} \neq \tilde{a}$  (Charge conserved:  $0-C=-C$ ; Spin violated:  $1 + \frac{1}{2} \neq \frac{1}{2}$ ),

is FTL observed as impossible disappearance to nothingness of cisantiparticle-photon pair.

### 6.9 ***Transformation antimatter → nilantimatter is impossible.***

*Expl.* This transformation violates spin conservation to SP observers.

SP and STL observed impossible transformation of antiparticle into nilantiparticle:

$\tilde{a} \neq \gamma + \tilde{a}$  (Charge conserved:  $C=0+C$ ; Spin violated:  $\frac{1}{2} \neq 1 + \frac{1}{2}$ ),

is FTL observed as impossible creation from nothing of nilantiparticle-photon pair.

- 6.10 Transformation nilantimatter  $\rightarrow$  antimatter is impossible.**  
*Expl.* This transformation violates spin conservation to SP observers.  
 SP and STL observed impossible transformation of nilantiparticle into antiparticle:  
 $\gamma + \hat{a} \neq \bar{a}$  (Charge conserved:  $0 + C = C$ ; Spin violated:  $1 + \frac{1}{2} \neq \frac{1}{2}$ ),  
 is FTL observed as impossible transformation of photon into nilantiparticle.
- 6.11 Transformation nilantimatter  $\rightarrow$  cisantimatter is impossible.**  
*Expl.* This transformation violates spin conservation to SP observers.  
 SP and FTL observed impossible transformation of nilantiparticle into cisantiparticle:  
 $\gamma + \hat{a} \neq \bar{a}$  (Charge conserved:  $0 + C = C$ ; Spin violated:  $1 + \frac{1}{2} \neq \frac{1}{2}$ ),  
 is STL observed as impossible disappearance to nothingness of photon-nilantiparticle pair.
- 6.12 Transformation cisantimatter  $\rightarrow$  nilantimatter is impossible.**  
*Expl.* This transformation violates spin conservation to SP observers.  
 SP and FTL observed impossible transformation of cisantiparticle into nilantiparticle:  
 $\bar{a} + \gamma \neq \hat{a}$  (Charge conserved:  $C - C = 0$ ; Spin violated:  $\frac{1}{2} + 1 \neq \frac{1}{2}$ ),  
 is STL observed as impossible creation from nothing of nilantiparticle-photon pair.
- 6.13 CP symmetry is violated in favour of: matter, cisantimatter and nilantimatter.**  
*Expl.* SP observed transformations into matter, cisantimatter e nilantimatter are energetically favourite.  
 In fact in transformation of antiparticle-cisparticle pair into particle-cisantiparticle's:  
 $\bar{a} + \bar{a} \rightarrow a + \bar{a}$ , the minimum photon  $\gamma_{\min}$  necessary to come out of cismass depends on cisparticle's energy, between  $-m_0c^2$  and  $+m_0c^2$ , i.e. the energy minimum value sufficient for any transition cismass  $\rightarrow$  transmass is:  $E_{\min} = 2m_0c^2$ .  
 Similarly in transformation of antiparticle-nilparticle pair into particle-nilantiparticle's:  
 $\bar{a} + \bar{a} \rightarrow a + \hat{a}$ , the minimum photon  $\gamma_{\min}$  necessary to come out of nilmass is:  $\pm m_0c^2$ , i.e. the energy minimum value sufficient for any transition nilmass  $\rightarrow$  transmass is:  $E_{\min} = m_0c^2$ .  
 On the opposite, in transformation of particle-cisantiparticle pair into antiparticle-cisparticle:  
 $a + \bar{a} \rightarrow \bar{a} + \bar{a}$ , the minimum photon  $\gamma_{\min}$  necessary to become cismass depends on particle's energy, between  $\pm m_0c^2$  and  $\pm\infty$ , i.e. there is not an energy minimum value sufficient for any transition transmass  $\rightarrow$  cismass.  
 Analogously, in transformation of particle-nilantiparticle's pair into antiparticle-nilparticle's:  
 $a + \hat{a} \rightarrow \bar{a} + \bar{a}$ , the minimum photon  $\gamma_{\min}$  necessary to become nilparticle depends on particle's energy, between  $\pm m_0c^2$  and  $\pm\infty$ , i.e. there is not an energy minimum value sufficient for any transition transmass  $\rightarrow$  nilmass.
- 6.14 There is a quantum time-arrow whose direction coincides with entropy-arrow.**  
*Expl.* By Thesis 6.13, the time direction marked by violation of symmetry CP in favour of matter coincides with the macroscopically observed entropy-arrow, although it has totally a different explanation. The matter's percentage increasing (compared to the antimatter's) provides an irreversible cosmic measurement of time.
- 6.15 It's conceptually possible the teleportation of matter as radiant energy.**  
*Expl.* SP and STL observed teleportation of particle:  $a + \hat{a} \rightarrow \gamma \rightarrow a + \hat{a}$ ,  
 is FTL observed as transformation nilantiparticle  $\leftrightarrow$  photon.
- 6.16 It's conceptually possible the teleportation of antimatter as radiant energy.**  
*Expl.* SP and STL observed teleportation of antiparticle:  $\bar{a} + \bar{a} \rightarrow \gamma \rightarrow \bar{a} + \bar{a}$ ,  
 is FTL observed as transformation nilparticle  $\leftrightarrow$  photon.
- 6.17 It's conceptually possible the teleportation of cismatter as radiant energy.**  
*Expl.* SP and STL observed teleportation of cisparticle:  $\bar{a} + \hat{a} \rightarrow \gamma \rightarrow \bar{a} + \hat{a}$ ,  
 is STL observed as transformation nilantiparticle  $\leftrightarrow$  photon.

**6.18** *It's conceptually possible the teleportation of cisantimatter as radiant energy.*

*Expl.* The teleportation of cisantiparticle to observers SP and FTL:  $\tilde{a} + \tilde{a} \rightarrow \gamma \rightarrow \tilde{a} + \tilde{a}$ ,  
is STL observed as transformation nilparticle  $\leftrightarrow$  photon.

**6.19** *There are STL observed apparent violations of charge, spin and mass-energy conservation.*

*Expl.* SP and FTL observed annihilation of pair cisparticle-cisantiparticle into photon:

$\tilde{a} + \tilde{a} = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $1/2 + 1/2 = 1$ ),  
is STL observed as creation from nothing of photon.

SP and FTL observed transformation of photon into cisparticle-cisantiparticle pair:

$\gamma = \tilde{a} + \tilde{a}$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = 1/2 + 1/2$ ),  
is STL observed as disappearance to nothingness of photon.

SP observed annihilation of cisparticle-antiparticle pair into photon:

$\bar{a} + \tilde{a} = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $1/2 + 1/2 = 1$ ),  
is STL observed as transformation of antiparticle into photon.

SP observed transformation of photon into cisantiparticle-particle pair:

$\gamma = \tilde{a} + a$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = 1/2 + 1/2$ ),  
is STL observed as transformation of photon into particle.

SP observed annihilation of particle-cisantiparticle pair into photon:

$\tilde{a} + a = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $1/2 + 1/2 = 1$ ),  
is STL observed as transformation of particle into photon.

SP observed transformation of photon into antiparticle-cisparticle pair:

$\gamma = \bar{a} + \tilde{a}$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = 1/2 + 1/2$ ),  
is STL observed as transformation of photon into antiparticle.

SP and FTL observed annihilation of cisparticle-nilantiparticle pair into photon:

$\tilde{a} + \hat{a} = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $1/2 + 1/2 = 1$ ),  
is STL observed as transformation of nilantiparticle into photon.

SP and FTL observed transformation of photon into cisantiparticle-nilparticle pair:

$\gamma = \tilde{a} + \hat{a}$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = 1/2 + 1/2$ ),  
is STL observed as transformation of photon into nilparticle.

SP and FTL observed transformation of photon into cisparticle-nilantiparticle pair:

$\gamma = \tilde{a} + \hat{a}$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = 1/2 + 1/2$ ),  
is STL observed as transformation of photon into nilantiparticle.

SP and FTL observed annihilation of cisantiparticle-nilparticle pair into photon:

$\tilde{a} + \hat{a} = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $1/2 + 1/2 = 1$ ),  
is STL observed as transformation of nilparticle into photon.

**6.20** *There are FTL observed apparent violations of charge, spin and mass-energy conservation.*

*Expl.* SP and STL observed annihilation of particle-antiparticle pair into photon:

$a + \bar{a} = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $1/2 + 1/2 = 1$ ),  
is FTL observed as creation from nothing of photon.

SP and STL observed transformation of photon into particle-antiparticle pair:

$\gamma = \bar{a} + a$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = 1/2 + 1/2$ ),  
is FTL observed as disappearance to nothingness of photon.

SP observed annihilation of cisparticle-antiparticle pair into photon:

$\bar{a} + \tilde{a} = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $1/2 + 1/2 = 1$ ),  
is FTL observed as transformation of cisparticle into photon.

SP observed transformation of photon into cisantiparticle-particle pair:

$\gamma = \tilde{a} + a$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = 1/2 + 1/2$ ),  
is FTL observed as transformation of photon into cisantiparticle.

SP observed annihilation of particle-cisantiparticle pair into photon:

$\tilde{a} + a = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $1/2 + 1/2 = 1$ ),  
is FTL observed as transformation of cisantiparticle into photon.

SP observed transformation of photon into antiparticle-cisparticle pair:

$\gamma = \bar{a} + \tilde{a}$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = 1/2 + 1/2$ ),  
is FTL observed as transformation of photon into cisparticle.

SP and STL observed annihilation of particle-nilantiparticle pair into photon:

$a+\hat{a}=\gamma$  (Charge conserved:  $C-C=0$ ; Spin conserved:  $1/2+1/2=1$ ),

is FTL observed as transformation of nilantiparticle into photon.

SP and STL observed transformation of photon into antiparticle-nilparticle pair:

$\gamma=\bar{a}+\hat{a}$  (Charge conserved:  $0=C-C$ ; Spin conserved:  $1=1/2+1/2$ ),

is FTL observed as transformation of photon into nilparticle.

SP and STL observed transformation of photon into particle-nilantiparticle pair:

$\gamma=a+\hat{a}$  (Charge conserved:  $0=C-C$ ; Spin conserved:  $1=1/2+1/2$ ),

is FTL observed as transformation of photon into nilantiparticle.

SP and STL observed annihilation of antiparticle-nilparticle pair into photon:

$\bar{a}+\hat{a}=\gamma$  (Charge conserved:  $C-C=0$ ; Spin conserved:  $1/2+1/2=1$ ),

is FTL observed as transformation of nilparticle into photon.

**6.21 Nilmass has the same features of the so called dark matter.**

*Expl.* It has gravitational and electromagnetic effects inexplicable by nowadays knowledge.

**6.22 Neutral nilparticles have the same features of neutrinos.**

*Expl.* Their null charge and mass, Fermion's spin and light's velocity are identical to neutrinos'.

**6.23 Neutral nilantiparticles have the same features of antineutrinos.**

*Expl.* Their null charge, null mass, Fermion's spin and light's velocity are identical to antineutrinos'.

## 7 CONJECTURES

**7.1 In isolated systems the transformation transmass $\leftrightarrow$ cismass conserves the movement quantity.**

*Explanation.* Extension of the conservation principle valid to STL observers.

**7.2 Cismass is an energy source potentially unlimited.**

*Expl.* Consequence of conjecture 7.1. The more its mass grows close, however lower, to the particle at rest, the more the cisparticle increases its velocity, until infinite. Hence by expelling a cisparticle in an isolated system, by the movement quantity conservation the product between its mass, tiny but not zero, and its velocity, adjustable at pleasure in the range between  $c$  and  $\infty$ , we get a counter-propulsion for the left system. This propulsion is potentially *unlimited*, *i.e.* a single expelled cisparticle could move any mass at any velocity.

## 8 PRACTICAL APPLICATIONS

### 8.1 Generator of nilparticles' beams.

*Expl.* Denote:  $h$ =Plank's constant,  $n$ =antiparticles' number,  $\langle m \rangle$ =average mass,  $\nu$ =laser ray's frequency. Nilmatter's generation requires the antiparticles' beam to collide with a laser ray whose frequency is:

$$\nu_{\text{nilmatter}} = n_{\text{antiparticles}} * (m_{\text{nilparticle}} - \langle m_{\text{antiparticle}} \rangle) * c^2 / h = n_{\text{antiparticles}} * |\langle m_{\text{antiparticle}} \rangle| * c^2 / h.$$

### 8.2 Generator of cisparticles' beams.

*Expl.* Denote:  $h$ =Plank's constant,  $n$ =antiparticles' number,  $\langle m \rangle$ =average mass,  $\nu$ =laser ray's frequency. Cismatter's generation requires the antiparticles' beam to be collided with a laser ray whose frequency is:

$$\nu_{\text{cismatter}} = n_{\text{antiparticles}} * (\langle m_{\text{cisparticle}} \rangle - \langle m_{\text{antiparticle}} \rangle) * c^2 / h.$$

### 8.3 Aircraft by gravitational attraction.

*Expl.* It uses generators of nilmatter. By concentrating some nilparticles' beams in the same place a temporary bubble of nilmatter forms, attracting the aircraft towards it.

Hence the aircraft runs after a space-time's deformation created by itself, exactly as due to a huge close mass whose extent is adjusted at pleasure according to beams' consistencies. By orientating beams the velocity's direction is governed as well.

### 8.4 Aircraft by tachyonic propulsion.

*Expl.* It uses generators of cismatter. By assuming Conjectures 7.1 e 7.2, i.e. the conservation of movement quantity for a SP oberver, the speed of aircraft  $v$  is linked to the aircraft's mass  $M$ , the cismass  $m$  of expelled beam, the beam's speed  $w$ , by equation:

$$v = mw / (M - m).$$

A single expelled particle's velocity  $w$  is linked to its mass by equation:

$$w = c / [1 - (m/m_0)^2]^{1/2};$$

therefore, considering for beam's cisparticles an average mass  $\langle m \rangle$  and velocity  $\langle w \rangle$ , for the aircraft we have:

$$\langle v \rangle = \langle m \rangle * c / \{ (M - \langle m \rangle) * [1 - (\langle m \rangle / m_0)^2]^{1/2} \}.$$

Since  $m \ll M$ , cismass must have a velocity  $w \gg v$ , i.e. the cisparticles' mass should get close to the particles'  $m_0$  at rest.

It requires a laser ray of frequency:

$$\nu \cong n_{\text{antiparticles}} * (m_0 - \langle m_{\text{antiparticle}} \rangle) * c^2 / h.$$

For example a *positron*, to whom has been given enough energy to increase its mass almost at  $m_e$ , becomes a very fast cispositron whose movement quantity is potentially unlimited and once expelled from an aircraft, could push it backwards. In this case the laser ray frequency is:

$$\nu \cong (m_e - m_{\text{positron}}) * c^2 / h.$$

The technical difficulty lays in calibrating the energy of colliding photon at right value, neither becoming a slow cisparticle, whose movement quantity is useless in the balance of our isolated system nor trespassing the transmatter's border becoming an ordinary electron.

### 8.5 Neutralizator of nilmatter.

*Expl.* It uses generators of antimatter. An antiparticles' beam collides with a nilparticles's one according to the conversion into photons:  $\bar{a} + \tilde{a} \rightarrow \gamma$ .

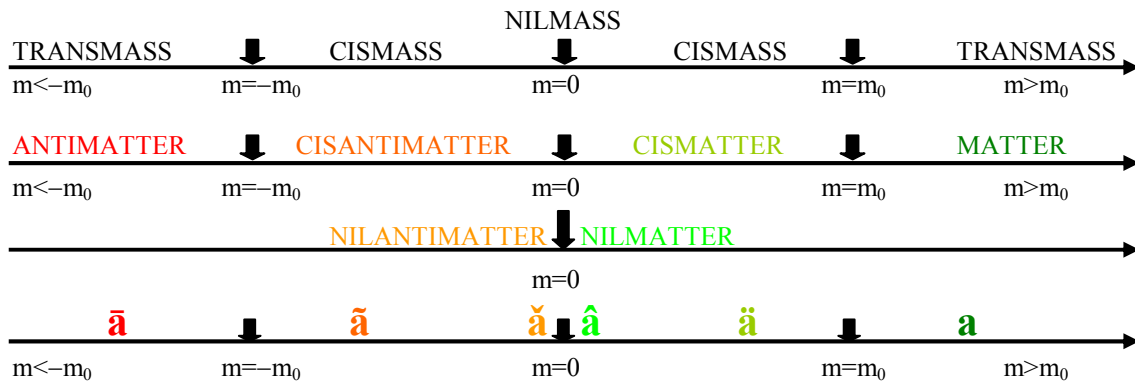
### 8.6 Neutralizator of cismatter.

*Expl.* It uses generators of antimatter. An antiparticles' beam collides with a cisparticles's one according to the conversion into photons:  $\bar{a} + \tilde{a} \rightarrow \gamma$ .

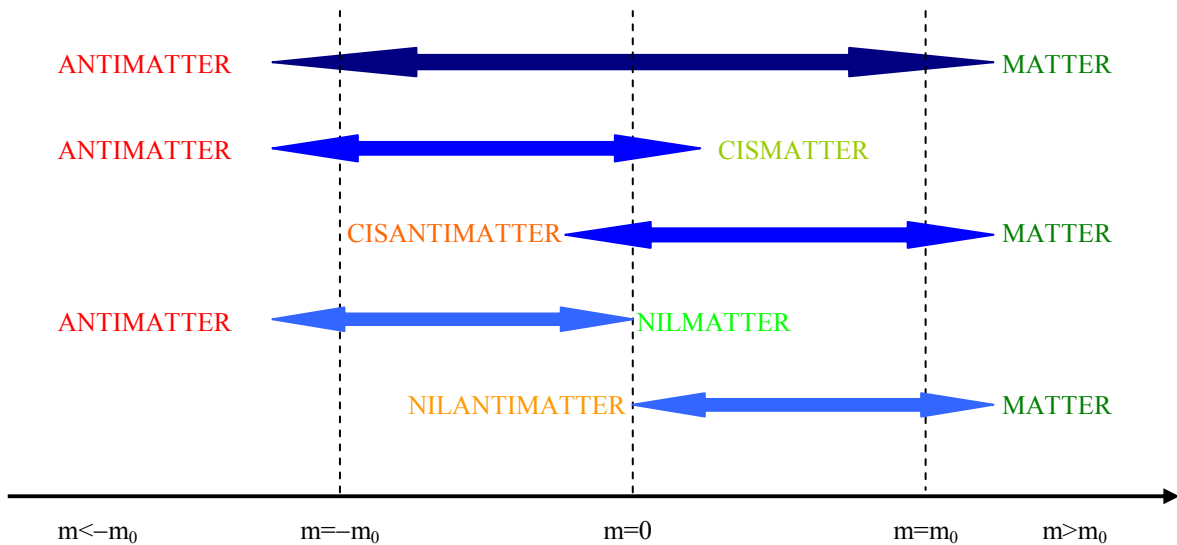
## 9 DIAGRAMS

### 9.1 Classification of particles based upon energy levels.

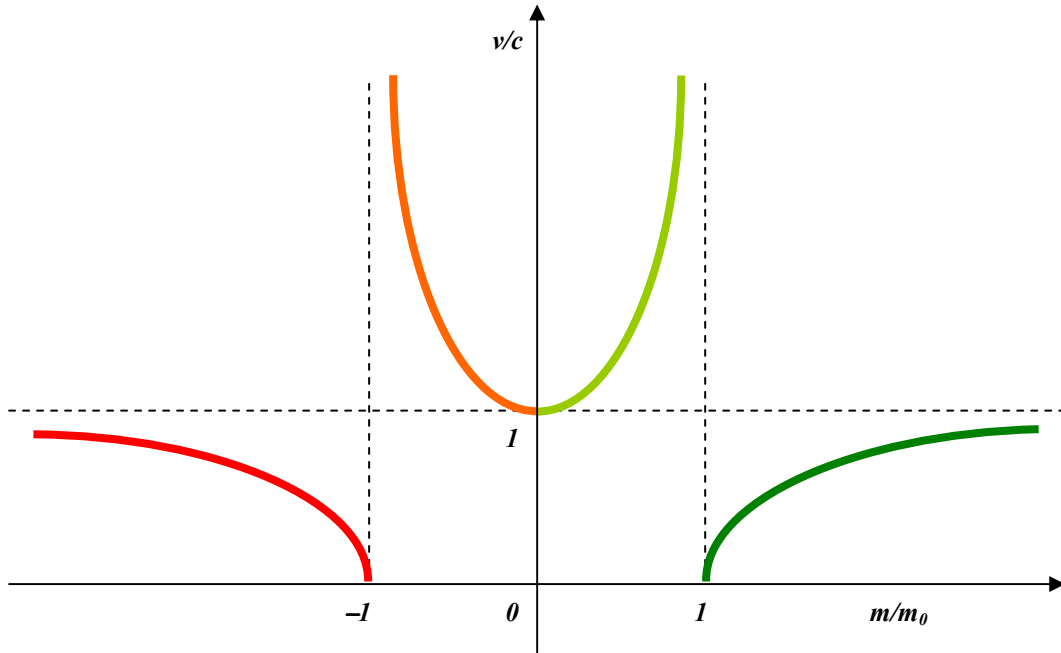
Description	Particle	Mass at rest	Moving mass	Length	Time	Velocity	Spin
RADIANT ENERGY	Photon	$m_0=0$	$m=E/c^2 \neq 0$	$\Delta x=0$	$\Delta t=\infty$	$v=c$	1
TRANSMASS	Matter	$m_0>0$	$m>m_0$	$0<\Delta x<\Delta x_0$	$\Delta t_0<\Delta t$	$v<c$	$\pm\frac{1}{2}$
	Antimatter	$m_0<0$	$m<m_0$	$-\Delta x_0<\Delta x<0$	$\Delta t<-\Delta t_0$	$v<c$	$\pm\frac{1}{2}$
CISMASS	Cismatter	$m_0>0$	$0<m<m_0$	$\Delta x_0<\Delta x$	$0<\Delta t<\Delta t_0$	$v>c$	$\pm\frac{1}{2}$
	Cisantimatter	$m_0<0$	$m_0<m<0$	$\Delta x<-\Delta x_0$	$-\Delta t_0<\Delta t<0$	$v>c$	$\pm\frac{1}{2}$
	Nilmatter	$m_0>0$	$m=0$	$\Delta x=\infty$	$\Delta t=0$	$v=c$	$\pm\frac{1}{2}$
	Nilantimatter	$m_0<0$	$m=0$	$\Delta x=\infty$	$\Delta t=0$	$v=c$	$\pm\frac{1}{2}$



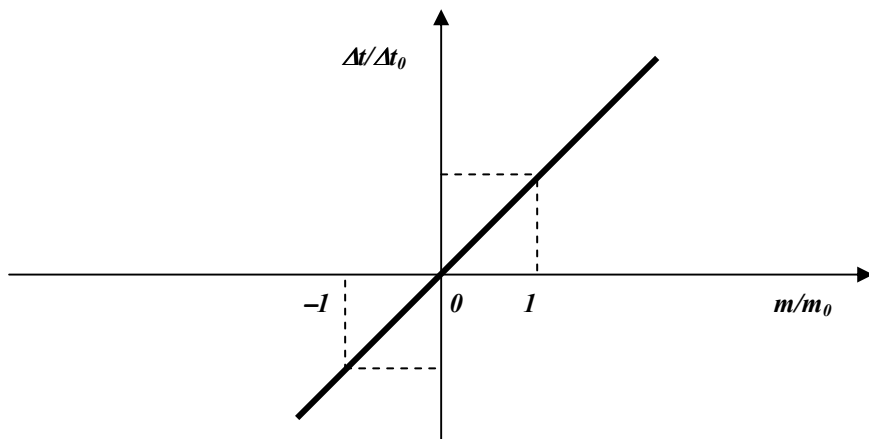
### 9.2 Transitions among energy levels where spin and charge are conserved.



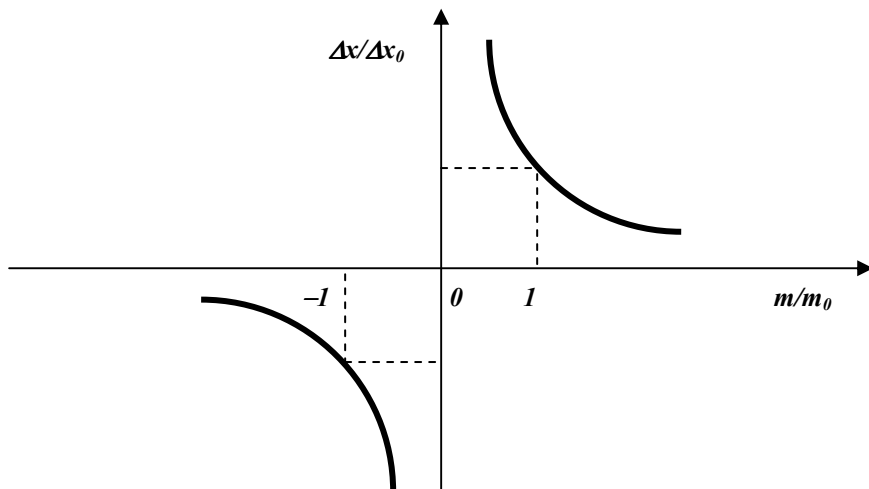
9.3 *Velocity of particle in function of its mass  $\beta=\beta(\alpha)$ .*



9.4 *Time-stretching of particle in function of its mass  $\Delta t=\alpha\Delta t_0$ .*



9.5 *Length-contraction of particle in function of its mass  $\Delta x=\Delta x_0/\alpha$ .*



## 9.6 Electromagnetic interactions

9.6.1 Left-to-right in the diagrams represents time, a process begins on the left and ends on the right.

9.6.2 Every line in the diagram represents a particle; the seven types of particles are:

Image	Description	Particle represented	Energy	Spin	Charge
	Dark blue wavy line	Photon: $\gamma$	$0 < E/c^2 < \infty$	1	0
	Blue wavy line	Photon: $\gamma$	$0 < E/c^2 < 2m_0$	1	0
	Light blue wavy line	Photon: $\gamma$	$0 < E/c^2 < m_0$	1	0
	Green straight line, arrow to the right	Particle: $a$	$m > m_0 > 0$	$\frac{1}{2}$	C
	Light green straight line, arrow to the right	Cisparticle: $\tilde{a}$	$0 < m < m_0$	$\frac{1}{2}$	C
	Lemon green straight line, arrow down	Nilparticle: $\check{a}$	$m = 0^+$	$\frac{1}{2}$	C
	Red straight line, arrow to the left	Antiparticle: $\bar{a}$	$m < -m_0 < 0$	$\frac{1}{2}$	-C
	Orange straight line, arrow to the left	Cisantiparticle: $\tilde{\bar{a}}$	$-m_0 < m < 0$	$\frac{1}{2}$	-C
	Light orange straight line, arrow down	Nilantiparticle: $\hat{a}$	$m = 0^-$	$\frac{1}{2}$	-C

9.6.3 Up and down (vertical) displacement in a diagram indicates particle motion, but no attempt is made to show direction or speed, except schematically.

9.6.4 Any vertex (point where at least three lines meet) represents an electromagnetic interaction (absorption/emission of a photon).

9.6.5 Any interaction is observed by three different reference-systems: *super partes SP*, ordinary *slower than light STL*, *faster than light FTL*.

### 9.6.6 Captions.

9.6.7 Transformation:  $a + \bar{a} = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $\frac{1}{2} + \frac{1}{2} = 1$ ).

9.6.7.1 SP and STL observed annihilation of particle-antiparticle pair into photon.

9.6.7.2 FTL observed creation from nothing of photon.

9.6.8 Transformation:  $\gamma = \bar{a} + a$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = \frac{1}{2} + \frac{1}{2}$ ).

9.6.8.1 SP and STL observed transformation of photon into particle-antiparticle pair.

9.6.8.2 FTL observed disappearance to nothingness of photon.

9.6.9 Transformation:  $\tilde{a} + \tilde{\bar{a}} = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $\frac{1}{2} + \frac{1}{2} = 1$ ).

9.6.9.1 SP and FTL observed annihilation of cisparticle-cisantiparticle pair into photon.

9.6.9.2 STL observed creation from nothing of photon.

9.6.10 Transformation:  $\gamma = \tilde{a} + \tilde{\bar{a}}$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = \frac{1}{2} + \frac{1}{2}$ ).

9.6.10.1 SP and FTL observed transformation of photon into cisparticle-cisantiparticle pair.

9.6.10.2 STL observed disappearance to nothingness of photon.

9.6.11 Transformation:  $\bar{a} + \check{a} = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $\frac{1}{2} + \frac{1}{2} = 1$ ).

9.6.11.1 SP observed annihilation of cisparticle-antiparticle pair into photon.

9.6.11.2 STL observed transformation of antiparticle into photon.

9.6.11.3 FTL observed transformation of cisparticle into photon.

9.6.12 Transformation:  $\gamma = \tilde{a} + a$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = \frac{1}{2} + \frac{1}{2}$ ).

9.6.12.1 SP observed transformation of photon into cisantiparticle-particle pair.

9.6.12.2 STL observed transformation of photon into particle.

9.6.12.3 FTL observed transformation of photon into cisantiparticle.

9.6.13 Transformation:  $\tilde{\bar{a}} + a = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $\frac{1}{2} + \frac{1}{2} = 1$ ).

9.6.13.1 SP observed annihilation of particle-cisantiparticle pair into photon.

9.6.13.2 STL observed transformation of particle into photon.

9.6.13.3 FTL observed transformation of cisantiparticle into photon.

9.6.14 Transformation:  $\gamma = \tilde{a} + \bar{a}$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = \frac{1}{2} + \frac{1}{2}$ ).

9.6.14.1 SP observed transformation of photon into antiparticle-cisparticle pair.

9.6.14.2 STL observed transformation of photon into antiparticle.

9.6.14.3 FTL observed transformation of photon into cisparticle.

9.6.15 Impossible transformation:  $a \neq \gamma + \tilde{a}$  (Charge conserved:  $C = 0 + C$ ; Spin violated:  $\frac{1}{2} \neq 1 + \frac{1}{2}$ ).

9.6.15.1 SP observed impossible transformation of particle into cisparticle.

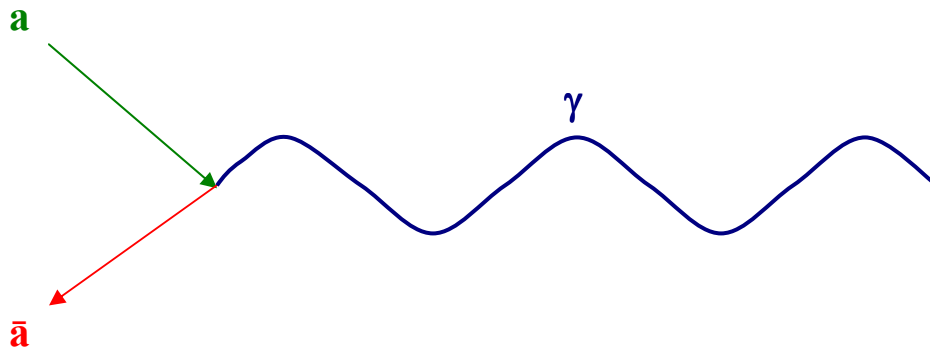
9.6.15.2 FTL observed impossible creation from nothing of cisparticle-photon pair.

- 9.6.16 Impossible transformation:  $\gamma + \bar{a} \neq \bar{a}$  (Charge conserved:  $0 - C = -C$ ; Spin violated:  $1 + \frac{1}{2} \neq \frac{1}{2}$ ).
- 9.6.16.1 SP observed impossible transformation of cisantiparticle into antiparticle.
- 9.6.16.2 FTL observed impossible disappearance to nothingness of cisantiparticle-photon pair.
- 9.6.17 Impossible transformation:  $\gamma + \bar{a} \neq a$  (Charge conserved:  $0 + C = 0$ ; Spin violated:  $1 + \frac{1}{2} \neq \frac{1}{2}$ ).
- 9.6.17.1 SP observed impossible transformation of cisparticle into particle.
- 9.6.17.2 FTL observed impossible disappearance to nothingness of cisparticle-photon pair.
- 9.6.18 Transformation:  $\bar{a} \neq \gamma + \bar{a}$  (Charge conserved:  $-C = 0 - C$ ; Spin violated:  $\frac{1}{2} \neq 1 + \frac{1}{2}$ ).
- 9.6.18.1 SP observed impossible transformation of antiparticle into cisantiparticle.
- 9.6.18.2 FTL observed impossible creation from nothing of photon-cisantiparticle pair.
- 9.6.19 Transformation:  $a + \bar{a} = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $\frac{1}{2} + \frac{1}{2} = 1$ ).
- 9.6.19.1 SP and STL observed annihilation of particle-nilantiparticle pair into photon.
- 9.6.19.2 FTL observed transformation of nilantiparticle into photon.
- 9.6.20 Transformation:  $\gamma = \bar{a} + \bar{a}$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = \frac{1}{2} + \frac{1}{2}$ ).
- 9.6.20.1 SP and STL observed transformation of photon into antiparticle-nilparticle pair.
- 9.6.20.2 FTL observed transformation of photon into nilparticle.
- 9.6.21 Transformation:  $\gamma = a + \bar{a}$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = \frac{1}{2} + \frac{1}{2}$ ).
- 9.6.21.1 SP and STL observed transformation of photon into particle-nilantiparticle pair.
- 9.6.21.2 FTL observed transformation of photon into nilantiparticle.
- 9.6.22 Transformation:  $\bar{a} + \bar{a} = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $\frac{1}{2} + \frac{1}{2} = 1$ ).
- 9.6.22.1 SP and STL observed annihilation of antiparticle-nilparticle pair into photon.
- 9.6.22.2 FTL observed transformation of nilparticle into photon.
- 9.6.23 Transformation:  $\bar{a} + \bar{a} = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $\frac{1}{2} + \frac{1}{2} = 1$ ).
- 9.6.23.1 SP and FTL observed annihilation of cisparticle-nilantiparticle pair into photon.
- 9.6.23.2 STL observed transformation of nilantiparticle into photon.
- 9.6.24 Transformation:  $\gamma = \bar{a} + \bar{a}$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = \frac{1}{2} + \frac{1}{2}$ ).
- 9.6.24.1 SP and FTL observed transformation of photon into cisantiparticle-nilparticle pair.
- 9.6.24.2 STL observed transformation of photon into nilparticle.
- 9.6.25 Transformation:  $\gamma = \bar{a} + \bar{a}$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = \frac{1}{2} + \frac{1}{2}$ ).
- 9.6.25.1 SP and FTL observed transformation of photon into cisparticle-nilantiparticle pair.
- 9.6.25.2 STL observed transformation of photon into nilantiparticle.
- 9.6.26 Transformation:  $\bar{a} + \bar{a} = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $\frac{1}{2} + \frac{1}{2} = 1$ ).
- 9.6.26.1 SP and FTL observed annihilation of cisantiparticle-nilparticle pair into photon.
- 9.6.26.2 STL observed transformation of nilparticle into photon.
- 9.6.27 Impossible transformation:  $a \neq \gamma + \bar{a}$  (Charge conserved:  $-C = 0 - C$ ; Spin violated:  $\frac{1}{2} \neq 1 + \frac{1}{2}$ ).
- 9.6.27.1 SP and STL observed impossible annihilation of particle-nilparticle pair into photon.
- 9.6.27.2 FTL observed impossible creation from nothing of nilparticle-photon pair.
- 9.6.28 Impossible transformation:  $\gamma + \bar{a} = \bar{a}$  (Charge conserved:  $0 + C = C$ ; Spin violated:  $1 + \frac{1}{2} \neq \frac{1}{2}$ ).
- 9.6.28.1 SP and STL observed impossible transformation of nilantiparticle into antiparticle.
- 9.6.28.2 FTL observed impossible transformation of photon into nilantiparticle.
- 9.6.29 Impossible transformation:  $\gamma + \bar{a} \neq a$  (Charge conserved:  $0 - C = -C$ ; Spin violated:  $1 + \frac{1}{2} \neq \frac{1}{2}$ ).
- 9.6.29.1 SP and STL observed impossible transformation of nilparticle into particle.
- 9.6.29.2 FTL observed impossible disappearance to nothingness of photon-nilparticle pair.
- 9.6.30 Impossible transformation:  $\bar{a} \neq \gamma + \bar{a}$  (Charge conserved:  $C = 0 + C$ ; Spin violated:  $\frac{1}{2} \neq 1 + \frac{1}{2}$ ).
- 9.6.30.1 SP and STL observed impossible transformation of antiparticle into nilantiparticle.
- 9.6.30.2 FTL observed impossible creation from nothing of nilantiparticle-photon pair.
- 9.6.31 Impossible transformation:  $\bar{a} \neq \gamma + \bar{a}$  (Charge conserved:  $-C = 0 - C$ ; Spin violated:  $\frac{1}{2} \neq 1 + \frac{1}{2}$ ).
- 9.6.31.1 SP and FTL observed impossible transformation of cisparticle into nilparticle.
- 9.6.31.2 STL observed impossible creation from nothing of nilparticle-photon pair.
- 9.6.32 Impossible transformation:  $\gamma + \bar{a} \neq \bar{a}$  (Charge conserved:  $0 + C = C$ ; Spin violated:  $1 + \frac{1}{2} \neq \frac{1}{2}$ ).
- 9.6.32.1 SP and FTL observed impossible transformation of nilantiparticle into cisantiparticle.
- 9.6.32.2 STL observed impossible disappearance to nothingness of photon-nilantiparticle pair.
- 9.6.33 Impossible transformation:  $\gamma + \bar{a} \neq \bar{a}$  (Charge conserved:  $0 = C - C$ ; Spin violated:  $1 + \frac{1}{2} \neq \frac{1}{2}$ ).
- 9.6.33.1 SP and FTL observed impossible transformation of nilparticle into cisparticle.
- 9.6.33.2 STL observed impossible disappearance to nothingness of photon-nilparticle pair.

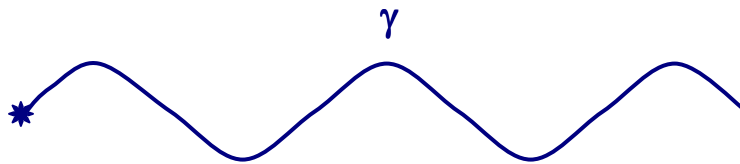
- 9.6.34 Impossible transformation:  $\tilde{a} \neq \hat{a} + \gamma$  (Charge conserved:  $C - C = 0$ ; Spin violated:  $\frac{1}{2} \neq \frac{1}{2} + 1$ ).
- 9.6.34.1 SP and FTL observed impossible transformation of cisantiparticle into nilantiparticle.
- 9.6.34.2 STL observed impossible creation from nothing of nilantiparticle-photon pair.
- 9.6.35 SP and STL observed teleportation of particle.
- 9.6.35.1 FTL observed transformation nilantiparticle  $\leftrightarrow$  photon.
- 9.6.36 SP and STL observed teleportation of antiparticle.
- 9.6.36.1 FTL observed transformation nilparticle  $\leftrightarrow$  photon.
- 9.6.37 SP and STL observed matter-nilantimatter lattice.
- 9.6.37.1 FTL observed matter-nilantimatter lattice.
- 9.6.38 SP and STL observed antimatter-nilmatter lattice.
- 9.6.38.1 FTL observed antimatter-nilmatter lattice.
- 9.6.39 SP and FTL observed teleportation of cisparticle.
- 9.6.39.1 STL observed transformation nilantiparticle  $\leftrightarrow$  photon.
- 9.6.40 SP and FTL observed teleportation of cisantiparticle.
- 9.6.40.1 STL observed transformation nilparticle  $\leftrightarrow$  photon.
- 9.6.41 SP and FTL observed cismatter-nilantimatter lattice.
- 9.6.41.1 STL observed cismatter-nilantimatter lattice.
- 9.6.42 SP and FTL observed cisantimatter-nilmatter lattice.
- 9.6.42.1 STL observed cisantimatter-nilmatter lattice.
- 9.6.43 SP and STL observed matter-antimatter lattice.
- 9.6.43.1 FTL observed matter-antimatter lattice.
- 9.6.44 SP and FTL observed cismatter-cisantimatter lattice.
- 9.6.44.1 STL observed cismatter-cisantimatter lattice.
- 9.6.45 SP observed external matter-antimatter mixed lattice.
- 9.6.45.1 STL observed external matter-antimatter mixed lattice.
- 9.6.45.2 FTL observed external matter-antimatter mixed lattice.
- 9.6.46 SP observed internal matter-antimatter mixed lattice.
- 9.6.46.1 STL observed internal matter-antimatter mixed lattice.
- 9.6.46.2 FTL observed internal matter-antimatter mixed lattice.
- 9.6.47 SP observed transformation of particle-cisantiparticle pair into antiparticle-cisparticle's.
- 9.6.47.1  $\gamma_{\min}$  necessary to enter cismass depends on particle's energy, between  $\pm m_0 c^2$  and  $\pm \infty$ .
- 9.6.47.2 There is not a minimum energy sufficient for any transition transmass  $\rightarrow$  cismass.
- 9.6.48 SP observed transformation of antiparticle-cisparticle pair into particle-cisantiparticle's.
- 9.6.48.1  $\gamma_{\min}$  to leave cismass depends on cisparticle's energy, between  $-m_0 c^2$  and  $+m_0 c^2$ .
- 9.6.48.2 Minimum energy sufficient for any transition cismass  $\rightarrow$  transmass:  $E_{\min} = 2m_0 c^2$ .
- 9.6.49 SP observed energetically favourite matter and cisantimatter.
- 9.6.49.1 STL observed violation of CP symmetry in favour of matter.
- 9.6.49.2 FTL observed violation of CP symmetry in favour of cisantimatter.
- 9.6.50 SP observed transformation of particle-nilantiparticle pair into antiparticle-nilparticle's.
- 9.6.50.1  $\gamma_{\min}$  necessary to become nilmass depends on particle's energy, between  $\pm m_0 c^2$  and  $\pm \infty$ .
- 9.6.50.2 There is not a minimum energy sufficient for any transition transmass  $\rightarrow$  nilmass.
- 9.6.51 SP observed transformation of antiparticle-nilparticle pair into particle-nilantiparticle's.
- 9.6.51.1  $\gamma_{\min}$  necessary to come out of nilmass:  $\pm m_0 c^2$ .
- 9.6.51.2 Minimum energy sufficient for any transition nilmass  $\rightarrow$  transmass:  $E_{\min} = m_0 c^2$ .
- 9.6.52 SP observed energetically favourite matter and nilantimatter.
- 9.6.52.1 STL observed violation of CP symmetry in favour of matter.
- 9.6.52.2 FTL observed violation of CP symmetry in favour of nilantimatter.

9.6.7 Transformation:  $a+\bar{a}=\gamma$  (Charge conserved:  $C-C=0$ ; Spin conserved:  $1/2+1/2=1$ ).

9.6.7.1 SP and STL observed annihilation of particle-antiparticle pair into photon.

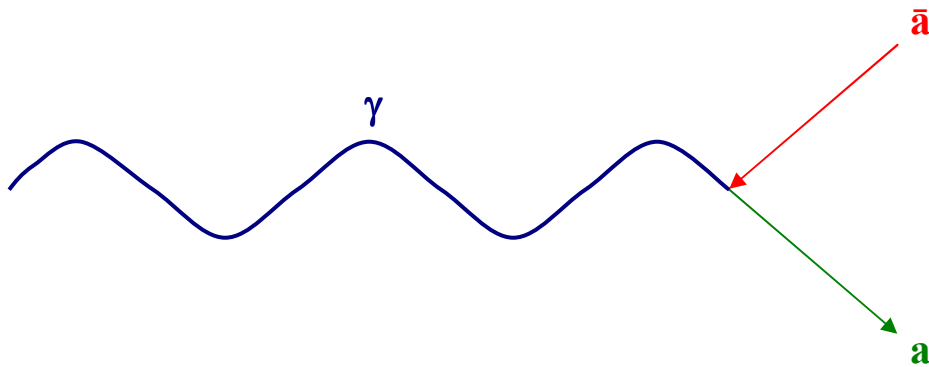


9.6.7.2 FTL observed creation from nothing of photon.

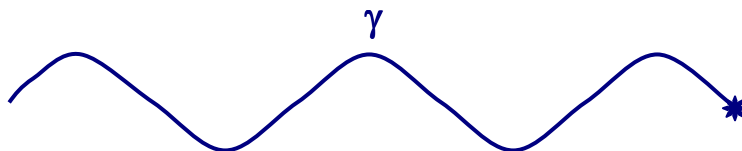


9.6.8 Transformation:  $\gamma=\bar{a}+a$  (Charge conserved:  $0=C-C$ ; Spin conserved:  $1=1/2+1/2$ ).

9.6.8.1 SP and STL observed transformation of photon into particle-antiparticle pair.

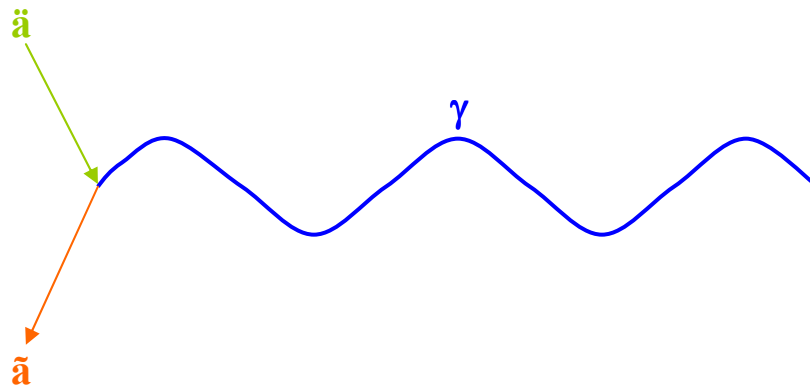


9.6.8.2 FTL observed disappearance to nothingness of photon.

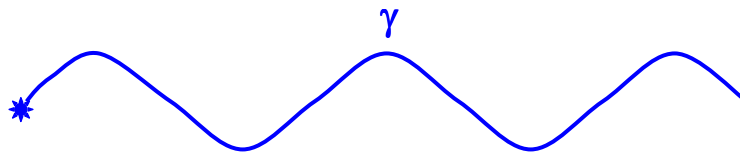


9.6.9 Transformation:  $\ddot{a} + \tilde{a} = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $\frac{1}{2} + \frac{1}{2} = 1$ ).

9.6.9.1 SP and FTL observed annihilation of cisparticle-cisantiparticle pair into photon.

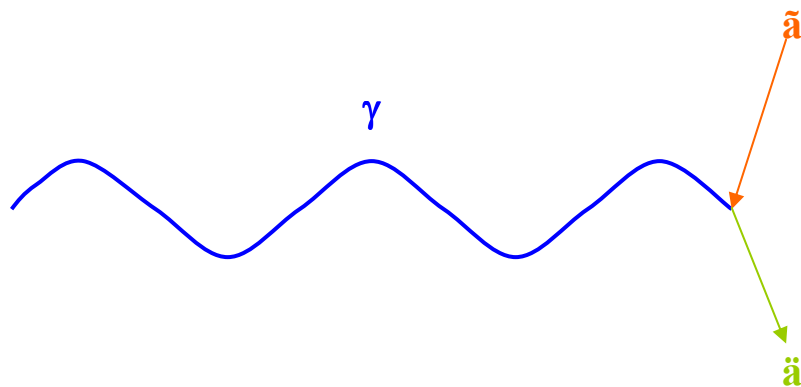


9.6.9.2 STL observed creation from nothing of photon.

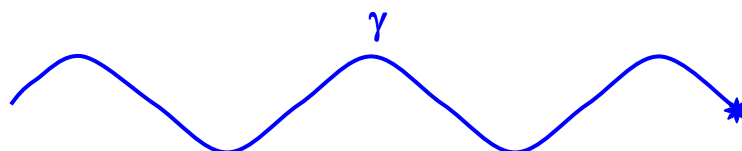


9.6.10 Transformation:  $\gamma = \tilde{a} + \ddot{a}$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = \frac{1}{2} + \frac{1}{2}$ ).

9.6.10.1 SP and FTL observed transformation of photon into cisparticle-cisantiparticle pair.

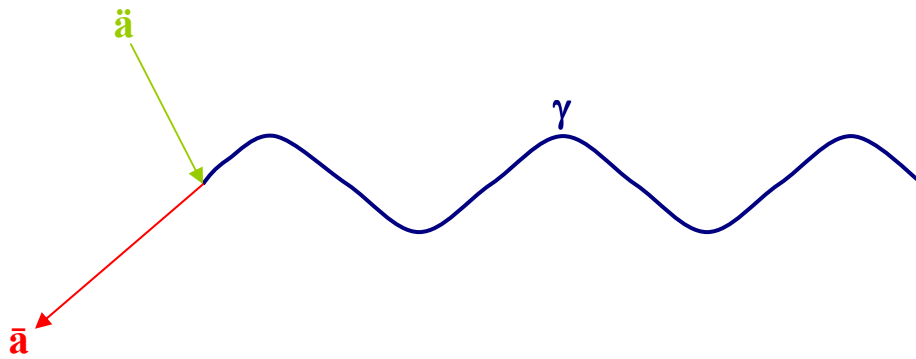


9.6.10.2 STL observed disappearance to nothingness of photon.

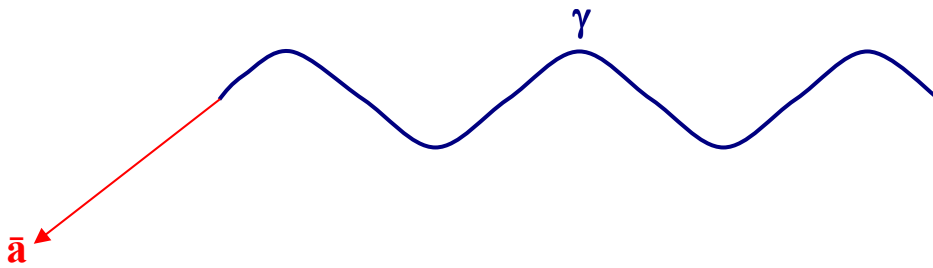


9.6.11 Transformation:  $\bar{a} + \bar{a} = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $1/2 + 1/2 = 1$ ).

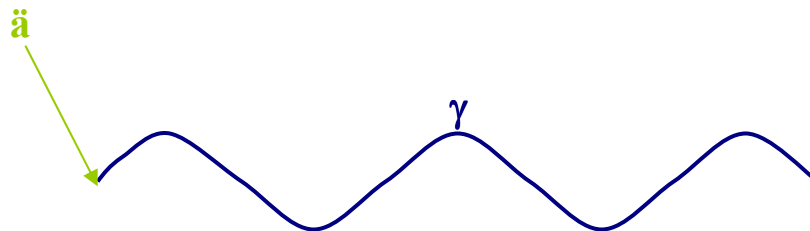
9.6.11.1 SP observed annihilation of cisparticle-antiparticle pair into photon.



9.6.11.2 STL observed transformation of antiparticle into photon.

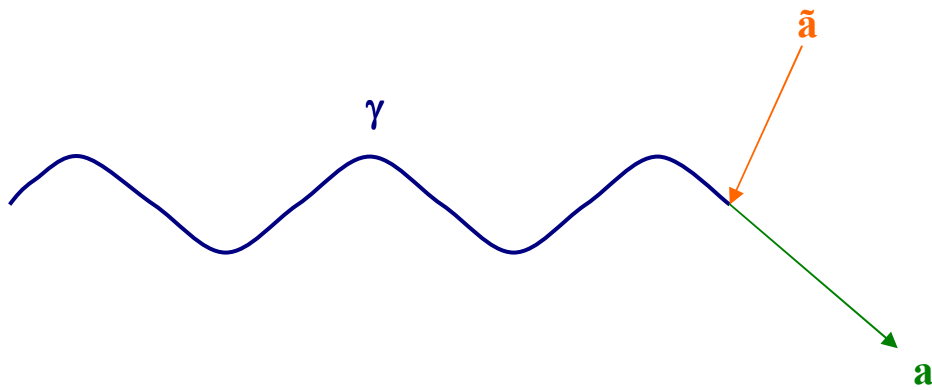


9.6.11.3 FTL observed transformation of cisparticle into photon.

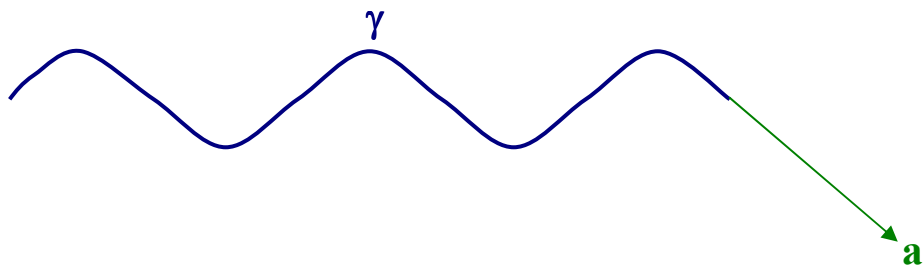


9.6.12 Transformation:  $\gamma \rightarrow \bar{a} + a$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = \frac{1}{2} + \frac{1}{2}$ ).

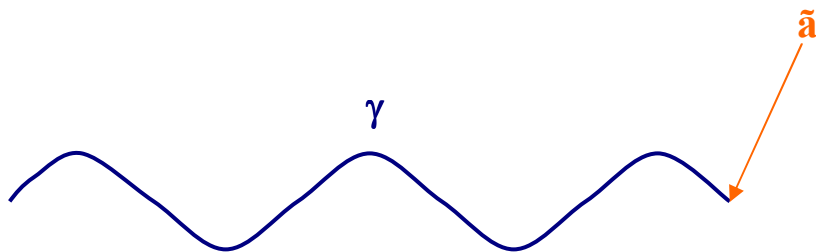
9.6.12.1 SP observed transformation of photon into cisantiparticle-particle pair.



9.6.12.2 STL observed transformation of photon into particle.

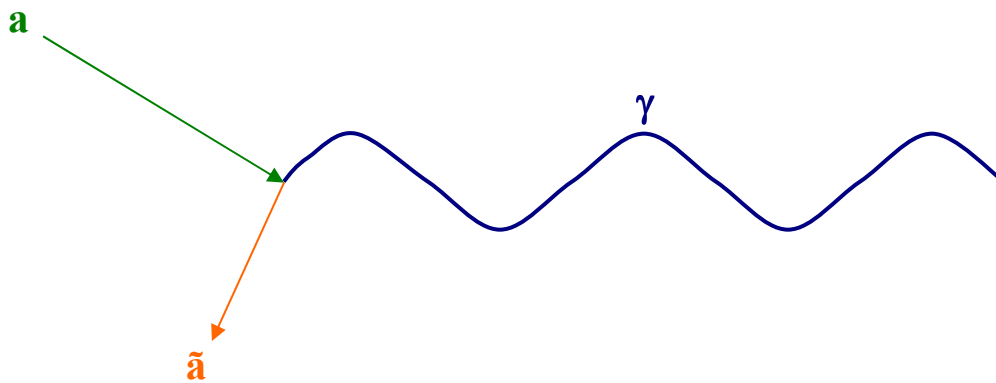


9.6.12.3 FTL observed transformation of photon into cisantiparticle.

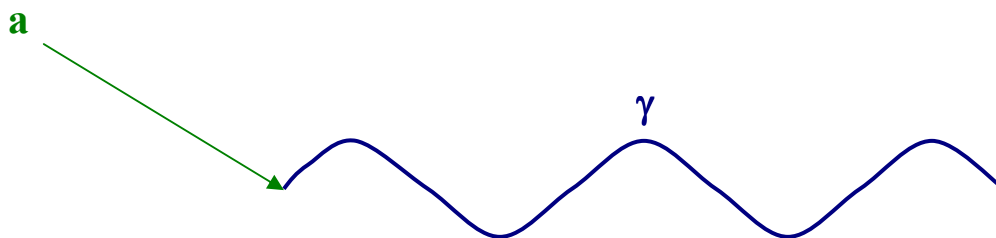


9.6.13 Transformation:  $\tilde{a}+a=\gamma$  (Charge conserved:  $C-C=0$ ; Spin conserved:  $\frac{1}{2}+\frac{1}{2}=1$ ).

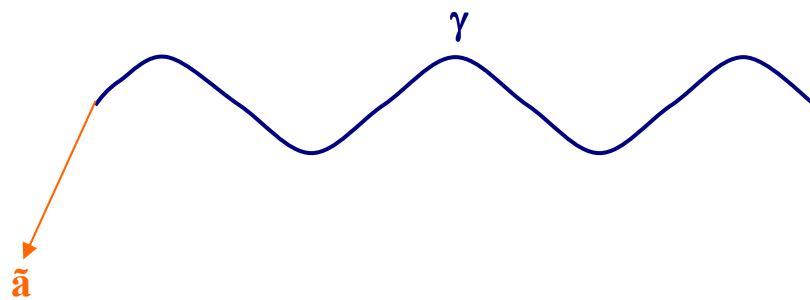
9.6.13.1 SP observed annihilation of particle-antiparticle pair into photon.



9.6.13.2 STL observed transformation of particle into photon.

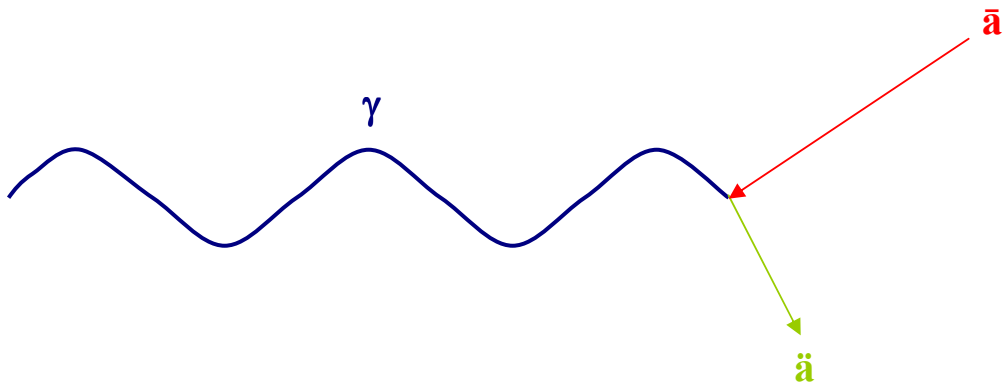


9.6.13.3 FTL observed transformation of antiparticle into photon.

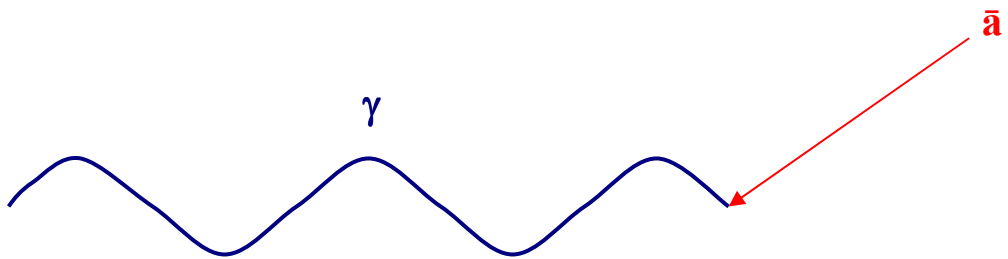


9.6.14 Transformation:  $\gamma \rightarrow \bar{a} + \ddot{a}$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = \frac{1}{2} + \frac{1}{2}$ ).

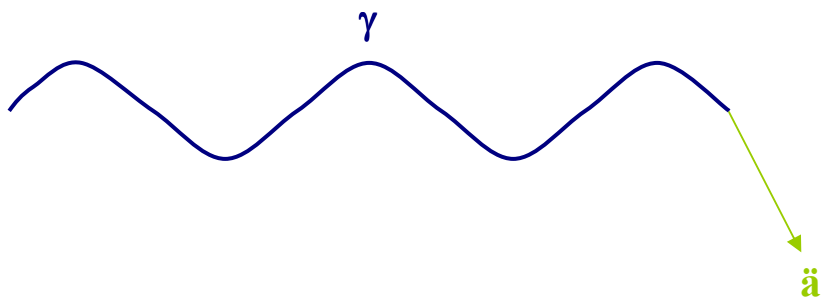
9.6.14.1 SP observed transformation of photon into antiparticle-cisparticle pair.



9.6.14.2 STL observed transformation of photon into antiparticle.

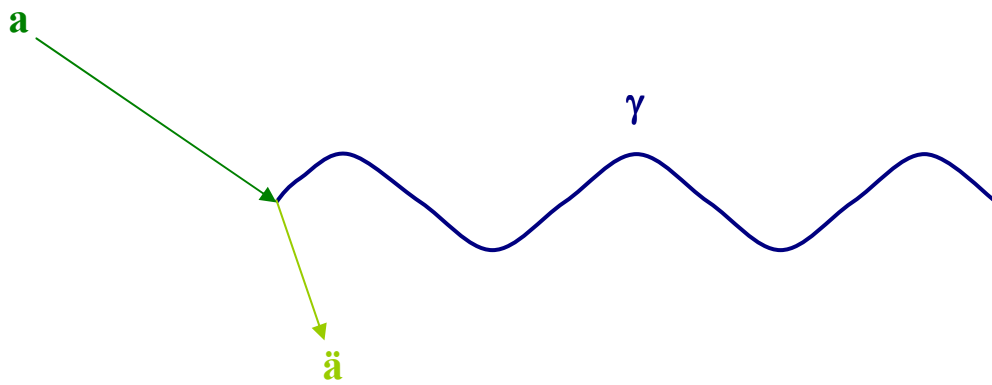


9.6.14.3 FTL observed transformation of photon into cisparticle.

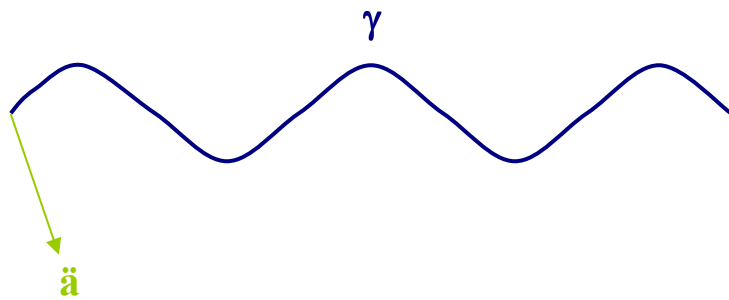


9.6.15 Impossible transformation:  $a \neq \gamma + \bar{a}$  (Charge conserved:  $C=0+C$ ; Spin violated:  $1/2 \neq 1+1/2$ ).

9.6.15.1 SP observed impossible transformation of particle into cisparticle.

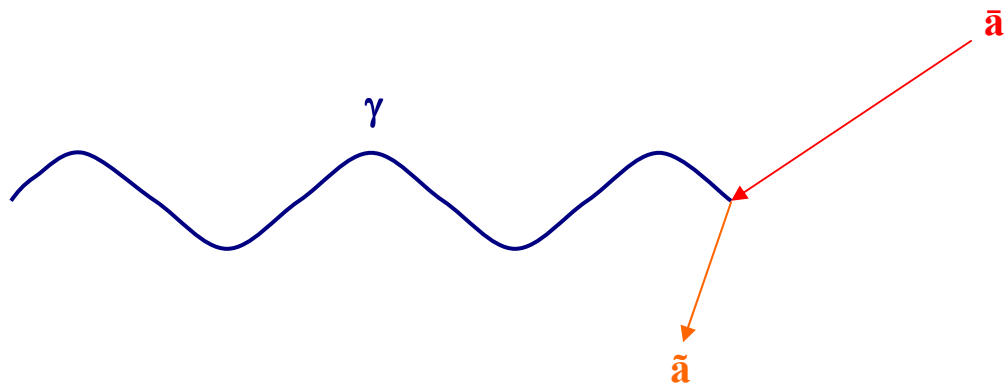


9.6.15.2 FTL observed impossible creation from nothing of cisparticle-photon pair.

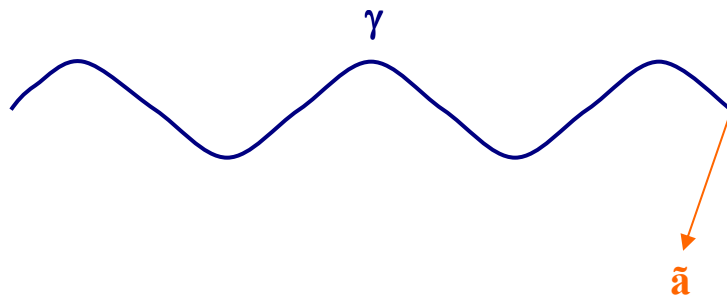


9.6.16 Impossible transformation:  $\gamma + \bar{a} \neq \bar{a}$  (Charge conserved:  $0-C=-C$ ; Spin violated:  $1+1/2 \neq 1/2$ ).

9.6.16.1 SP observed impossible transformation of cisantiparticle into antiparticle.

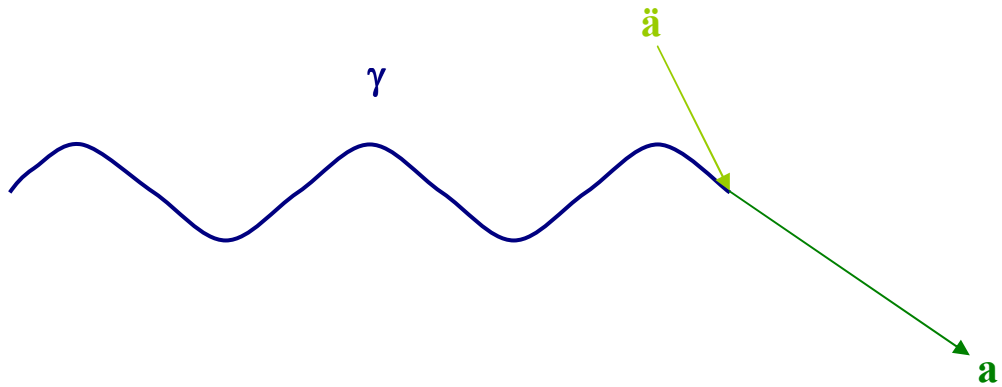


9.6.16.2 FTL observed impossible disappearance to nothingness of cisantiparticle-photon pair.

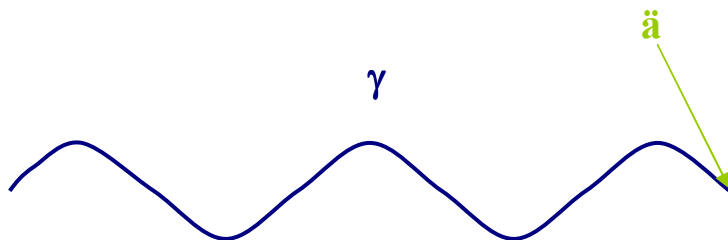


9.6.17 Impossible transformation:  $\gamma + \bar{a} \neq a$  (Charge conserved:  $0 + C = 0$ ; Spin violated:  $1 + 1/2 \neq 1/2$ ).

9.6.17.1 SP observed impossible transformation of cisparticle into particle.

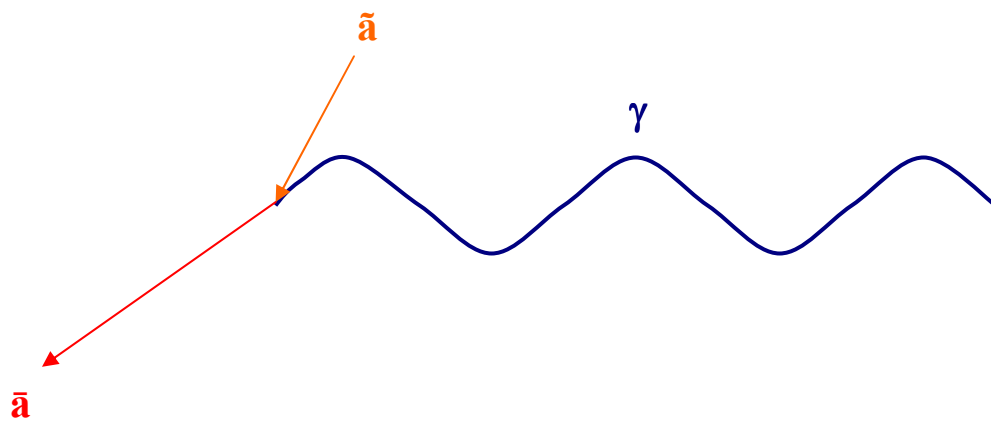


9.6.17.2 FTL observed impossible disappearance to nothingness of cisparticle-photon pair.

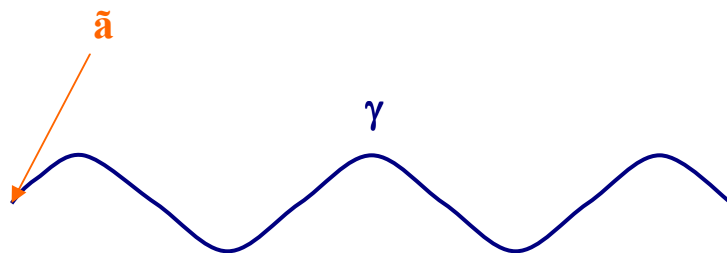


9.6.18 Transformation:  $\bar{a} \neq \gamma + \bar{a}$  (Charge conserved:  $-C = 0 - C$ ; Spin violated:  $1/2 \neq 1 + 1/2$ ).

9.6.18.1 SP observed impossible transformation of antiparticle into cisparticle.

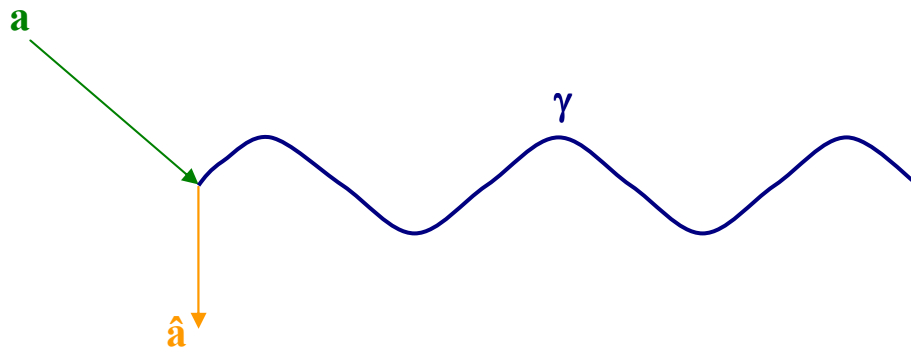


9.6.18.2 FTL observed impossible creation from nothing of photon-cisparticle pair.

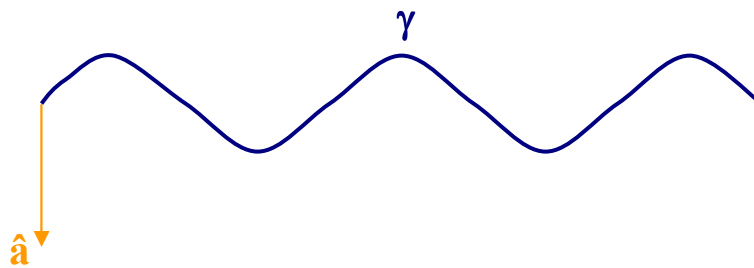


9.6.19 Transformation:  $a+\hat{a}=\gamma$  (Charge conserved:  $C-C=0$ ; Spin conserved:  $\frac{1}{2}+\frac{1}{2}=1$ ).

9.6.19.1 SP and STL observed annihilation of particle-nilantiparticle pair into photon.

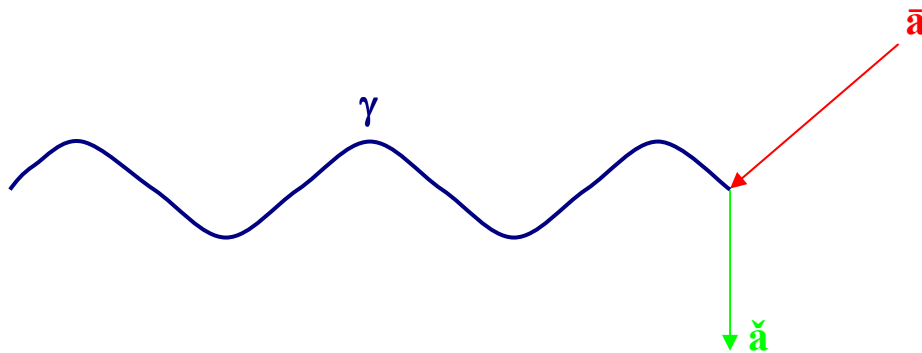


9.6.19.2 FTL observed transformation of nilantiparticle into photon.

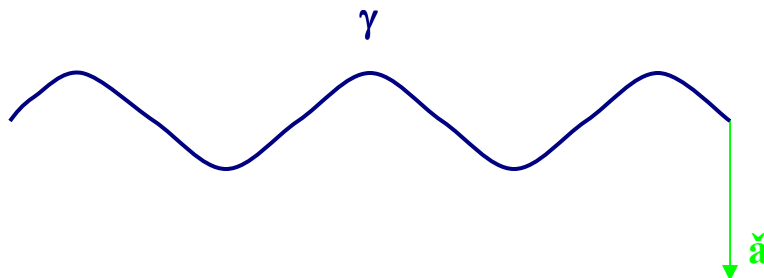


9.6.20 Transformation:  $\gamma=\bar{a}+\check{a}$  (Charge conserved:  $0=C-C$ ; Spin conserved:  $1=\frac{1}{2}+\frac{1}{2}$ ).

9.6.20.1 SP and STL observed transformation of photon into antiparticle-nilparticle pair.

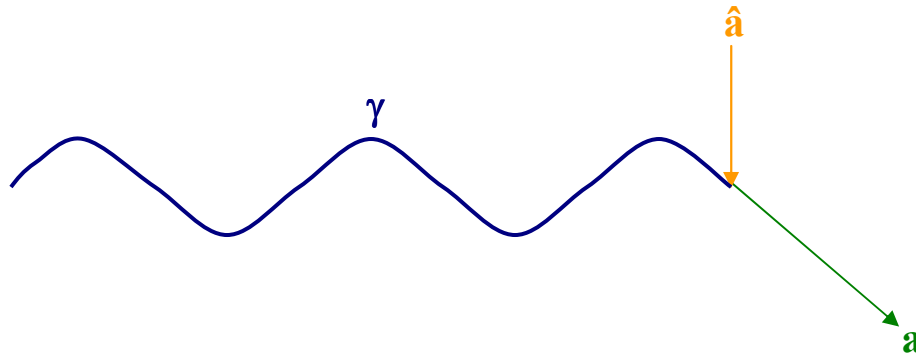


9.6.20.2 FTL observed transformation of photon into nilparticle.

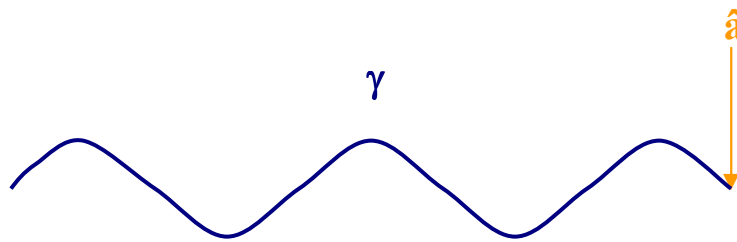


9.6.21 Transformation:  $\gamma = a + \hat{a}$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = \frac{1}{2} + \frac{1}{2}$ ).

9.6.21.1 SP and STL observed transformation of photon into particle-nilantiparticle pair.

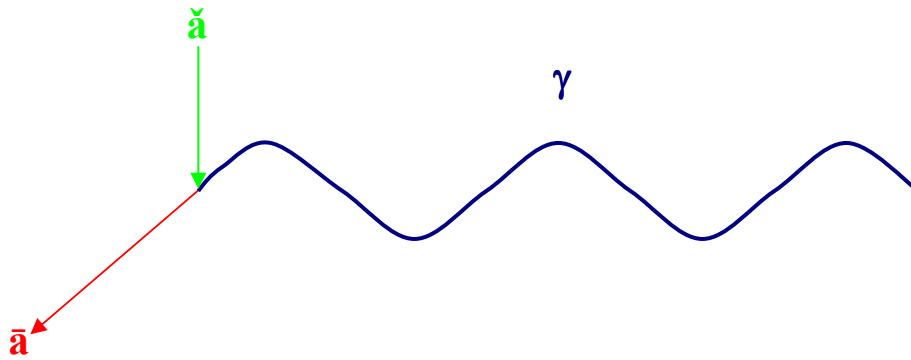


9.6.21.2 FTL observed transformation of photon into nilantiparticle.

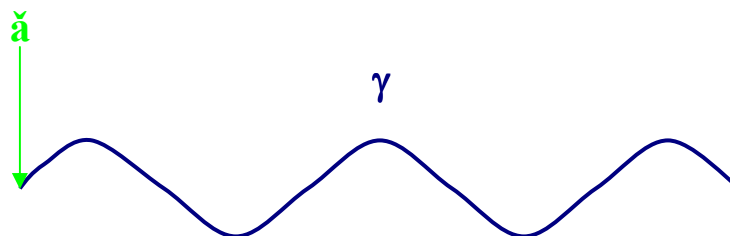


9.6.22 Transformation:  $\bar{a} + \check{a} = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $\frac{1}{2} + \frac{1}{2} = 1$ ).

9.6.22.1 SP and STL observed annihilation of antiparticle-nilparticle pair into photon.

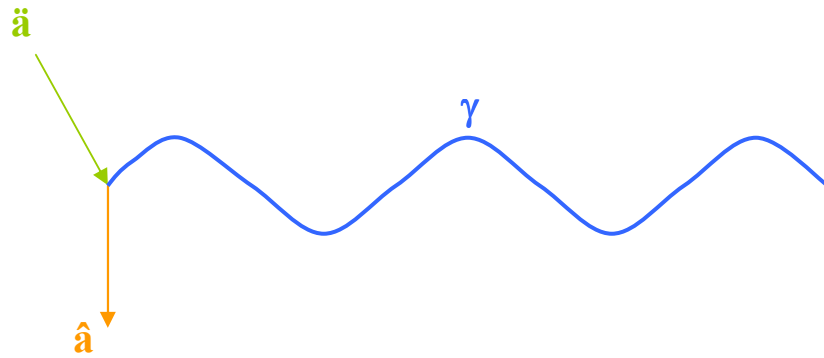


9.6.22.2 FTL observed transformation of nilparticle into photon.

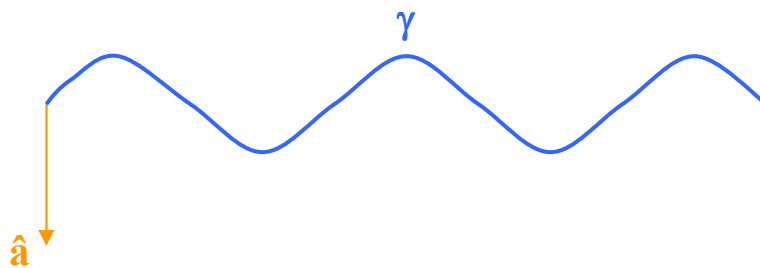


9.6.23 Transformation:  $\bar{a} + \hat{a} = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $1/2 + 1/2 = 1$ ).

9.6.23.1 SP and FTL observed annihilation of cisparticle-nilparticle pair into photon.

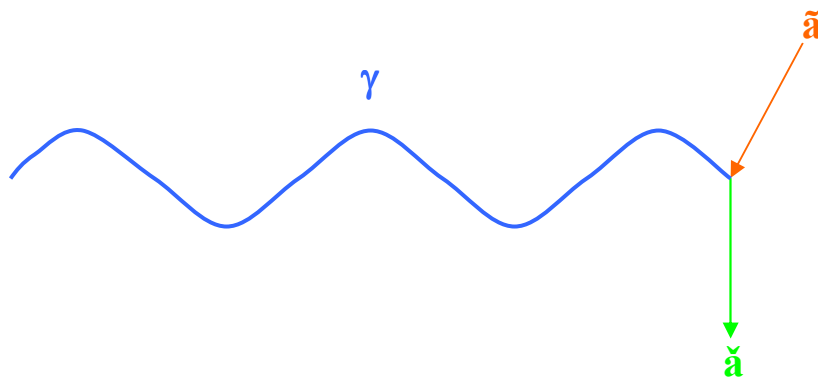


9.6.23.2 STL observed transformation of nilparticle into photon.

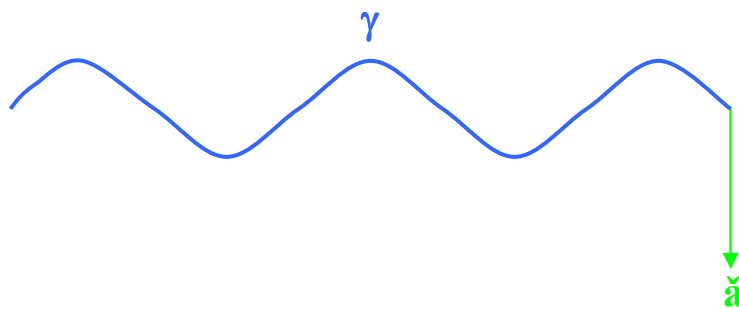


9.6.24 Transformation:  $\gamma = \bar{a} + \check{a}$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = 1/2 + 1/2$ ).

9.6.24.1 SP and FTL observed transformation of photon into cisparticle-nilparticle pair.

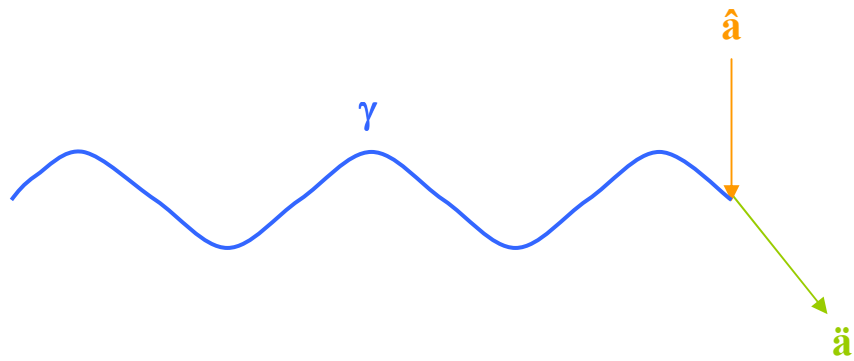


9.6.24.2 STL observed transformation of photon into nilparticle.

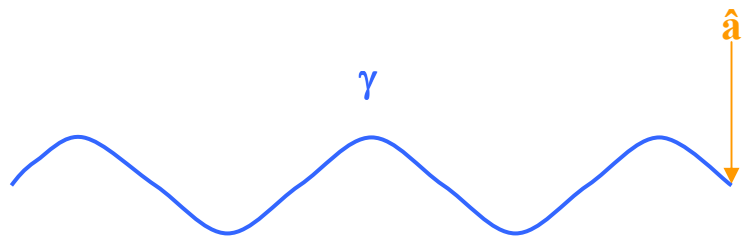


9.6.25 Transformation:  $\gamma = \tilde{a} + \hat{a}$  (Charge conserved:  $0 = C - C$ ; Spin conserved:  $1 = 1/2 + 1/2$ ).

9.6.25.1 SP and FTL observed transformation of photon into cisparticle-nilantiparticle pair.

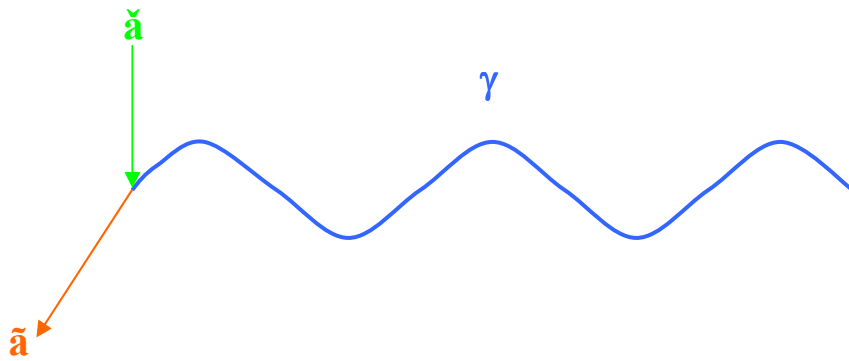


9.6.25.2 STL observed transformation of photon into nilantiparticle.

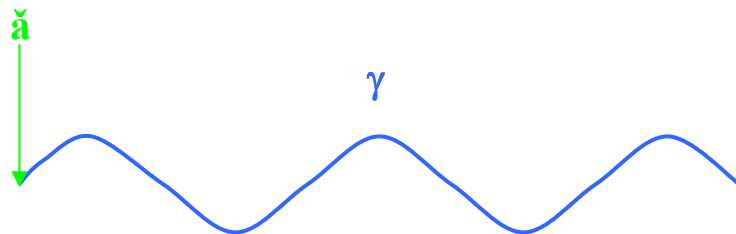


9.6.26 Transformation:  $\tilde{a} + \check{a} = \gamma$  (Charge conserved:  $C - C = 0$ ; Spin conserved:  $1/2 + 1/2 = 1$ ).

9.6.26.1 SP and FTL observed annihilation of cisantiparticle-nilparticle pair into photon.

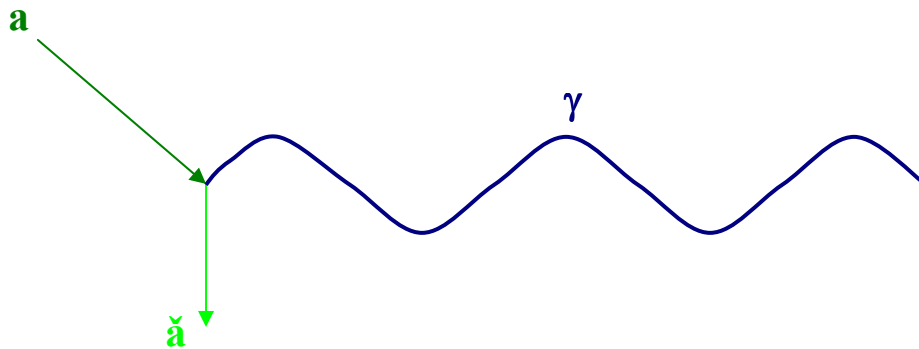


9.6.26.2 STL observed transformation of nilparticle into photon.

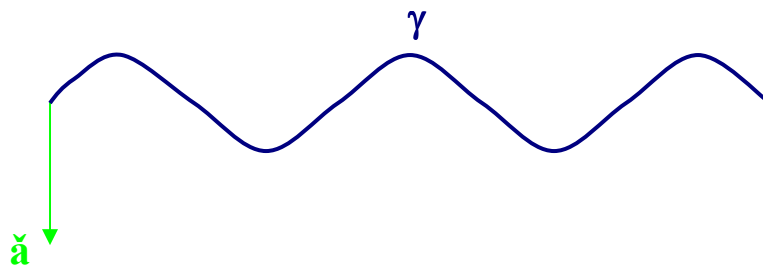


9.6.27 Impossible transformation:  $a \neq \gamma + \check{a}$  (Charge conserved:  $-C=0-C$ ; Spin violated:  $\frac{1}{2} \neq 1 + \frac{1}{2}$ ).

9.6.27.1 SP and STL observed impossible annihilation of particle-nilparticle pair into photon.

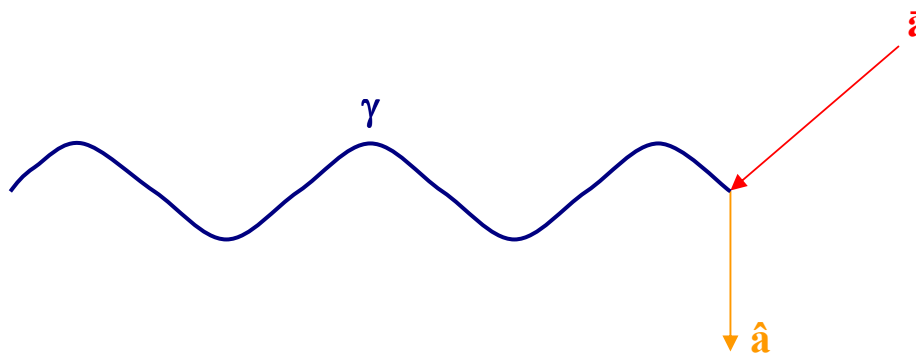


9.6.27.2 FTL observed impossible creation from nothing of nilparticle-photon pair.

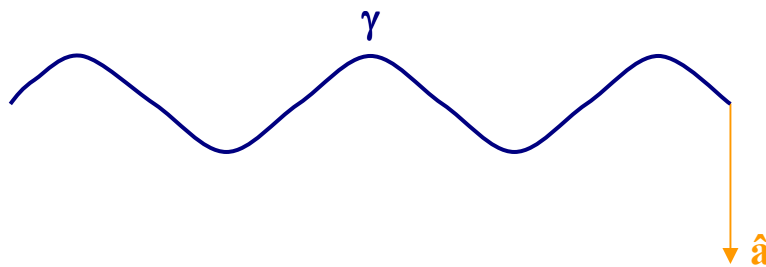


9.6.28 Impossible transformation:  $\gamma + \hat{a} = \bar{a}$  (Charge conserved:  $0+C=C$ ; Spin violated:  $1 + \frac{1}{2} \neq \frac{1}{2}$ ).

9.6.28.1 SP and STL observed impossible transformation of nilantiparticle into antiparticle.

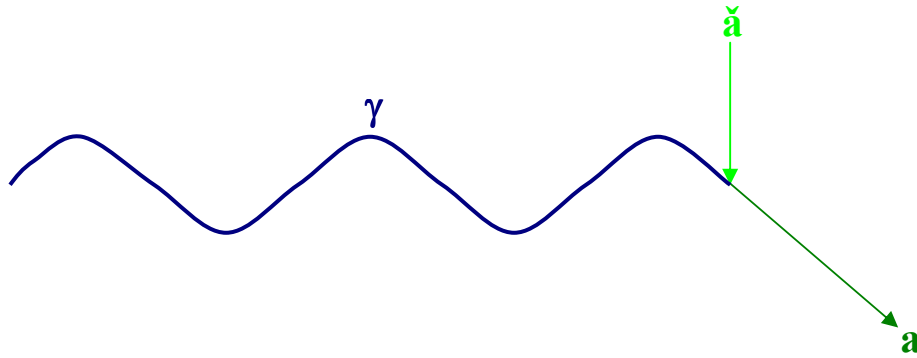


9.6.28.2 FTL observed impossible transformation of photon into nilantiparticle.

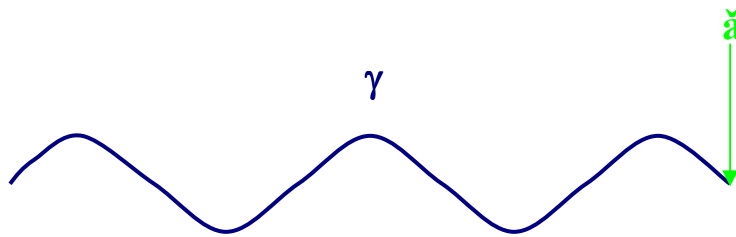


9.6.29 Impossible transformation:  $\gamma + \check{a} \neq a$  (Charge conserved:  $0 - C = -C$ ; Spin violated:  $1 + \frac{1}{2} \neq \frac{1}{2}$ ).

9.6.29.1 SP and STL observed impossible transformation of nilparticle into particle.

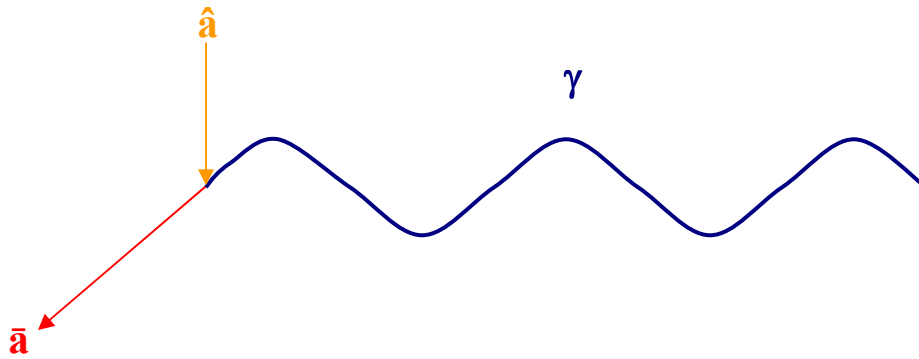


9.6.29.2 FTL observed impossible disappearance to nothingness of photon-nilparticle pair.

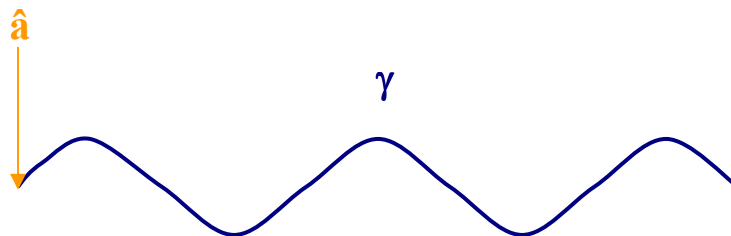


9.6.30 Impossible transformation:  $\bar{a} \neq \gamma + \hat{a}$  (Charge conserved:  $C = 0 + C$ ; Spin violated:  $\frac{1}{2} \neq 1 + \frac{1}{2}$ ).

9.6.30.1 SP and STL observed impossible transformation of antiparticle into nilantiparticle.

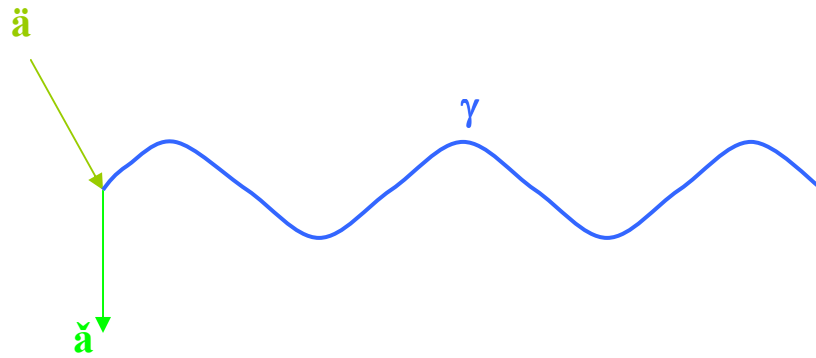


9.6.30.2 FTL observed impossible creation from nothing of nilantiparticle-photon pair.

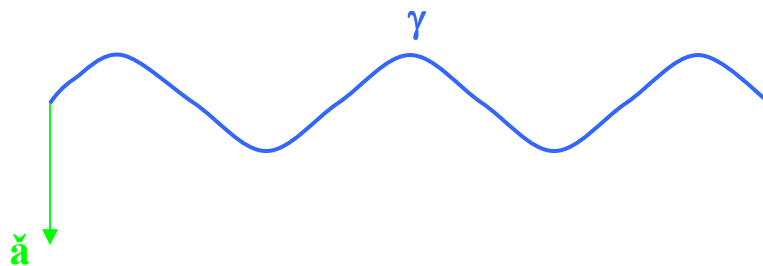


9.6.31 Impossible transformation:  $\bar{a} \neq \gamma + \check{a}$  (Charge conserved:  $-C=0-C$ ; Spin violated:  $1/2 \neq 1+1/2$ ).

9.6.31.1 SP and FTL observed impossible transformation of cisparticle into nilparticle.

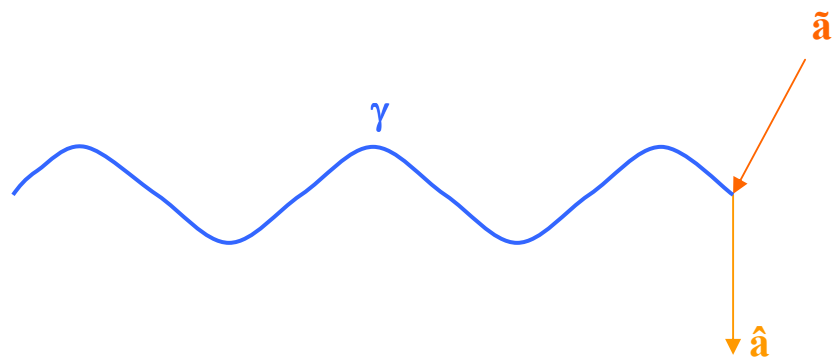


9.6.31.2 STL observed impossible creation from nothing of nilparticle-photon pair.

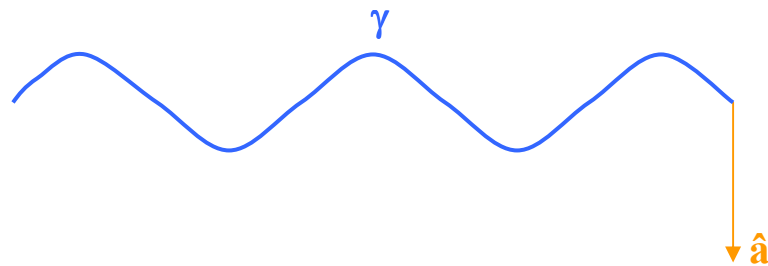


9.6.32 Impossible transformation:  $\gamma + \hat{a} \neq \bar{a}$  (Charge conserved:  $0+C=C$ ; Spin violated:  $1+1/2 \neq 1/2$ ).

9.6.32.1 SP and FTL observed impossible transformation of nilantiparticle into cisantiparticle.

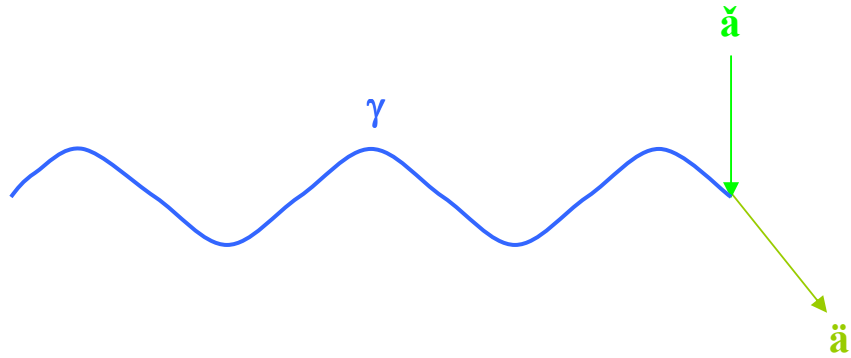


9.6.32.2 STL observed impossible disappearance to nothingness of photon-nilantiparticle pair.

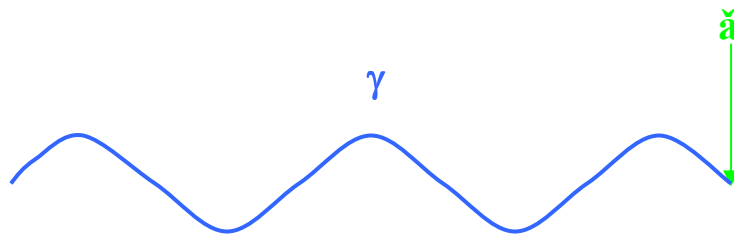


9.6.33 Impossible transformation:  $\gamma + \check{a} \rightarrow \hat{a}$  (Charge conserved:  $0=C-C$ ; Spin violated:  $1+\frac{1}{2} \neq \frac{1}{2}$ ).

9.6.33.1 SP and FTL observed impossible transformation of nilparticle into cisparticle.

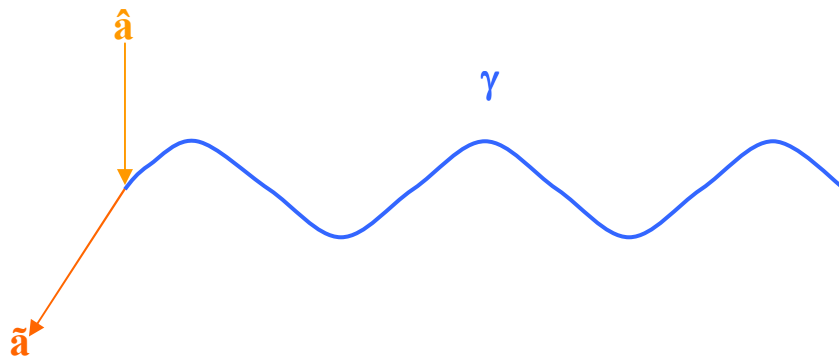


9.6.33.2 STL observed impossible disappearance to nothingness of photon-nilparticle pair.

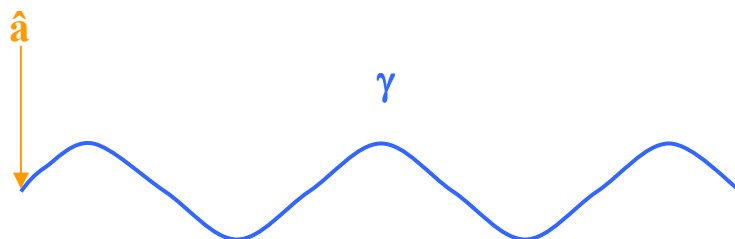


9.6.34 Impossible transformation:  $\hat{a} \rightarrow \check{a} + \gamma$  (Charge conserved:  $C-C=0$ ; Spin violated:  $\frac{1}{2} \neq \frac{1}{2}+1$ ).

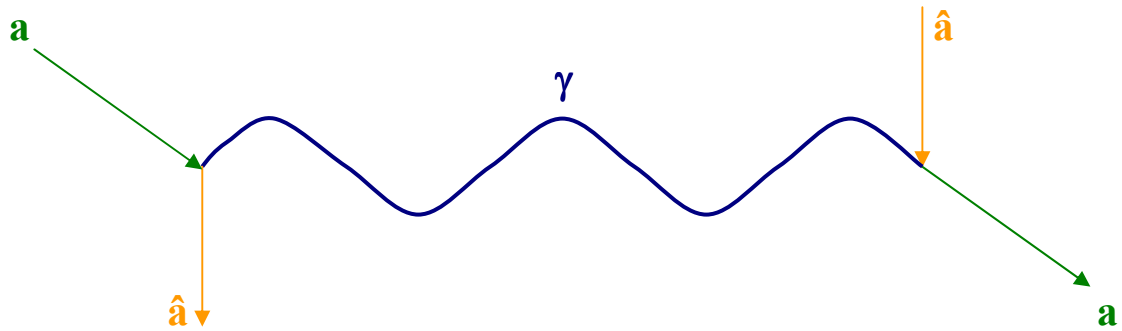
9.6.34.1 SP and FTL observed impossible transformation of cisantiparticle into nilantiparticle.



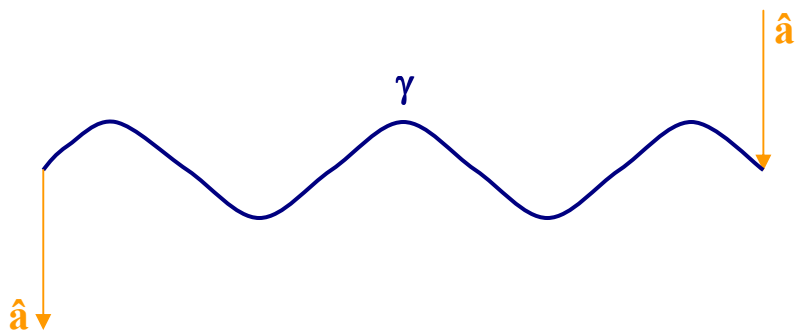
9.6.34.2 STL observed impossible creation from nothing of nilantiparticle-photon pair.



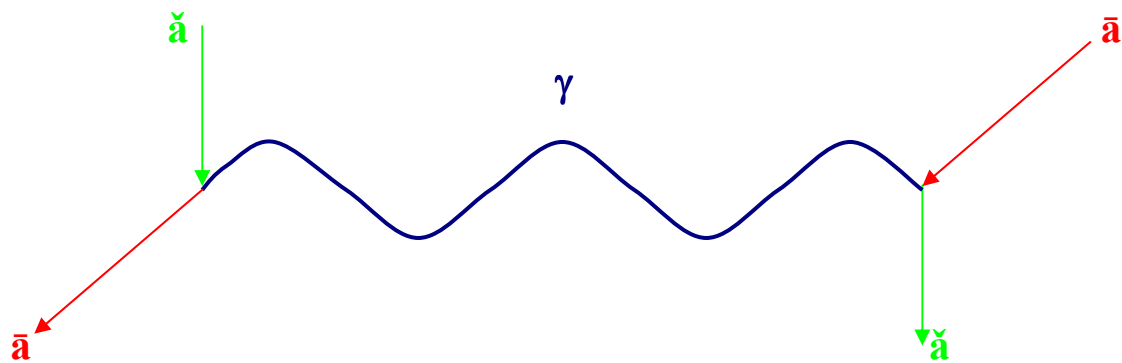
9.6.35 SP and STL observed teleportation of particle.



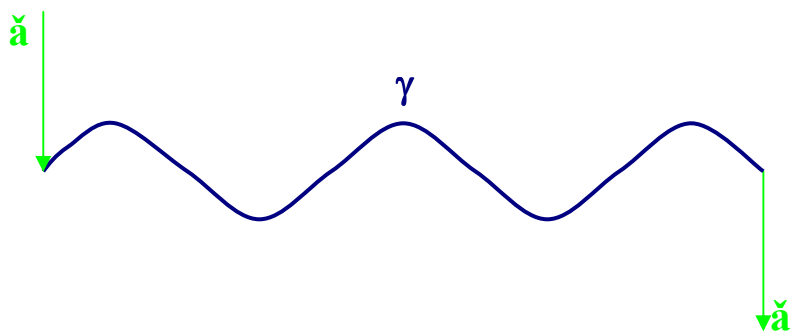
9.6.35.1 FTL observed transformation nilantiparticle ↔ photon.



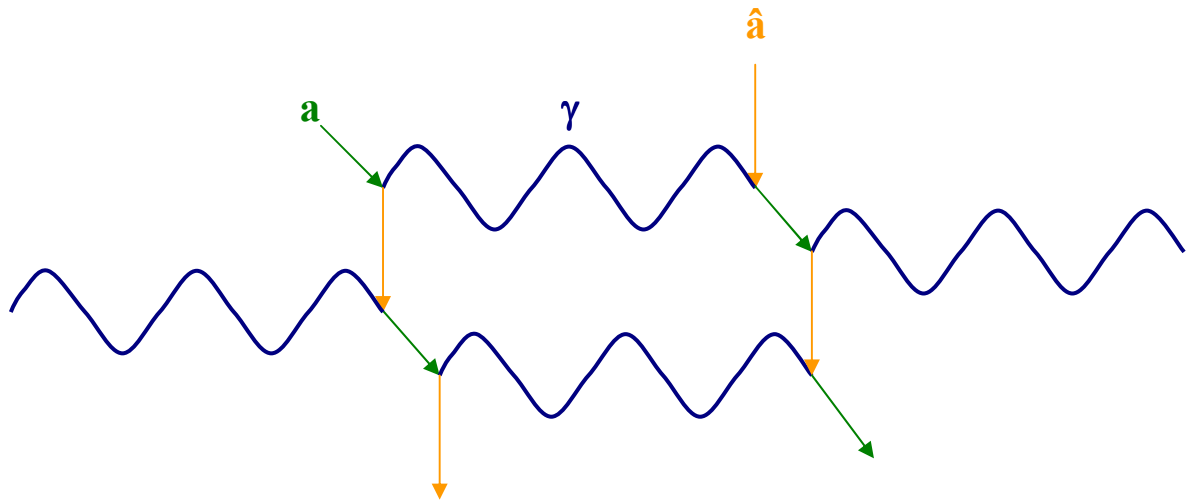
9.6.36 SP and STL observed teleportation of antiparticle.



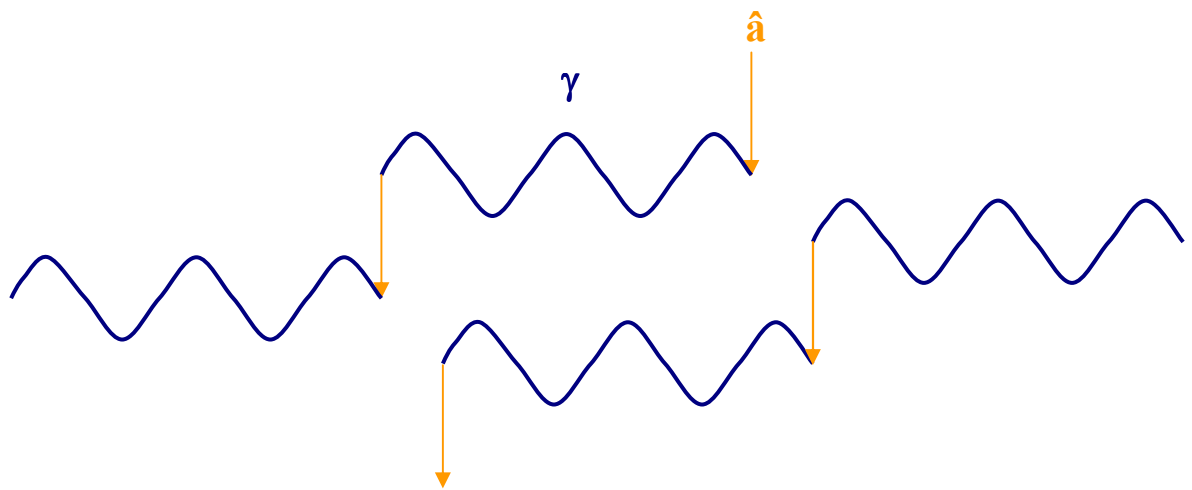
9.6.36.1 FTL observed transformation nilparticle ↔ photon.



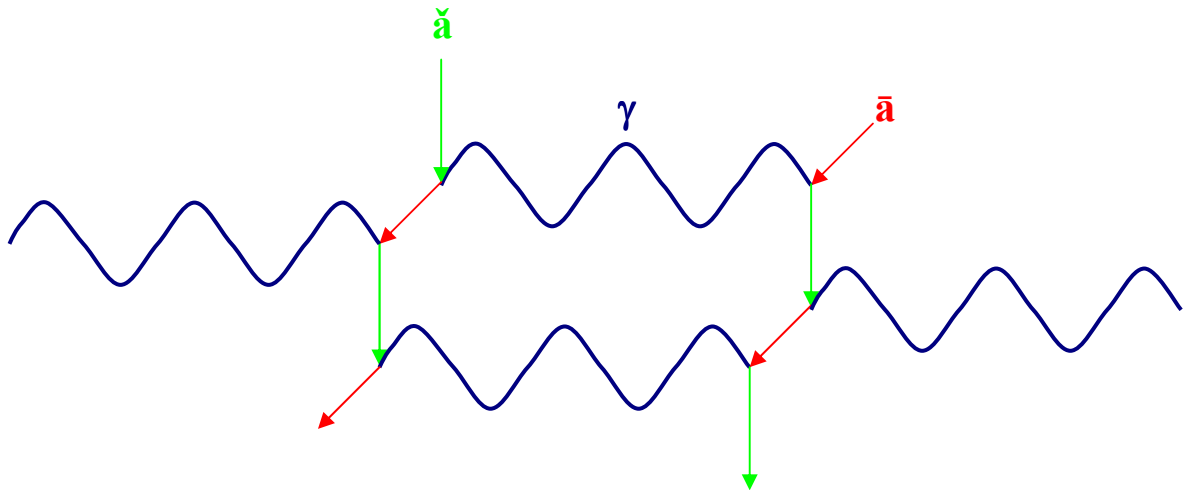
9.6.37 SP and STL observed matter-antimatter lattice.



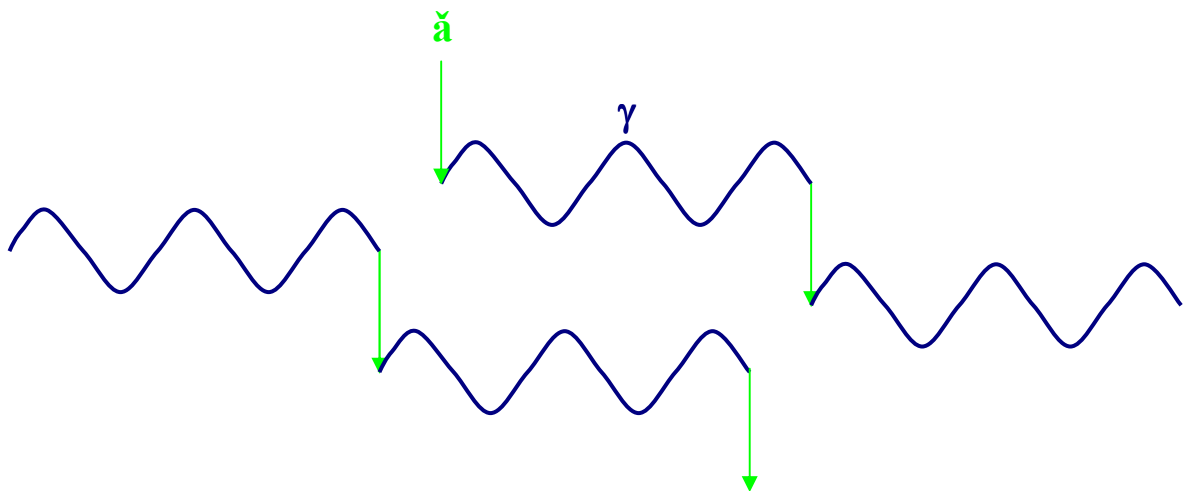
9.6.37.1 FTL observed matter-antimatter lattice.



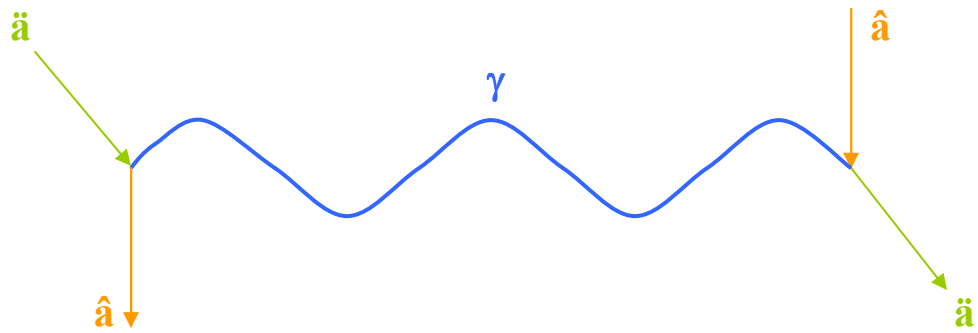
9.6.38 *SP and STL observed antimatter-nilmatter lattice.*



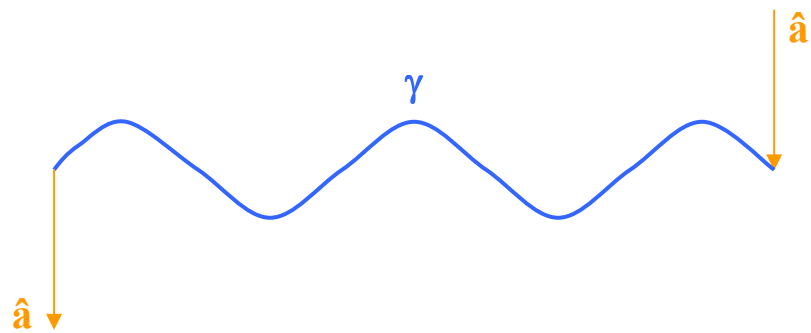
9.6.38.1 *FTL observed antimatter-nilmatter lattice.*



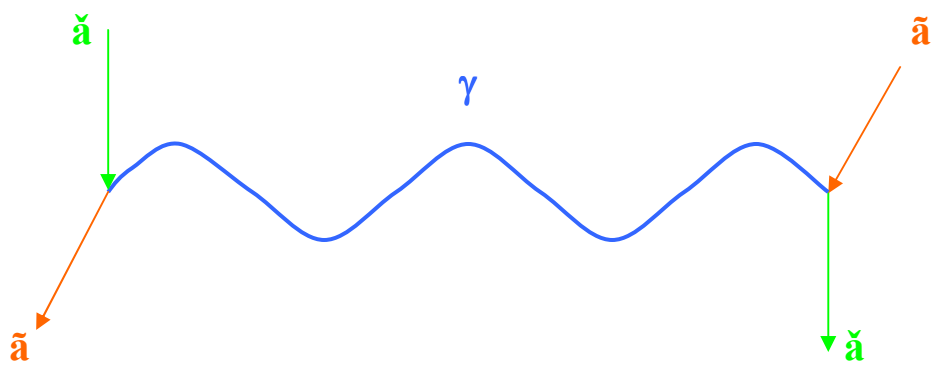
9.6.39 SP and FTL observed teleportation of cisparticle.



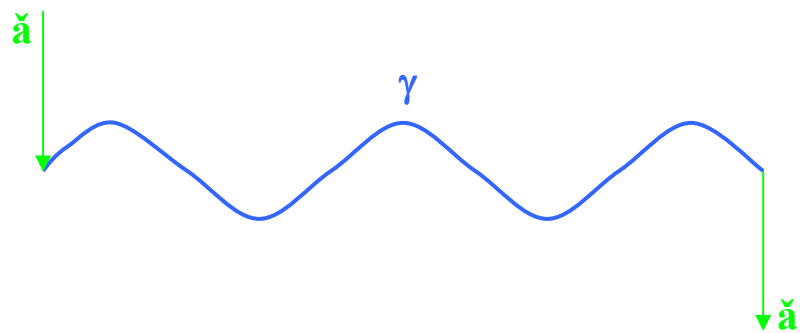
9.6.39.1 STL observed transformation nilantiparticle ↔ photon.



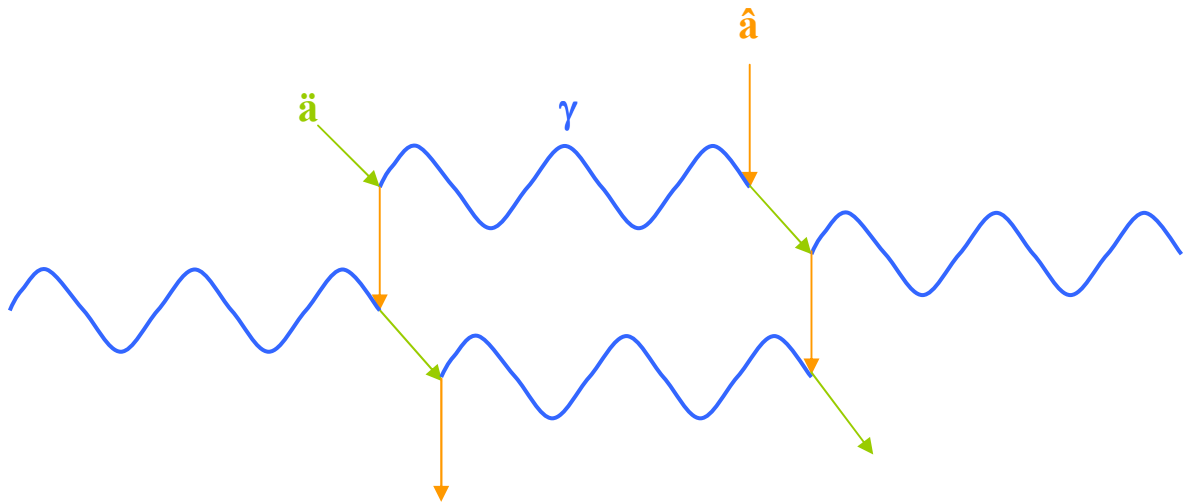
9.6.40 SP and FTL observed teleportation of cisantiparticle.



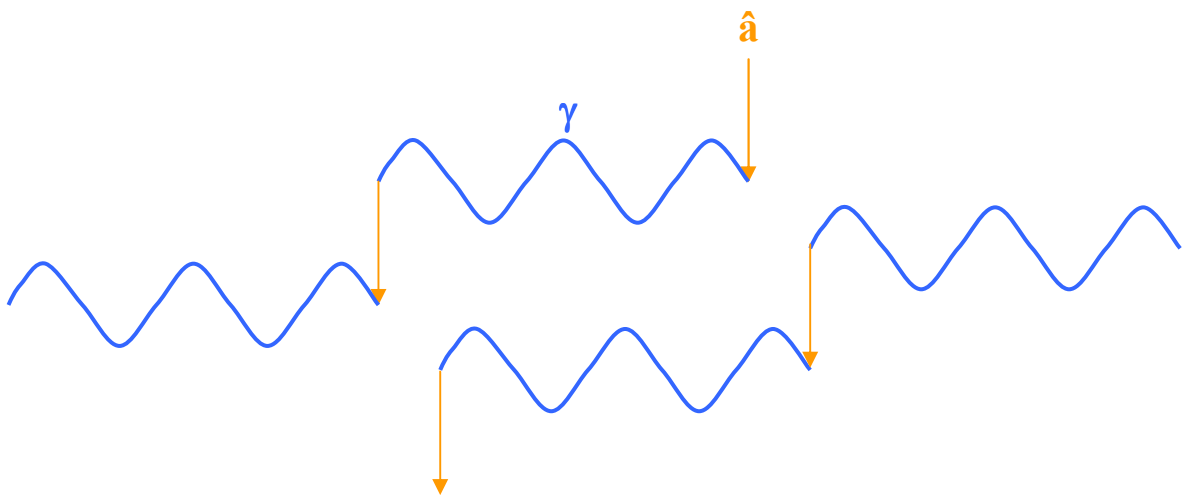
9.6.40.1 STL observed transformation nilparticle ↔ photon.



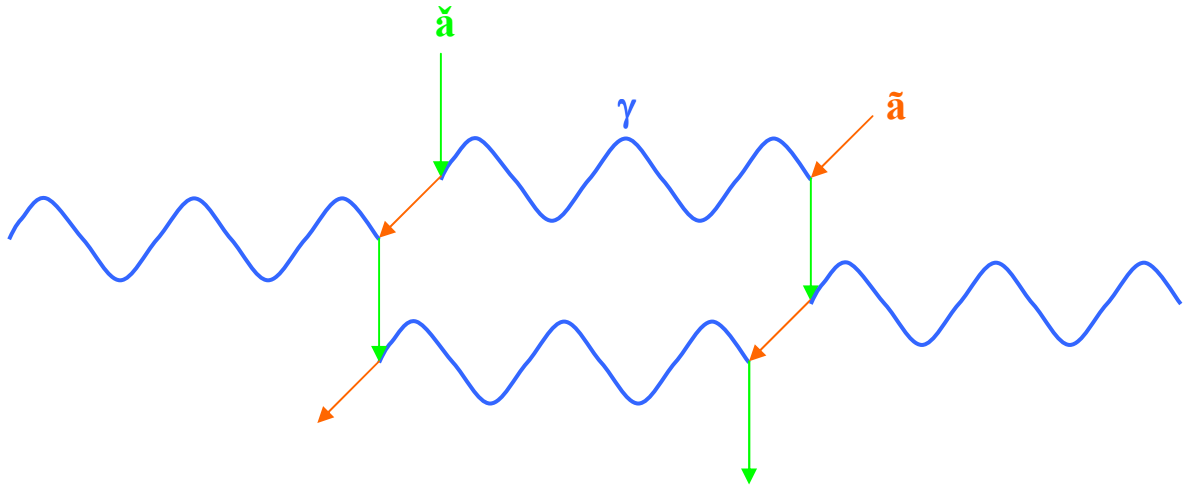
9.6.41 *SP and FTL observed cismatter-nilantimatter lattice.*



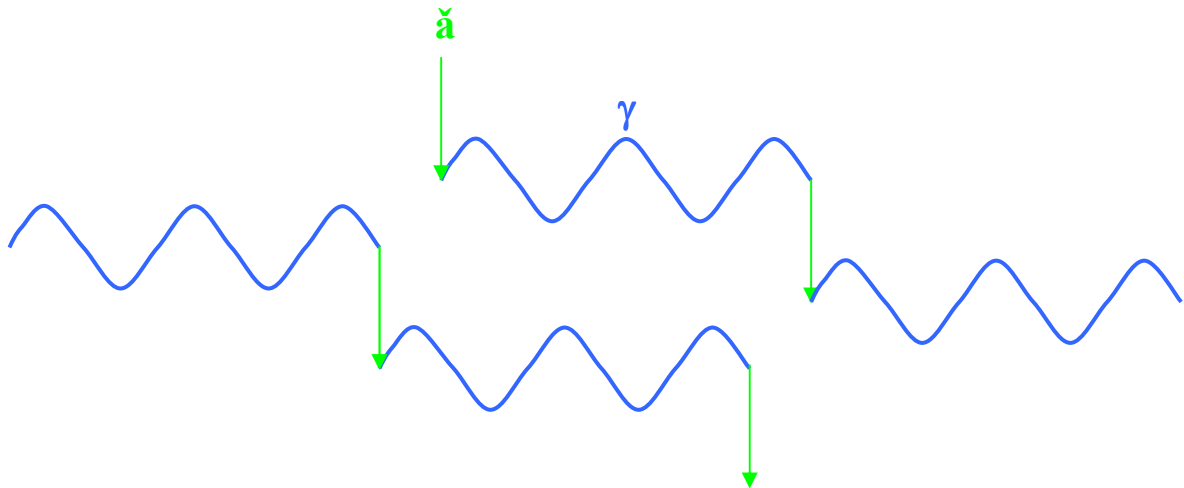
9.6.41.1 *STL observed cismatter-nilantimatter lattice.*



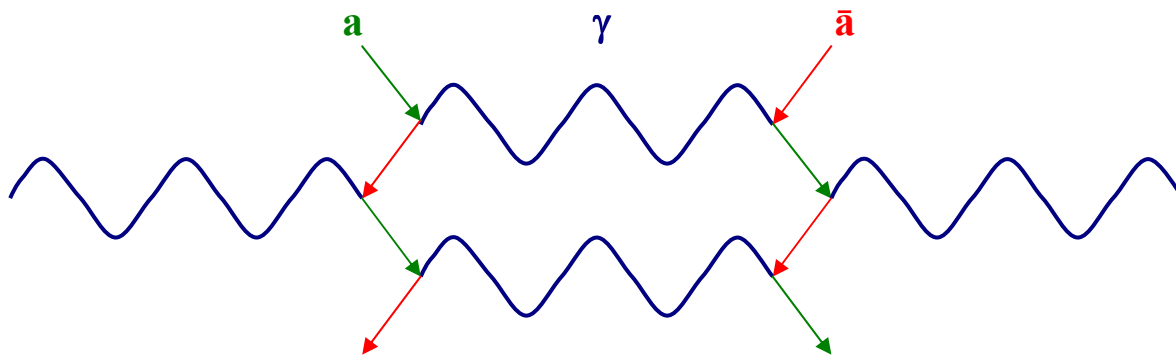
9.6.42 SP and FTL observed cisantimatter-nilmatter lattice.



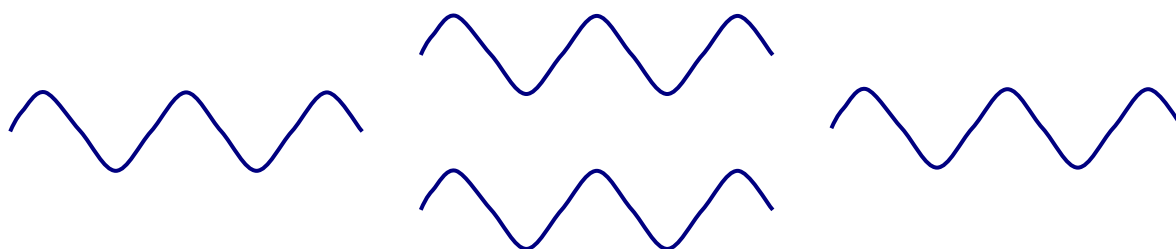
9.6.42.1 STL observed cisantimatter-nilmatter lattice.



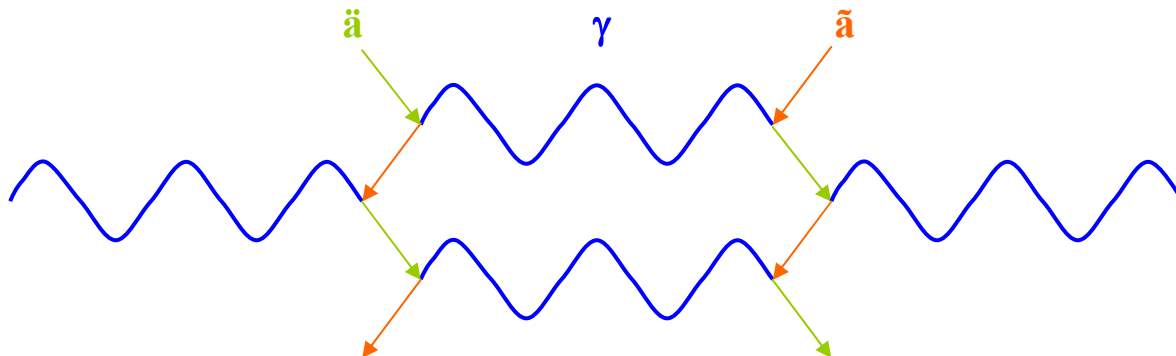
9.6.43 *SP and STL observed matter-antimatter lattice.*



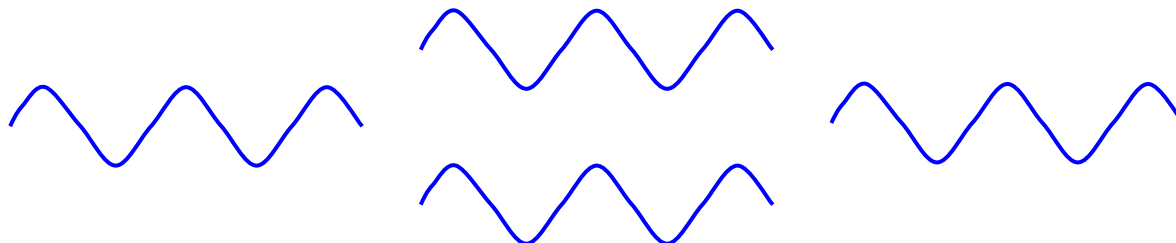
9.6.43.1 *FTL observed matter-antimatter lattice.*



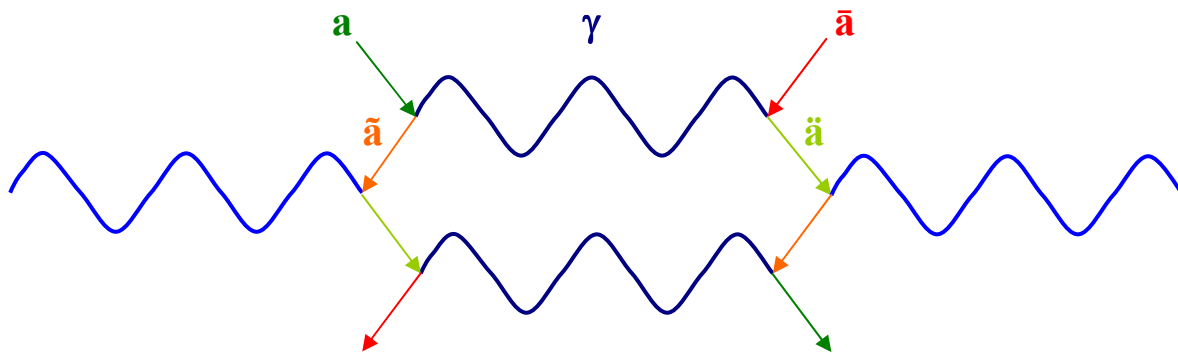
9.6.44 *SP and FTL observed cismatter-cisantimatter lattice.*



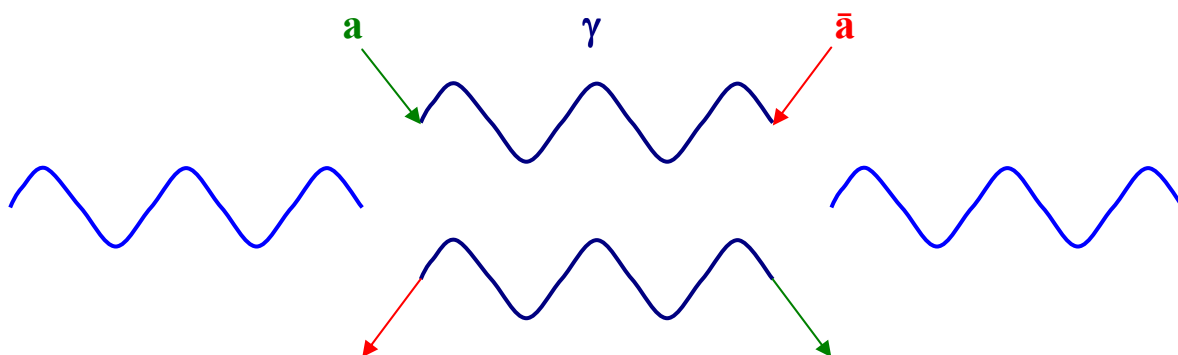
9.6.44.1 *STL observed cismatter-cisantimatter lattice.*



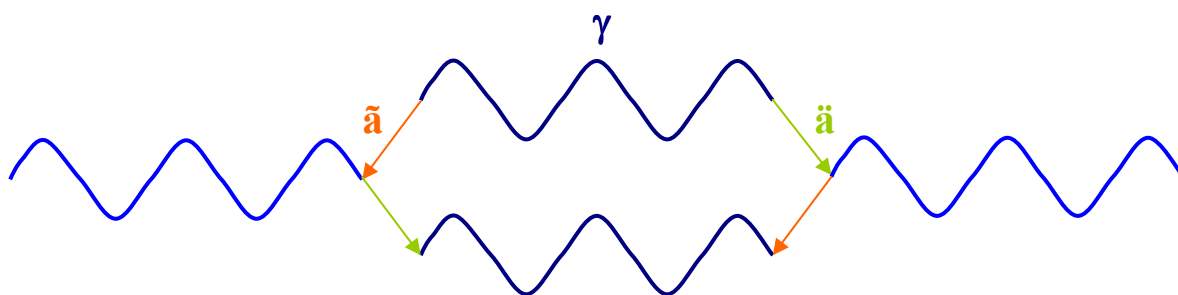
9.6.45 SP observed external matter-antimatter mixed lattice.



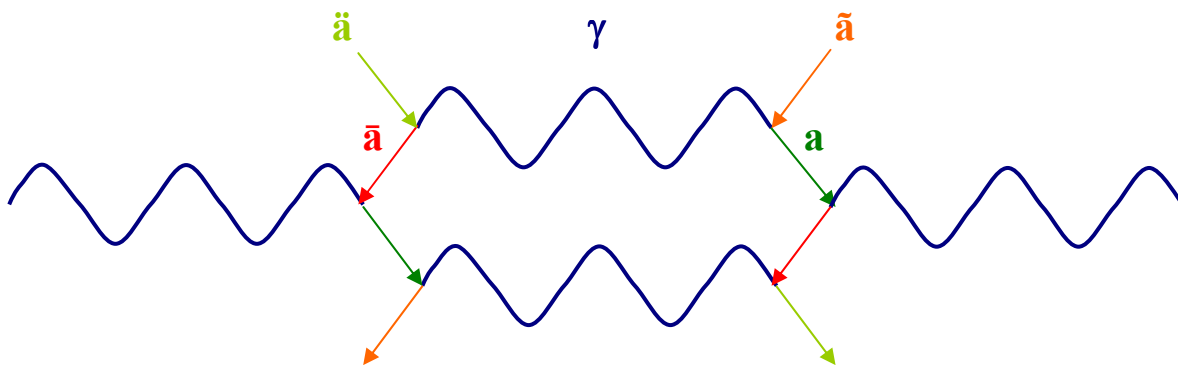
9.6.45.1 STL observed external matter-antimatter mixed lattice.



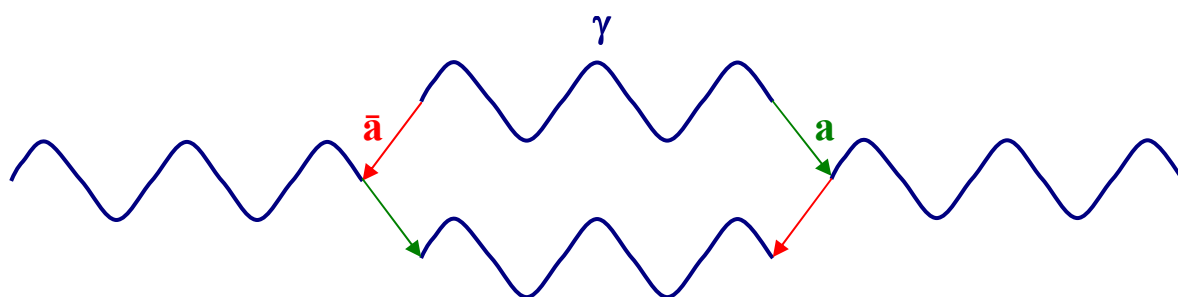
9.6.45.2 FTL observed external matter-antimatter mixed lattice.



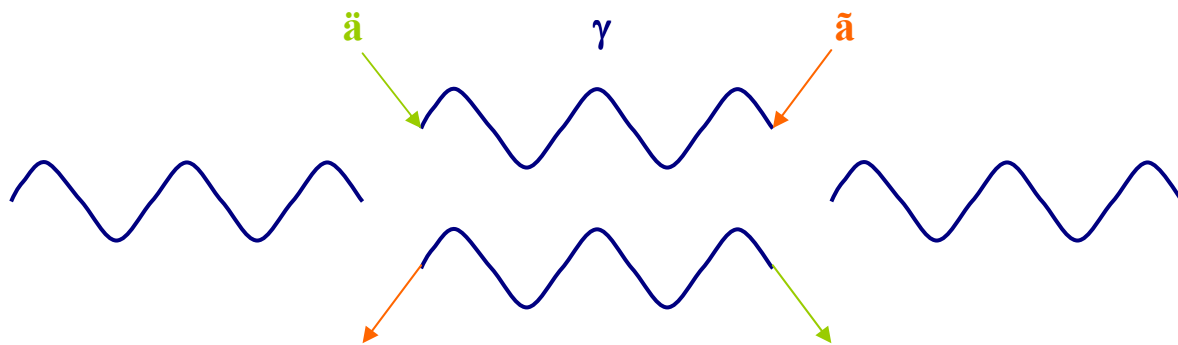
9.6.46 SP observed internal matter-antimatter mixed lattice.



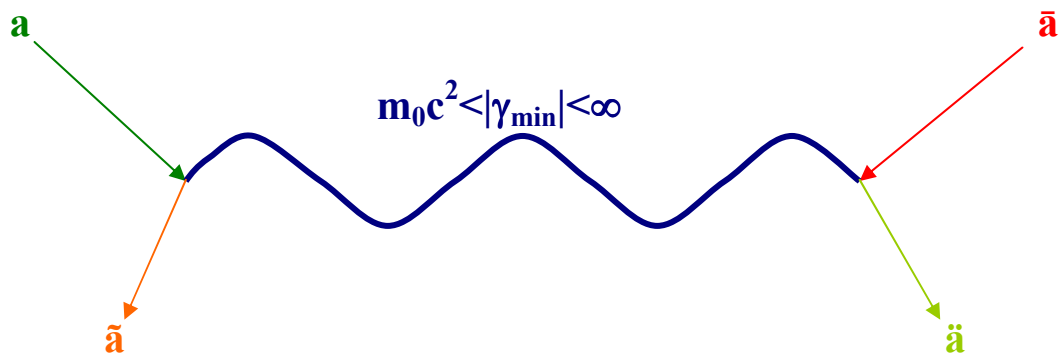
9.6.46.1 STL observed internal matter-antimatter mixed lattice.



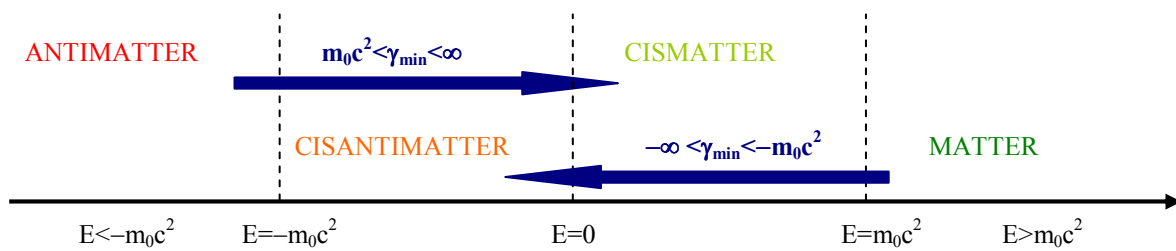
9.6.46.2 FTL observed internal matter-antimatter mixed lattice.



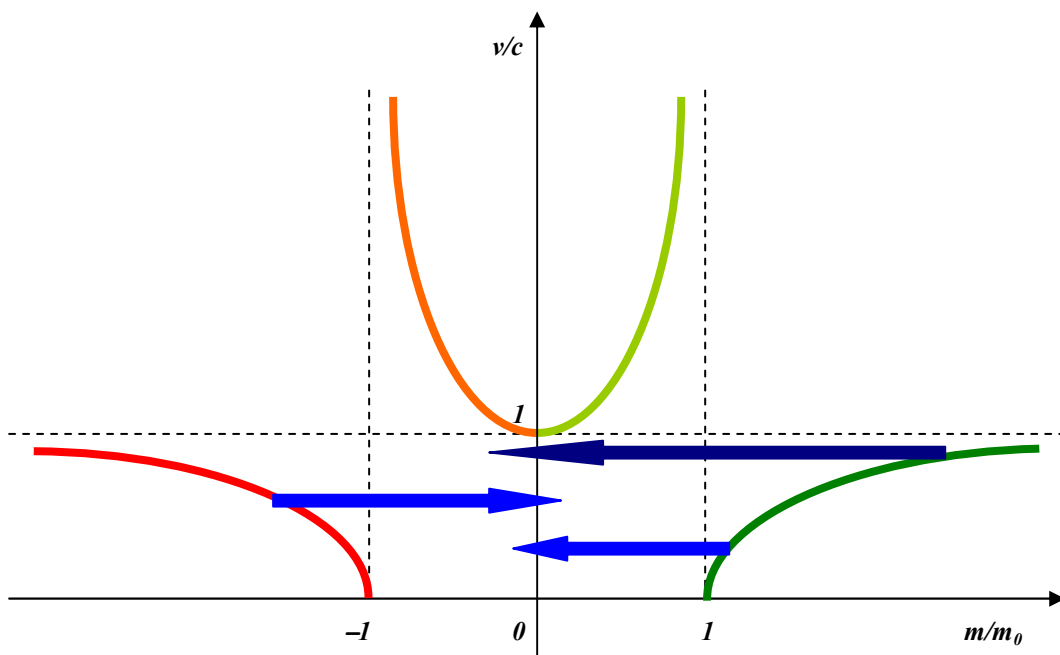
9.6.47 SP observed transformation of particle-cisparticle pair into antiparticle-cisparticle's.



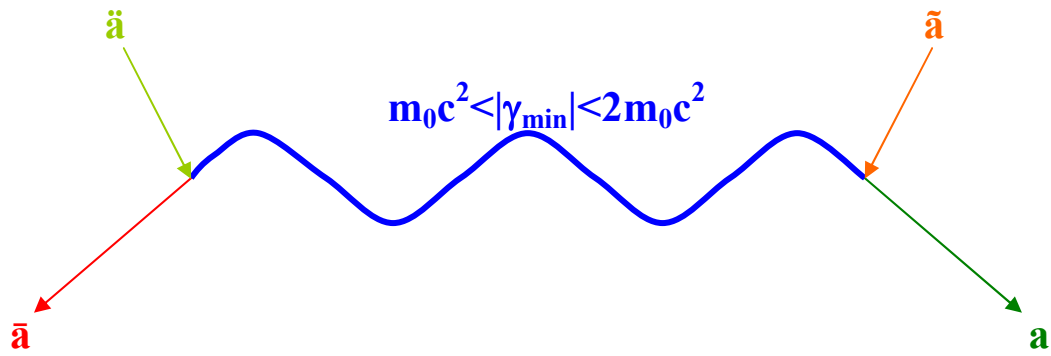
9.6.47.1  $\gamma_{min}$  necessary to enter cismass depends on particle's energy, between  $\pm m_0c^2$  and  $\pm\infty$ .



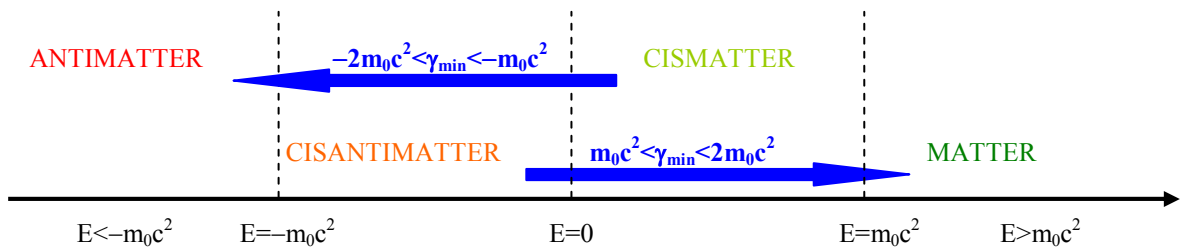
9.6.47.2 There is not a minimum energy sufficient for any transition transmass  $\rightarrow$  cismass.



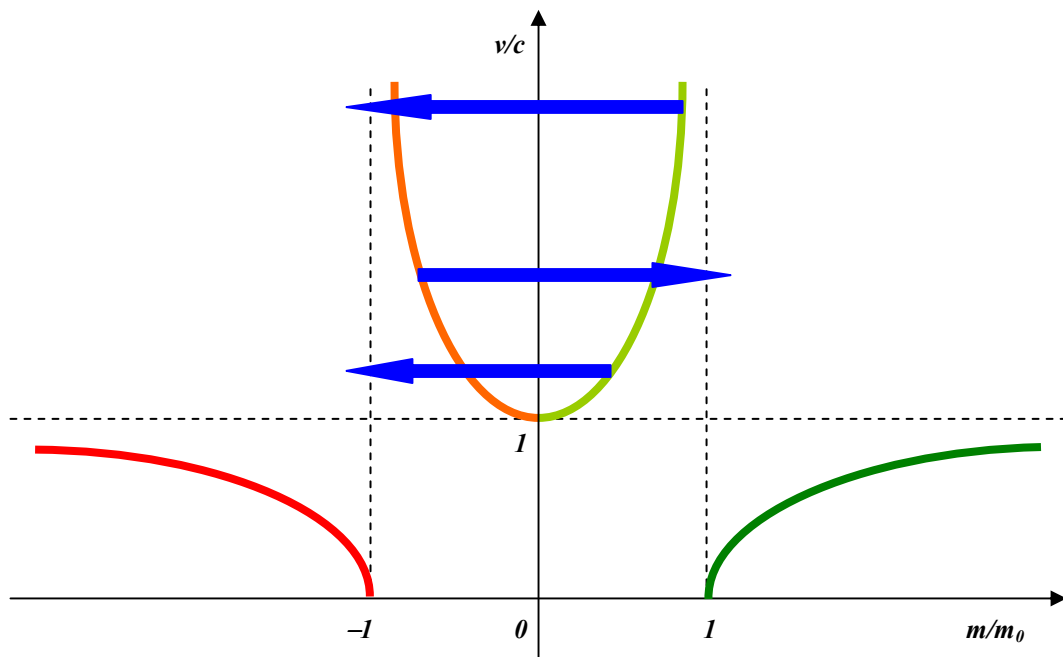
9.6.48 SP observed transformation of antiparticle-cisparticle pair into particle-cisantiparticle's.



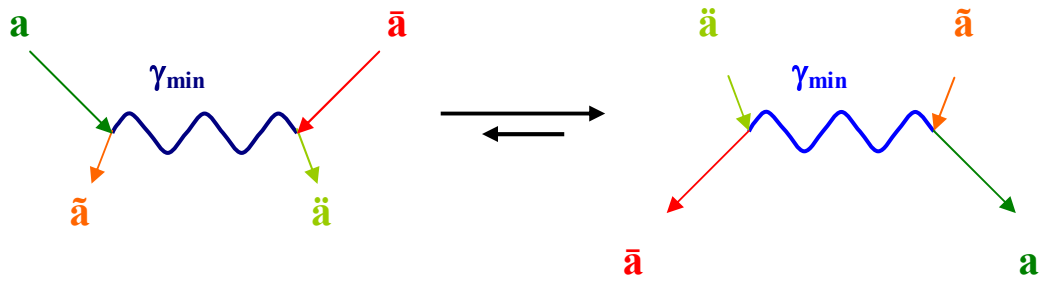
9.6.48.1  $\gamma_{min}$  to leave cismass depends on cisparticle's energy, between  $\pm m_0c^2$  and  $\pm 2m_0c^2$ .



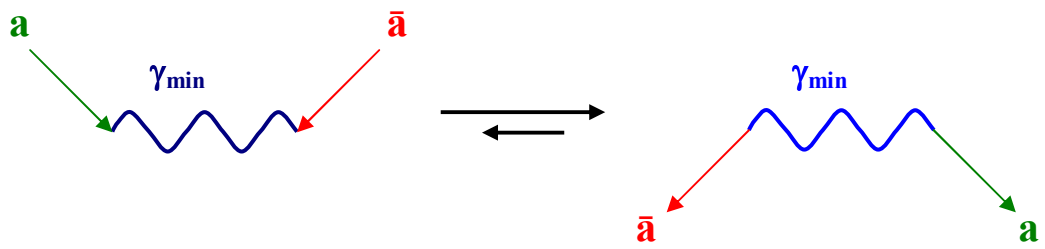
9.6.48.2 Minimum energy sufficient for any transition cismass  $\rightarrow$  transmass:  $E_{min} = 2m_0c^2$ .



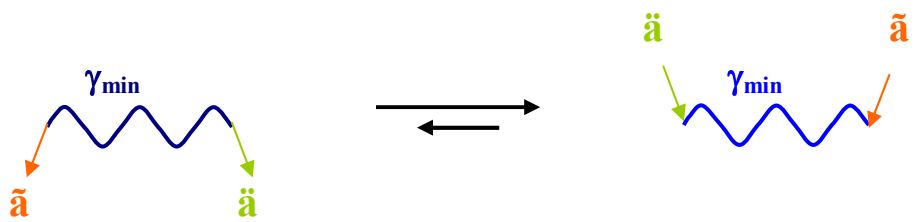
9.6.49 *SP observed energetically favourite matter and cisantimatter.*



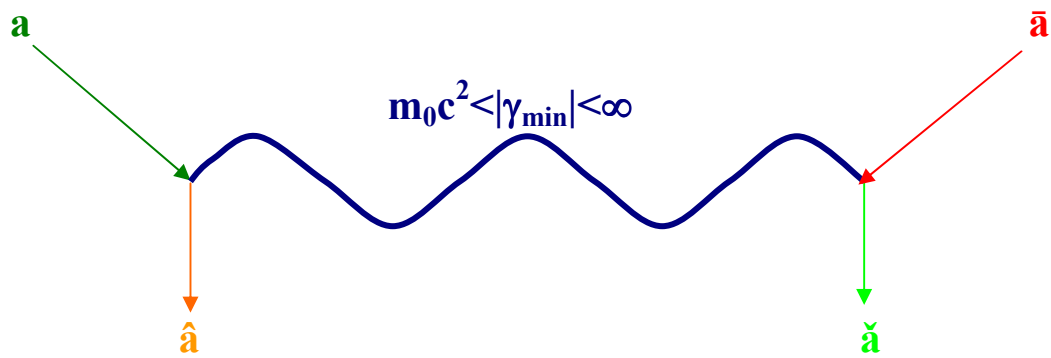
9.6.49.1 *STL observed violation of CP symmetry in favour of matter.*



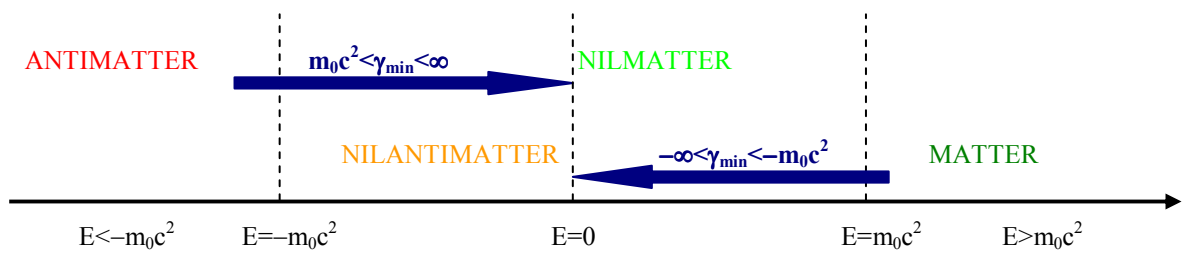
9.6.49.2 *FTL observed violation of CP symmetry in favour of cisantimatter.*



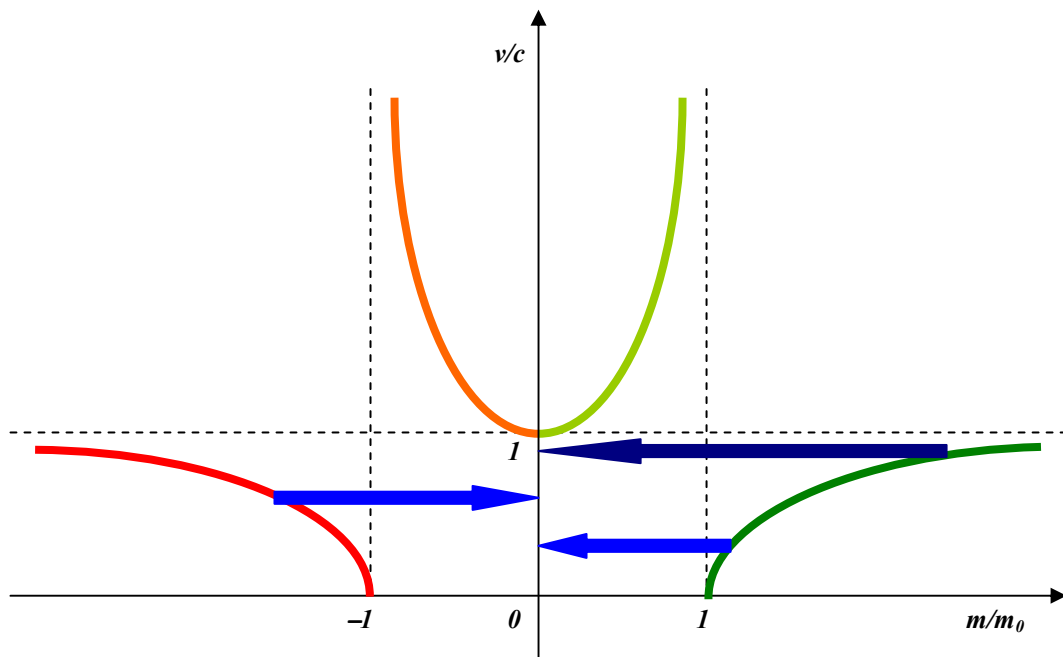
9.6.50 SP observed transformation of particle-nilantiparticle pair into antiparticle-nilparticle's.



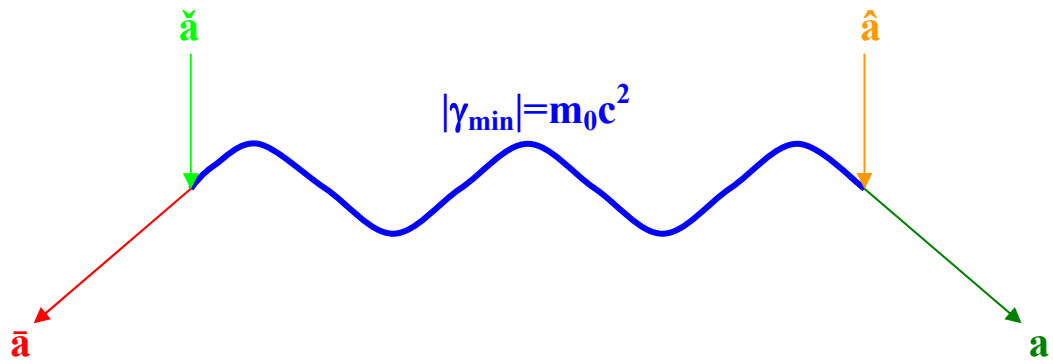
9.6.50.1  $\gamma_{min}$  necessary to become nilmass depends on particle's energy, between  $\pm m_0c^2$  and  $\pm\infty$ .



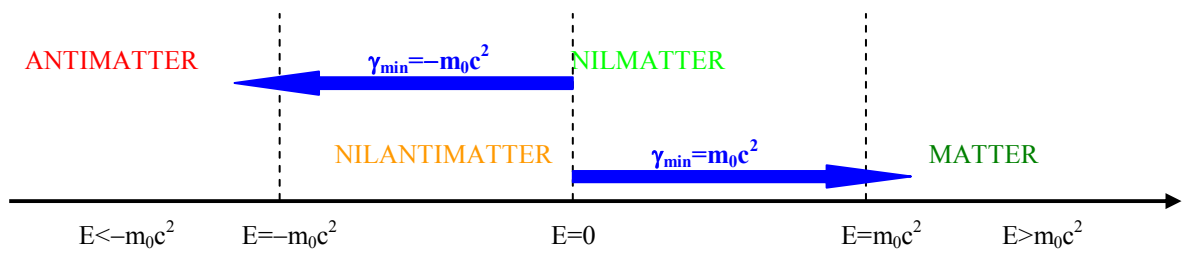
9.6.50.2 There is not a minimum energy sufficient for any transition transmass  $\rightarrow$  nilmass.



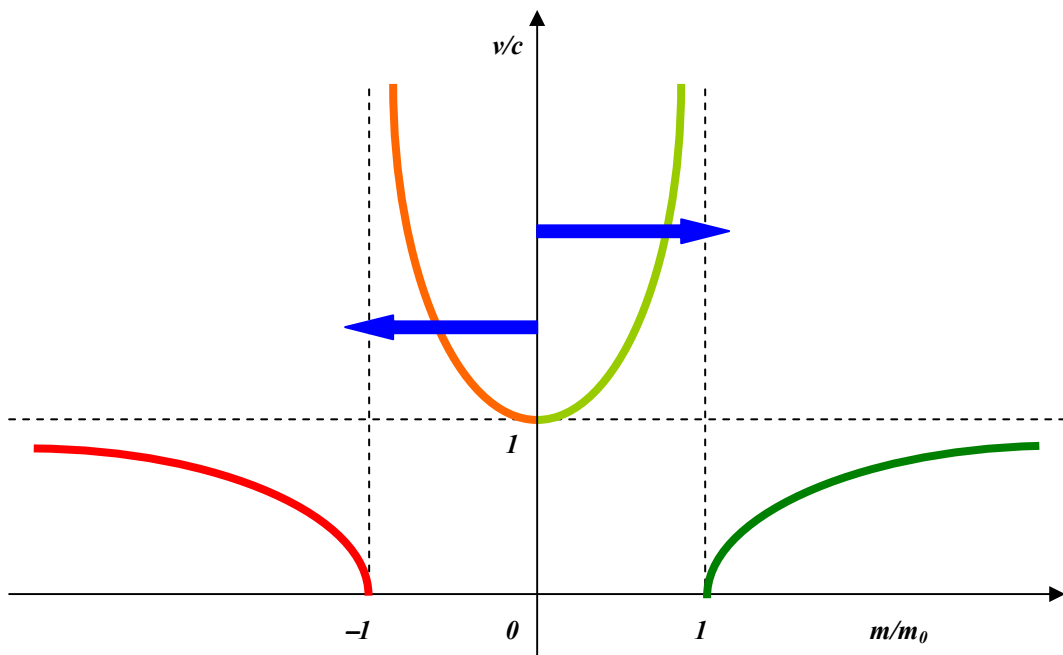
9.6.51 SP observed transformation of antiparticle-nilparticle pair into particle-nilantiparticle's.



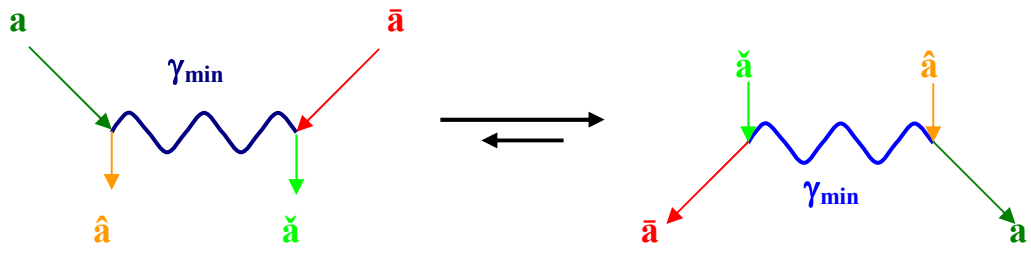
9.6.51.1  $\gamma_{min}$  necessary to come out of nilmass:  $\pm m_0 c^2$ .



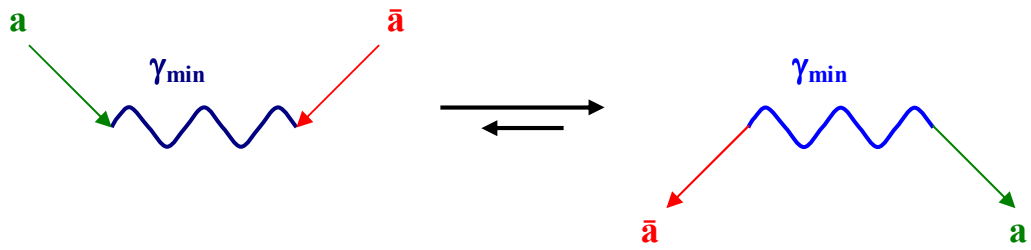
9.6.51.2 Minimum energy sufficient for any transition nilmass  $\rightarrow$  transmass:  $E_{min} = m_0 c^2$ .



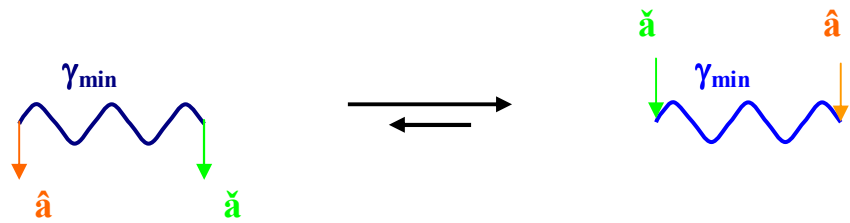
9.6.52 *SP observed energetically favourite matter and nilantimatter.*



9.6.52.1 *STL observed violation of CP symmetry in favour of matter.*

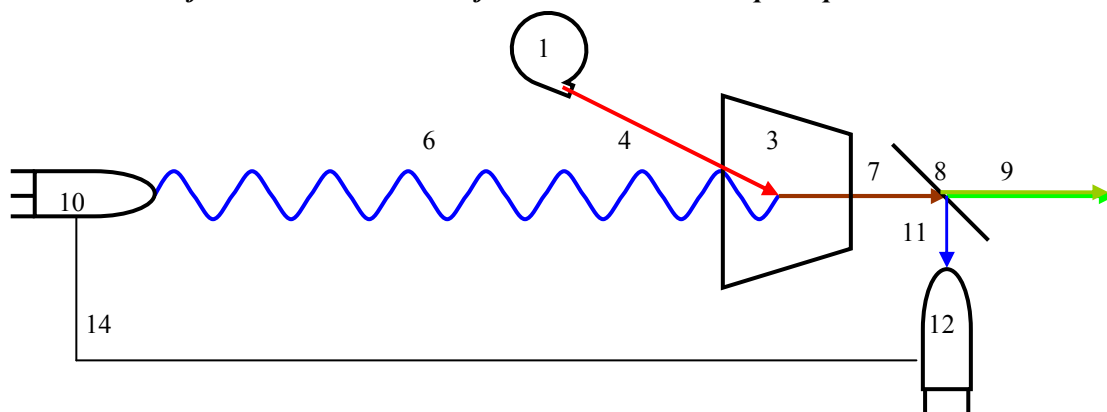


9.6.52.2 *FTL observed violation of CP symmetry in favour of nilantimatter.*

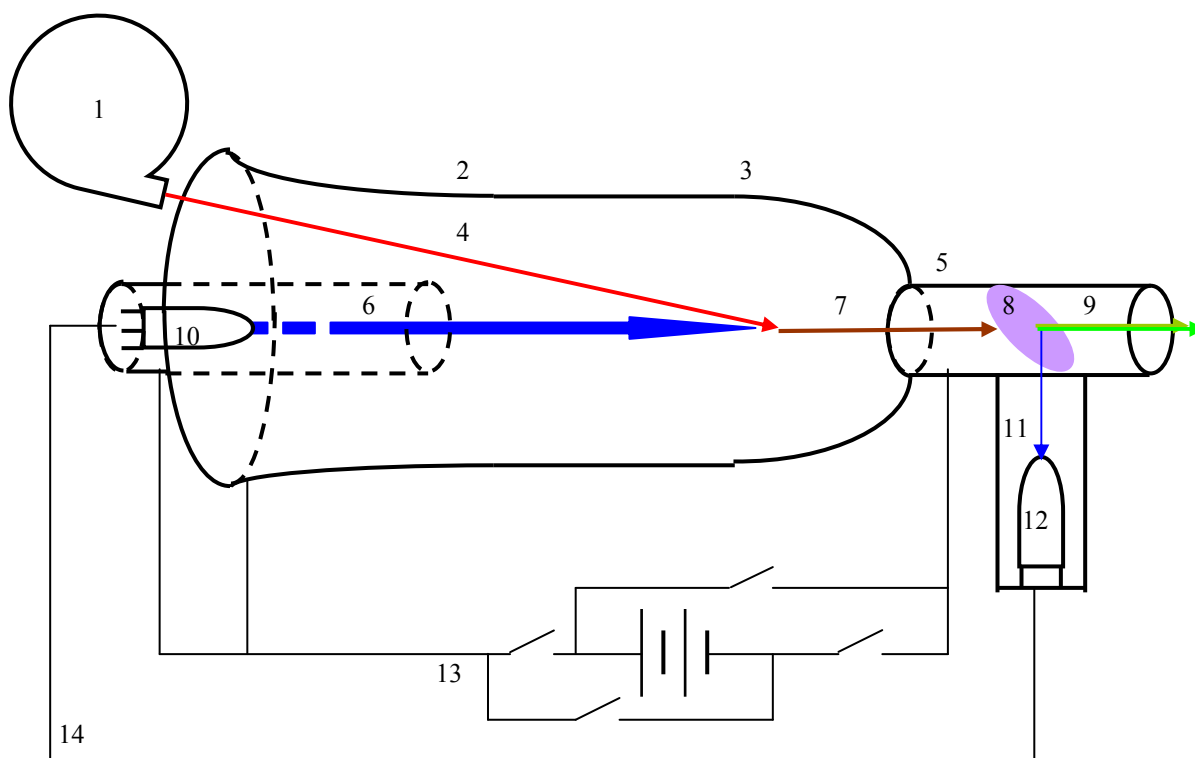


**9.7 Practical applications.**

**9.7.1 Generator of nilmatter or cismatter from antimatter: conceptual plan.**



**9.7.2 Generator of nilmatter or cismatter from antimatter: project plan.**



**9.7.3 Generator of nilmatter or cismatter from antimatter: caption.**

- |  |                                      |
|--|--------------------------------------|
| 1) Antiparticles' generator.                                 | 8) Mirror.                           |
| 2) Conveyor.   | 9) Beam of nilmatter or cismatter.   |
| 3) Conversion chamber.                                       | 10) Laser diode.                     |
| 4) Antiparticles beam.                                       | 11) Laser ray going out.             |
| 5) Nozzle with ionic neutralizzator.                         | 12) Photodiode.                      |
| 6) Laser ray at adjustable frequency coming in.              | 13) Switch anode/catode.             |
| 7) Beam of nilparticles (or cisparticles), ions and photons. | 14) Feedback photodiode↔laser diode. |

**9.7.4 Generator of nilmatter or cismatter from antimatter: explanation.**

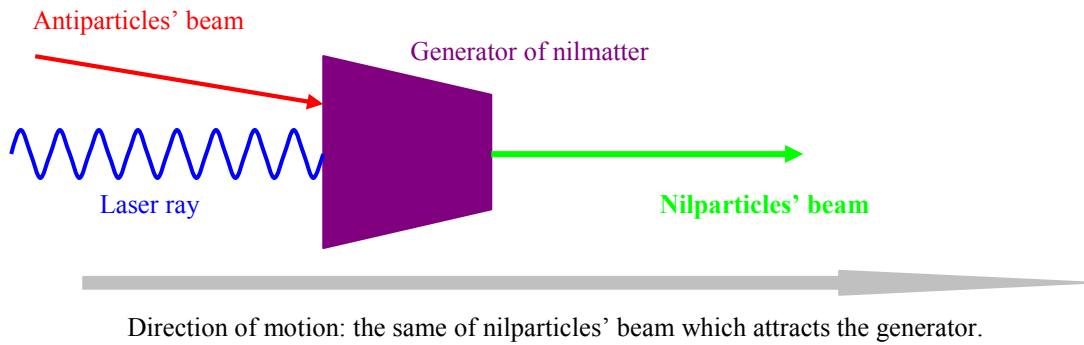
Denote:  $h$ =Plank's constant,  $n$ =antiparticles' number,  $\langle m \rangle$ =average mass,  $\nu$ =laser ray's frequency.

Cismatter's generation requires a laser ray whose frequency is:

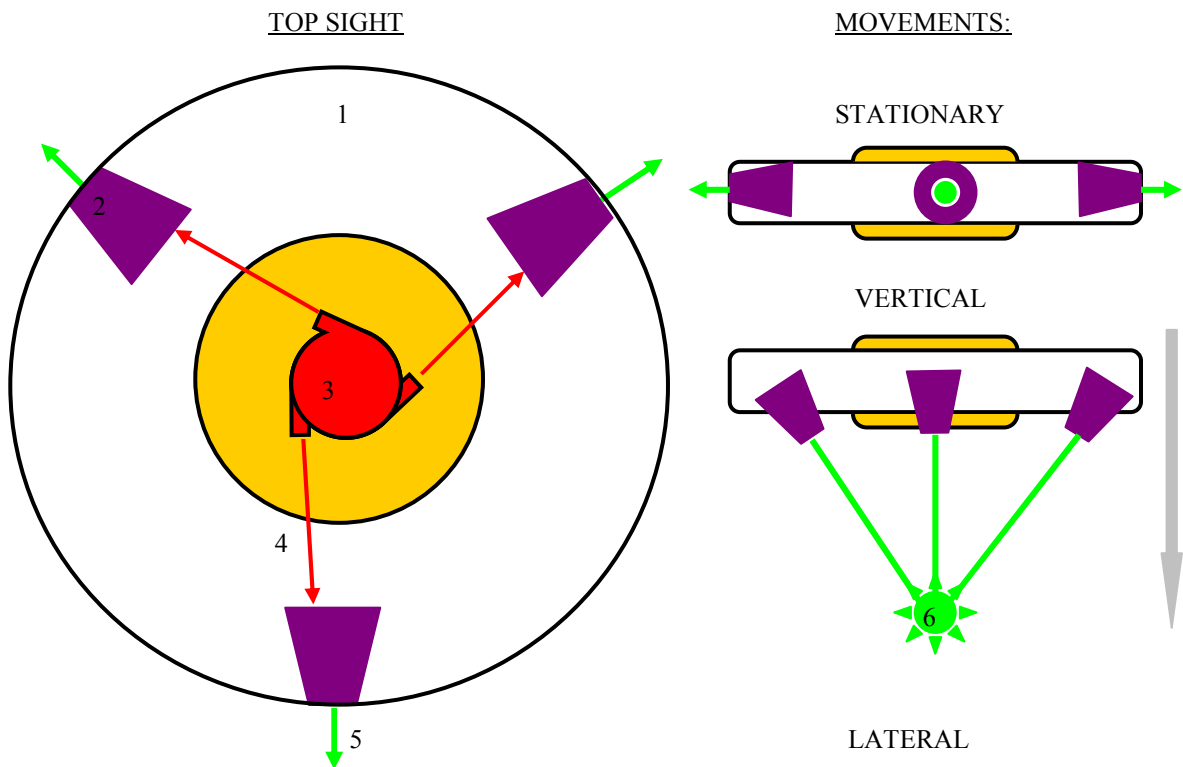
$$\nu_{\text{cismatter}} = n_{\text{antiparticles}} * (\langle m_{\text{cisparticle}} \rangle - \langle m_{\text{antiparticle}} \rangle) * c^2 / h.$$

$$\text{Nilmatter's generation requires: } \nu_{\text{nilmatter}} = n_{\text{antiparticles}} * (m_{\text{nilparticle}} - \langle m_{\text{antiparticle}} \rangle) * c^2 / h = n_{\text{antiparticles}} * |\langle m_{\text{antiparticle}} \rangle| * c^2 / h.$$

**9.7.5 Generator of nilparticles' beams used as attractor: conceptual plan.**

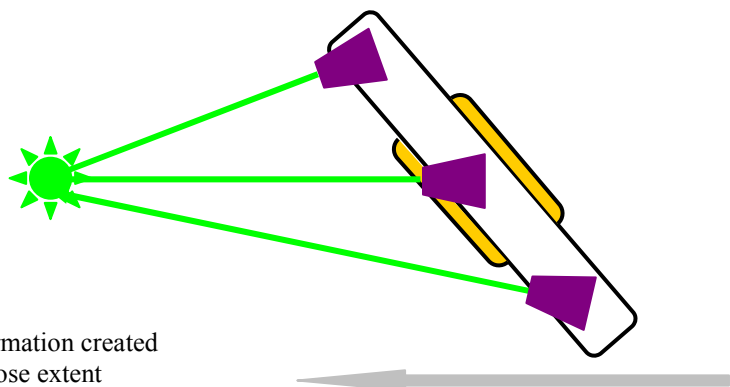


**9.7.6 Aircraft with generators of nilparticles: project plan.**



**9.7.7 Nilparticles' aircraft: caption.**

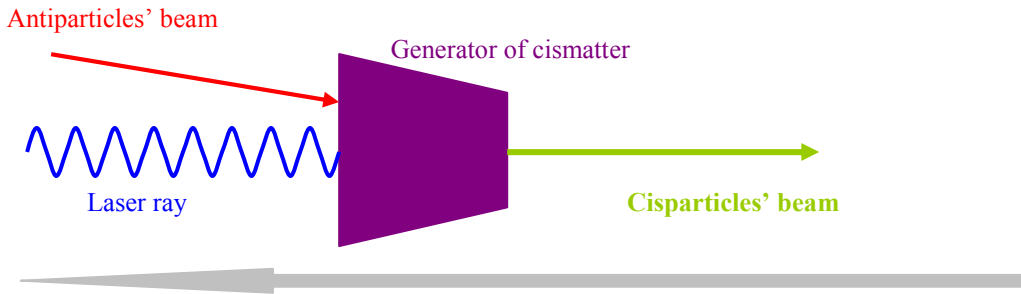
- 1) Aircraft's frame.
- 2) Nilmatter's generator.
- 3) Antimatter's generator.
- 4) Antiparticles' beam.
- 5) Nilparticles' beam.
- 6) Nilparticles' bubble.



**9.7.8 Nilparticles' aircraft: explanation.**

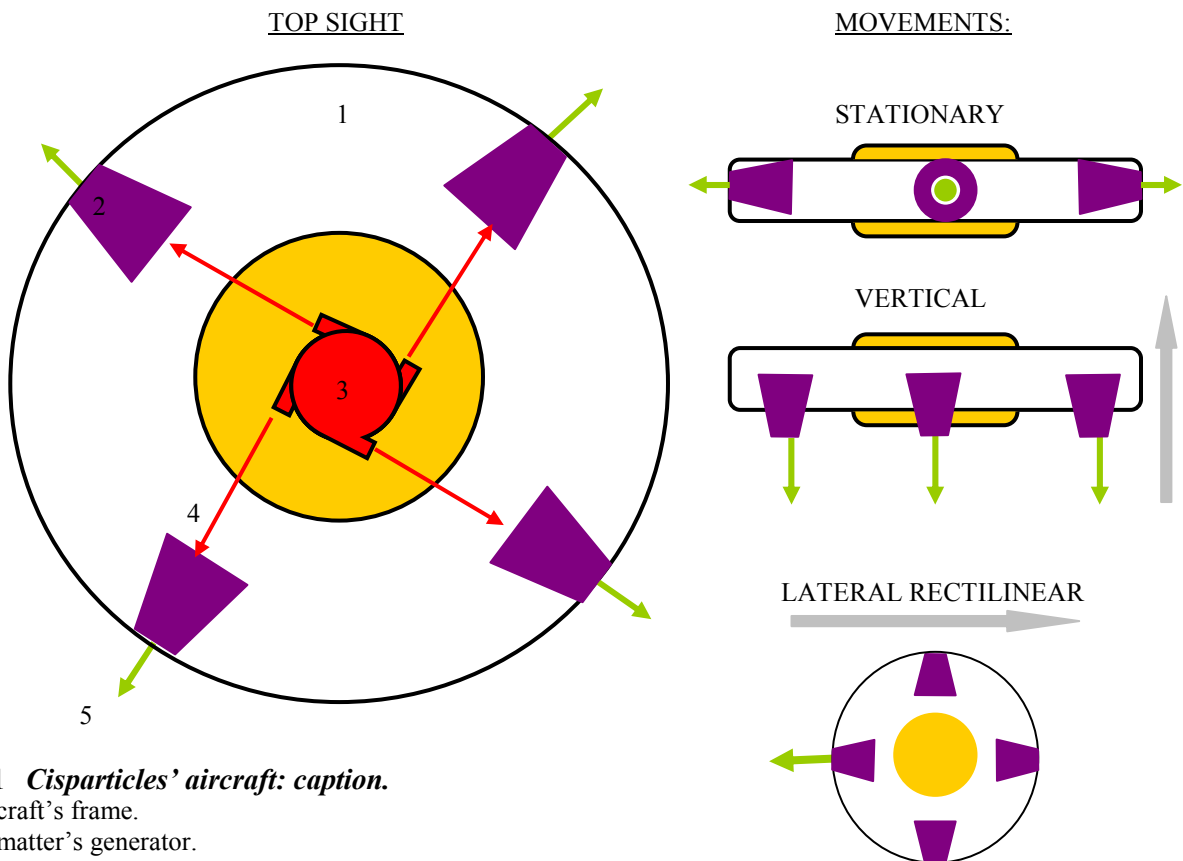
In the place where nilparticles meet the formed nilmatter's bubble attracts the aircraft towards it. Hence the aircraft runs after a space-time's deformation created by itself, exactly as due to a huge close mass whose extent is adjusted at pleasure according to beams' consistencies. By orientating beams the velocity's direction is governed as well.

**9.7.9 Generator of cisparticles' beams as propeller: conceptual plan.**



Direction of motion: opposite to cisparticles' beam which pushes the generator backwards.

**9.7.10 Aircraft with generators of cisparticles: project plan.**



**9.7.11 Cisparticles' aircraft: caption.**

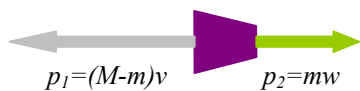
- 1) Aircraft's frame.
- 2) Cismatter's generator.
- 3) Antimatter's generator.
- 4) Antiparticles' beam.
- 5) Cisparticles' beam.

**9.7.12 Cisparticles' aircraft: explanation.**

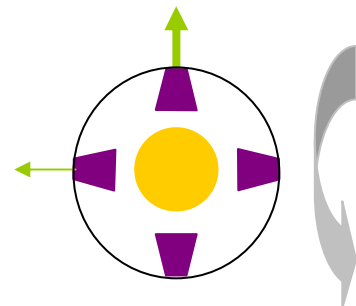
Assuming valid the conservation of *movement quantity*  $p_1=p_2$  for a SP oberver, the speed of aircraft  $v$  is linked to the aircraft's mass  $M$ , to the beam of expelled cismass  $m$  and to the same beam's speed  $w$ , by equation:  $v=mw/(M-m)$ .

Since  $m \ll M$ , cismass must have a velocity  $w \gg v$ , i.e. the cisparticles' mass should get close to the particles'  $m_0$  at rest.

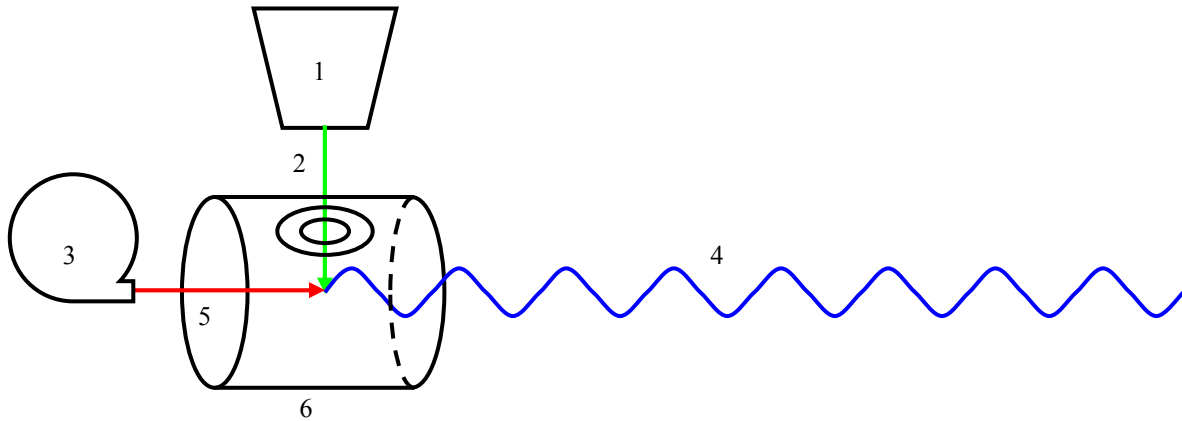
It requires a laser ray of frequency:  $\nu \cong n_{\text{antiparticles}} * (m_0 - \langle m_{\text{antiparticle}} \rangle) * c^2/h$ .



**LATERAL CURVILINEAR**



**9.7.13 Neutralizer of nilmatter: project plan.**



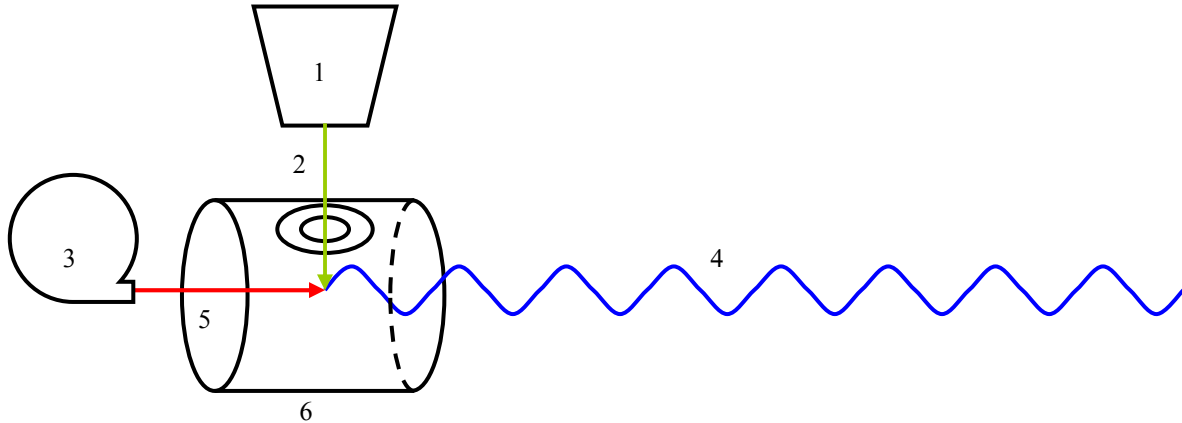
**9.7.14 Neutralizer of nilmatter: caption.**

- 1) Nilparticles' generator.
- 2) Nilparticles' beam coming in.
- 3) Antiparticles' generator.
- 4) Photons' beam going out.
- 5) Antiparticles' beam.
- 6) Conversion chamber:  $\bar{a}+\check{a}\rightarrow\gamma$ .

**9.7.15 Neutralizer of nilmatter: explanation.**

An antiparticles' beam collides with a nilparticles' one according to conversion into photons:  $\bar{a}+\check{a}\rightarrow\gamma$ .

**9.7.16 Neutralizer of cismatter: project plan.**



**9.7.17 Neutralizer of cismatter: caption.**

- 1) Cisparticles' generator.
- 2) Cisparticles' beam coming in.
- 3) Antiparticles' generator.
- 4) Photons' beam going out.
- 5) Antiparticles' beam.
- 6) Conversion chamber:  $\bar{a}+\check{a}\rightarrow\gamma$ .

**9.7.18 Neutralizer of cismatter: explanation.**

An antiparticles' beam collides with a cisparticles' one according to conversion into photons:  $\bar{a}+\check{a}\rightarrow\gamma$ .

# General Relativity Extension

## 1 SYNTHESIS

The proof of time's tridimensional nature completes the General Theory of Relativity, with the consequent six-dimensional extension of Einstein field equations.

While Einstein's GR geometrically explains *gravity* as space-time curvature due to the "stress-energy-momentum" four-dimensional tensor, similarly in Bonacci's extension *all the observed interactions* are unitarily interpretable as space-time modifications linked to the six-dimensional source tensor "stress-energy-momentum-electroweak charges-colour charges".

Thus we obtain the reduction of all forces to a unique geometrodynamics, the *six-dimensional continuum* symmetrically distinguished between three spatial and three temporal coordinates.

## 2 INTRODUCTION

**Keywords:** tridimensional time, tangential, angular, radial, six-dimensional continuum

**Abstract:** The purpose of the paper is the General Relativity's completion based on the tridimensional extension of time and consequent formulation of a six-dimensional continuum able to unitarily explain the apparent multiplicity of observed interactions. An ideal experiment carried out by a diode-photodiode reference in uniform circular motion gives three different temporal values according to the orientation of measurement so showing how time is at least *tridimensional*.

The bidimensional increase permits the *geometrodynamics* introduced by Einstein, so far valid for the gravitational interaction only, to describe all natural forces. In fact, beyond stress-energy-momentum, the source tensor at six dimensions  $T_{\mu\nu}$  can include also electroweak and colour charges among its own components. Analogously the six-dimensional variation principle can account for all the known conservation laws.

The reasons why forces seem manifold, instead of the same entity's manifestation, are at least three:

- 1) the habit to consider time as a monodimensional scalar;
- 2) the attitude to consider isotropic the interactions;
- 3) the highly complex structure of all observable bodies.

The efficacy of the hexadimensional geometrodynamics is immediately evident by the simplest model, a structureless rotating sphere, whose anisotropic interactive frame is able to coherently explain some phenomena of contemporary physics:

- 1) the condensed *Cooper pairs* in superconductors;
- 2) the *weight reduction* in Podkletnov shield and Searl effect;
- 3) the black hole *jet* and *accretion disk*;
- 4) the *quasi-coplanar distribution* of stars in the galaxies and of planets in the solar system;
- 5) the *hadronic confinement* and the *asymptotic freedom* of quarks.

More complex models, involving several bodies with different shapes, velocities, trajectories and distances, can explain the whole variety of the interactions.

There are some practical applications deriving directly from the six-dimensional theory:

- 1) rotating disks assimilable to structureless flat bodies generating *hypergravity* or *subgravity*;
- 2) rotating cylinders assimilable to structureless filiform bodies generating *hypergravity*.

Therefore *subgravity* and *hypergravity* are possible alternative sources of energy whose efficiency is however limited by building problems.

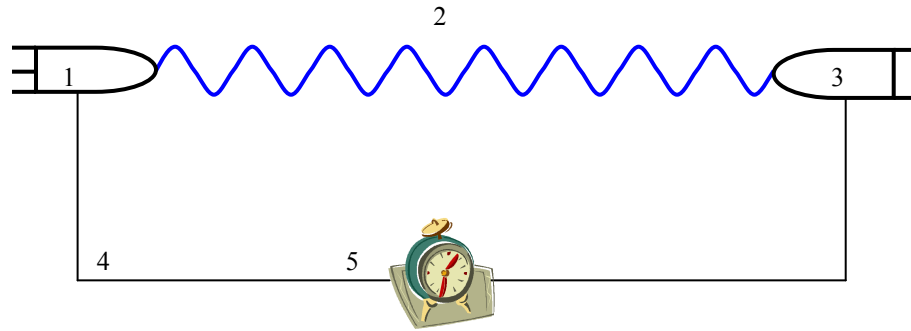
### 3 DEFINITIONS

- 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 *GR* the acronym for *General Relativity*.
- 3.4 Denote *URM* the acronym for *Uniform Rectilinear Motion*.
- 3.5 Denote *UCM* the acronym for *Uniform Circular Motion*.
- 3.6 Denote *DP* the *Diode–Photodiode* reference system.
- 3.7 Let  $\mathbf{v}$  be the tangential velocity vector of reference DP, *i.e.* of the *diode*.
- 3.8 Let  $\mathbf{r}$  be the *radius of curvature* vector of reference DP, *i.e.* of the *diode*.
- 3.9 Let  $\boldsymbol{\omega}$  be the *angular velocity* vector of reference DP, *i.e.* of the *diode*:  $\mathbf{v}=\boldsymbol{\omega}\mathbf{r}$ .
- 3.10 Let  $d$  be the real trajectory of the diode, *i.e.* in any immobile reference system.
- 3.11 Let  $c$  be the speed of light in vacuo.
- 3.12 Denote  $\beta=v/c$  the ratio between DP tangential velocity and speed of light.
- 3.13 Denote  $\gamma=(1-\beta^2)^{-1/2}$  the Lorentz coefficient relative to the reference DP.
- 3.14 Let  $\Delta t_0$  be the time-interval at rest, *i.e.* measured when DP is immobile.
- 3.15 Let  $l_0=c\Delta t_0$  be the laser ray trajectory at rest, *i.e.* measured when DP is immobile.
- 3.16 Let  $\Delta t$  be the time-interval measured in motion, *i.e.* when DP moves at velocity  $v$ .
- 3.17 Let  $\Delta t_i$  be the inertial time-interval, *i.e.* measured when DP is in URM.
- 3.18 Let  $\Delta\tau$  be the tangential time-interval, *i.e.* measured when DP is on a plane perpendicular to  $\mathbf{v}$ .
- 3.19 Let  $l_\tau=c\Delta\tau$  be the laser ray trajectory emitted in *angular* direction, *i.e.* in the way of  $\boldsymbol{\omega}$ .
- 3.20 Let  $d_i=v\Delta t$  be the *inertial* trajectory of the diode, *i.e.* rectified in tangential direction.
- 3.21 Let  $\Delta\theta$  be the *angular* time-interval, *i.e.* measured when DP is on a plane perpendicular to  $\boldsymbol{\omega}$ .
- 3.22 Let  $l_\theta=c\Delta\theta$  be the laser ray trajectory emitted in *radial* direction, *i.e.* in the way of  $\mathbf{r}$ .
- 3.23 Let  $\Delta\rho$  be the *radial* time-interval, *i.e.* measured when DP is on a plane perpendicular to  $\mathbf{r}$ .
- 3.24 Let  $l_\rho=c\Delta\rho$  be the laser ray trajectory emitted in *tangential* direction, *i.e.* in the way of  $\mathbf{v}$ .
- 3.25 Let  $m_0$  be the mass at rest, *i.e.* measured when immobile.
- 3.26 Let  $m$  be the total mass, *i.e.* measured at velocity  $v$ .
- 3.27 Let  $xyz$  be a *space Cartesian* reference, *i.e.* three orthogonal axes in a Euclidean flat space.
- 3.28 Let  $t_x t_y t_z$  be a *time Cartesian* reference, *i.e.* the three orthogonal planes  $t_x, t_y, t_z$  among the axes  $x, y, z$ .
- 3.29 Let  $xyz t_x t_y t_z$  be a *space-time Cartesian reference*, *i.e.* three orthogonal axes  $x, y, z$  and relative planes  $t_x, t_y, t_z$ .
- 3.30 Let  $P(x, y, z, t_x, t_y, t_z)$  be the *position* in a six-dimensional Cartesian reference.
- 3.31 Let  $X_1 X_2 X_3 X_4 X_5 X_6$  be a Gaussian reference in a six-dimensional curved space.
- 3.32 Let  $E(X_1, X_2, X_3, X_4, X_5, X_6)$  be the space-time event in the six-dimensional continuum.
- 3.33 Let  $ds$  be the *line element*:  $\delta ds=0$ .

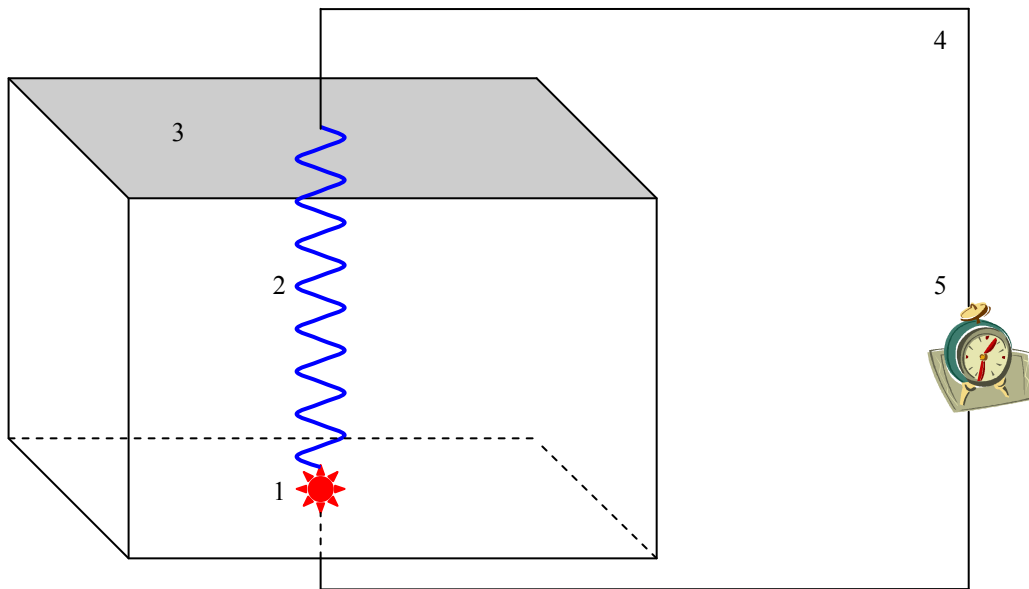
- 3.34 Denote  $g_{\mu\nu}$ , with  $\mu, \nu=1,2,3,4$ , the relativistic four-dimensional *metric tensor*.
- 3.35 Denote  $g_{\mu\nu}$ , with  $\mu, \nu=1,2,3,4,5,6$ , the metric *six-dimensional tensor*.
- 3.36 Denote  $ds^2=g_{\mu\nu}dx_\mu dx_\nu$ , with  $\mu, \nu=1,2,3,4$ , the relativistic four-dimensional *quadratic invariant*.
- 3.37 Denote  $ds^2=g_{\mu\nu}dx_\mu dx_\nu$ , with  $\mu, \nu=1,2,3,4,5,6$ , the *six-dimensional quadratic invariant*.
- 3.38 Denote  $R_{\mu\nu}$ , with  $\mu, \nu=1,2,3,4$ , the relativistic four-dimensional *Ricci Curvature Tensor*.
- 3.39 Denote  $R_{\mu\nu}$ , with  $\mu, \nu=1,2,3,4,5,6$ , the *six-dimensional Ricci Curvature Tensor*.
- 3.40 Denote  $R^4=R_a^a=R_{11}+R_{22}+R_{33}+R_{44}$ , the relativistic *scalar curvature*, trace of four-dimensional tensor  $R_{\mu\nu}$ .
- 3.41 Denote  $R^6=R_a^a=R_{11}+R_{22}+R_{33}+R_{44}+R_{55}+R_{66}$ , the scalar curvature trace of *six-dimensional tensor*  $R_{\mu\nu}$ .
- 3.42 Denote  $\nabla^\mu(R_{\mu\nu}-1/2Rg_{\mu\nu})=0$ , with  $\mu, \nu=1,2,3,4$ , the relativistic four-dimensional *contracted Bianchi identities*.
- 3.43 Denote  $\nabla^\mu(R_{\mu\nu}-1/2Rg_{\mu\nu})=0$ , with  $\mu, \nu=1,2,3,4,5,6$ , the *six-dimensional contracted Bianchi identities*.
- 3.44 Denote  $G_{\mu\nu}=R_{\mu\nu}-1/2g_{\mu\nu}R$ , with  $\mu, \nu=1,2,3,4$ , the relativistic four-dimensional *Einstein Tensor*.
- 3.45 Denote  $G_{\mu\nu}=R_{\mu\nu}-1/2g_{\mu\nu}R$ , with  $\mu, \nu=1,2,3,4,5,6$ , the *six-dimensional Einstein Tensor*.
- 3.46 Denote  $T_{\mu\nu}$ , with  $\mu, \nu=1,2,3,4$ , the relativistic four-dimensional *source tensor*.
- 3.47 Denote  $T_{\mu\nu}$ , with  $\mu, \nu=1,2,3,4,5,6$ , the *six-dimensional source tensor*.
- 3.48 Denote  $\nabla^\mu T_{\mu\nu}=0$ , with  $\mu, \nu=1,2,3,4$ , the relativistic four-dimensional *conservation equations*.
- 3.49 Denote  $\nabla^\mu T_{\mu\nu}=0$ , with  $\mu, \nu=1,2,3,4,5,6$ , the *six-dimensional conservation equations*.
- 3.50 Denote  $G_{\mu\nu}=kT_{\mu\nu}$ , with  $\mu, \nu=1,2,3,4$ , the relativistic four-dimensional *Einstein field equations*.
- 3.51 Denote  $G_{\mu\nu}=kT_{\mu\nu}$ , with  $\mu, \nu=1,2,3,4,5,6$ , the *six-dimensional extension of the Einstein field equations*.
- 3.52 Denote  $L^4$  the relativistic four-dimensional *Lagrangian of matter*.
- 3.53 Denote  $L^6$  the *six-dimensional Lagrangian of matter*.
- 3.54 Denote  $J^4$  the relativistic four-dimensional *scalar function*:  $J^4=L^4-R^4/2k$ .
- 3.55 Denote  $J^6$  the *six-dimensional extension of the scalar function*:  $J^6=L^6-R^6/2k$ .
- 3.56 Denote  $\delta\int J^4 \sqrt{g} d^4X=0$  the relativistic four-dimensional *variation principle*.
- 3.57 Denote  $\delta\int J^6 \sqrt{g} d^6X=0$  the *six-dimensional extension of the variation principle*.

4 HYPOTHESES

4.1 Time is measured on an orientation, i.e. between two parallel planes DP.



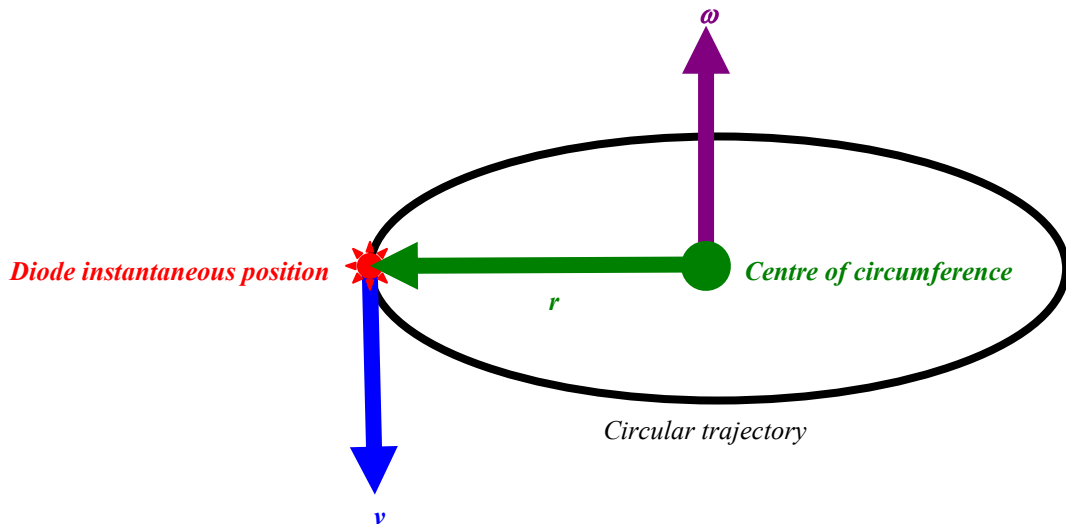
Let the diode be *puntiform* while the photodiode is *distributed* on the opposite wall:



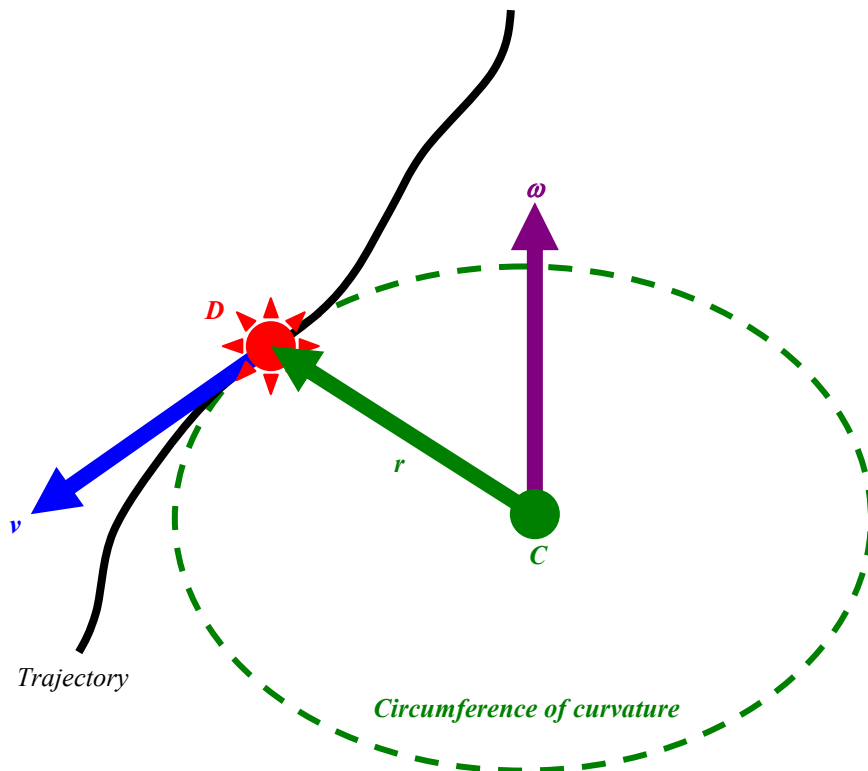
- 1) Diode
- 2) Laser ray
- 3) Photodiode
- 4) Feedback
- 5) Chronometer

4.2 **The trajectory described by a material point is continuous.**  
 The *trajectory* is the set of infinite successive positions assumed by a material point in its motion.

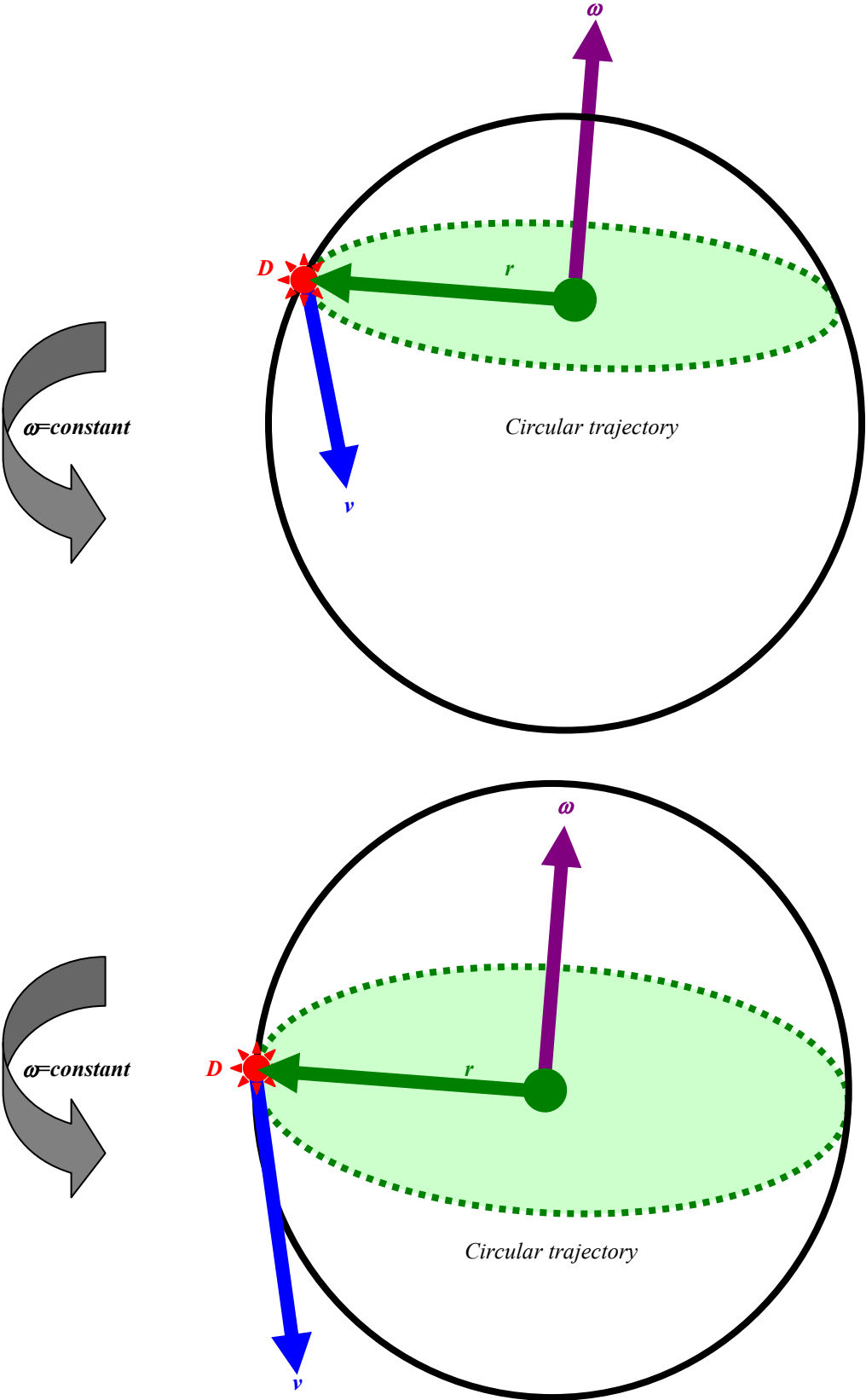
4.3 **The uniform circular motion individuates the three vectors  $v$ ,  $\omega$ ,  $r$ :  $v = \omega \times r$ .**  
 Denote  $v$ =tangential velocity;  $\omega$ = angular velocity;  $r$ =radius of circumference.



4.4 **In any trajectory each point individuates the three instantaneous vectors  $v$ ,  $\omega$ ,  $r$ :  $v = \omega \times r$ .**  
 Each point of a trajectory is assimilable to an *instantaneous UCM*.  
 The rectilinear trajectory is a limit case of degenerated UCM:  $r \rightarrow \infty$ ,  $\omega = 0$ .

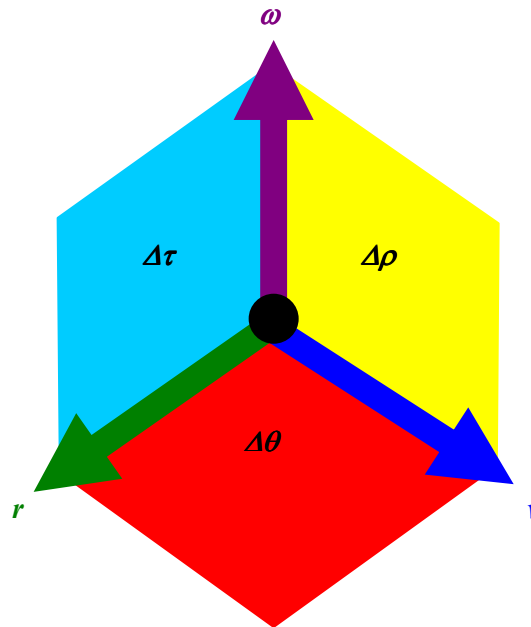


4.5 *A structureless sphere in UCM consists of infinite parallel circular trajectories.*  
 The DP reference system can be placed along different parallels:

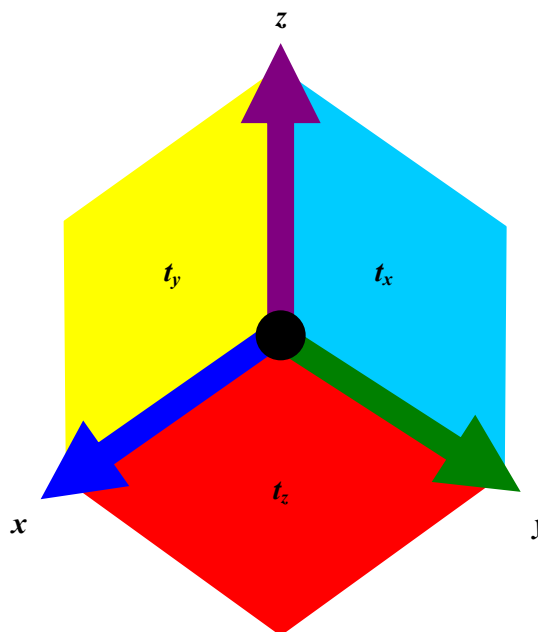


4.6 *In UCM time is measured on three mutually orthogonal orientations:  $\Delta\tau \perp v$ ,  $\Delta\theta \perp \omega$ ,  $\Delta\rho \perp r$ .*  
 The three instantaneous vectors  $v, \omega, r$  and their relative planes  $\tau, \theta, \rho$  altogether constitute an instantaneous Cartesian reference system  $v\omega r\tau\theta\rho$  on whose orientations the following times are measured:

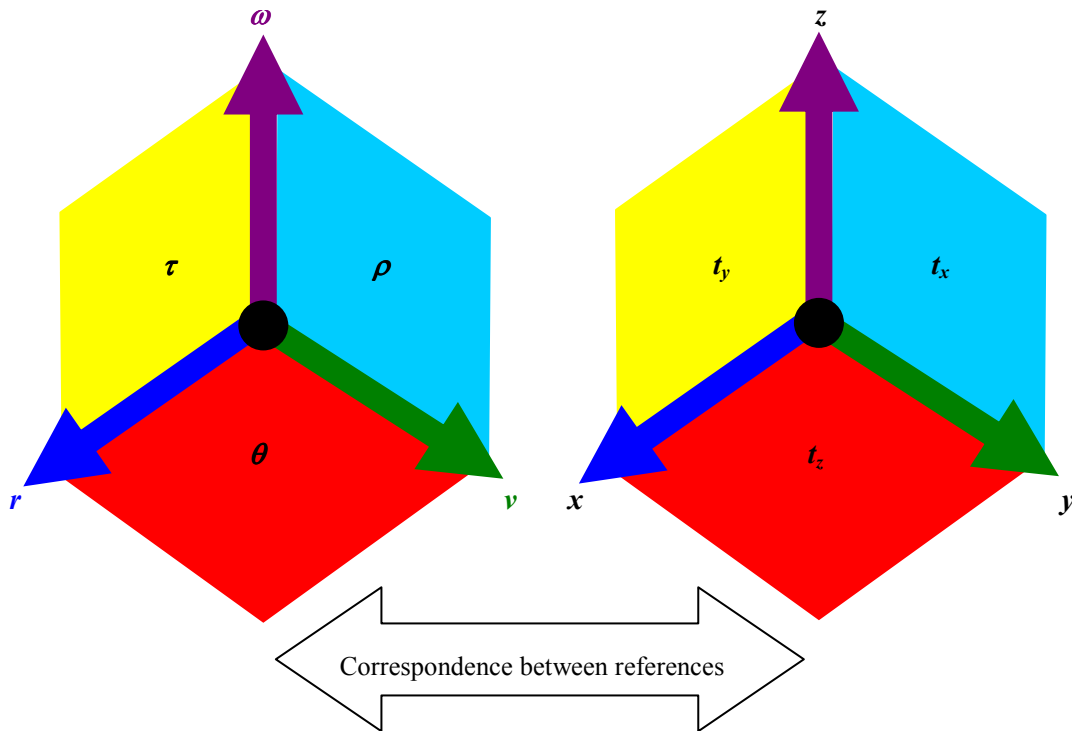
$\Delta\tau$ =*tangential time*, measured on the orientation perpendicular to  $v$ .  
 $\Delta\theta$ =*angular time*, measured on the orientation perpendicular to  $\omega$ .  
 $\Delta\rho$ =*radial time*, measured on the orientation perpendicular to  $r$ .



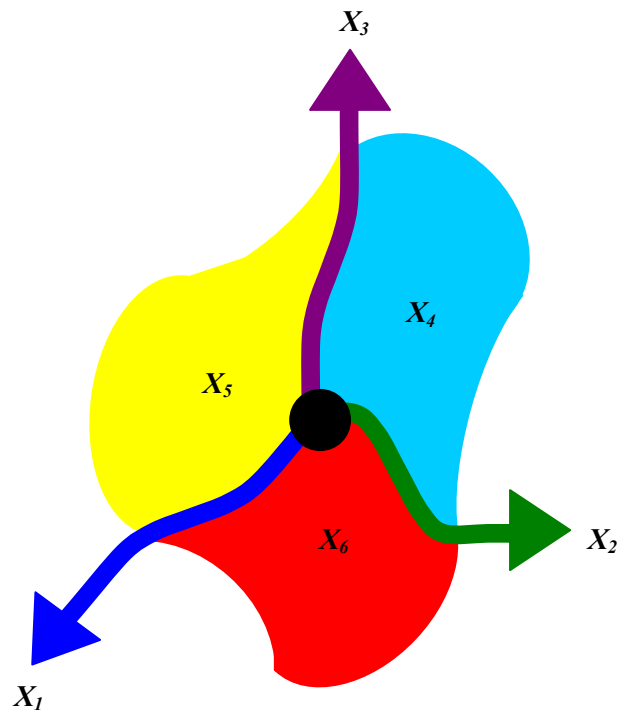
4.7 *Fixed six-dimensional Cartesian reference in a flat Euclidean space-time.*  
 The three spatial axes  $x, y, z$  and the three temporal orientations  $t_x, t_y, t_z$  are mutually orthogonal and immobile. Each position  $P(x, y, z, t_x, t_y, t_z)$  is unique, *i.e.* representable without ambiguity.



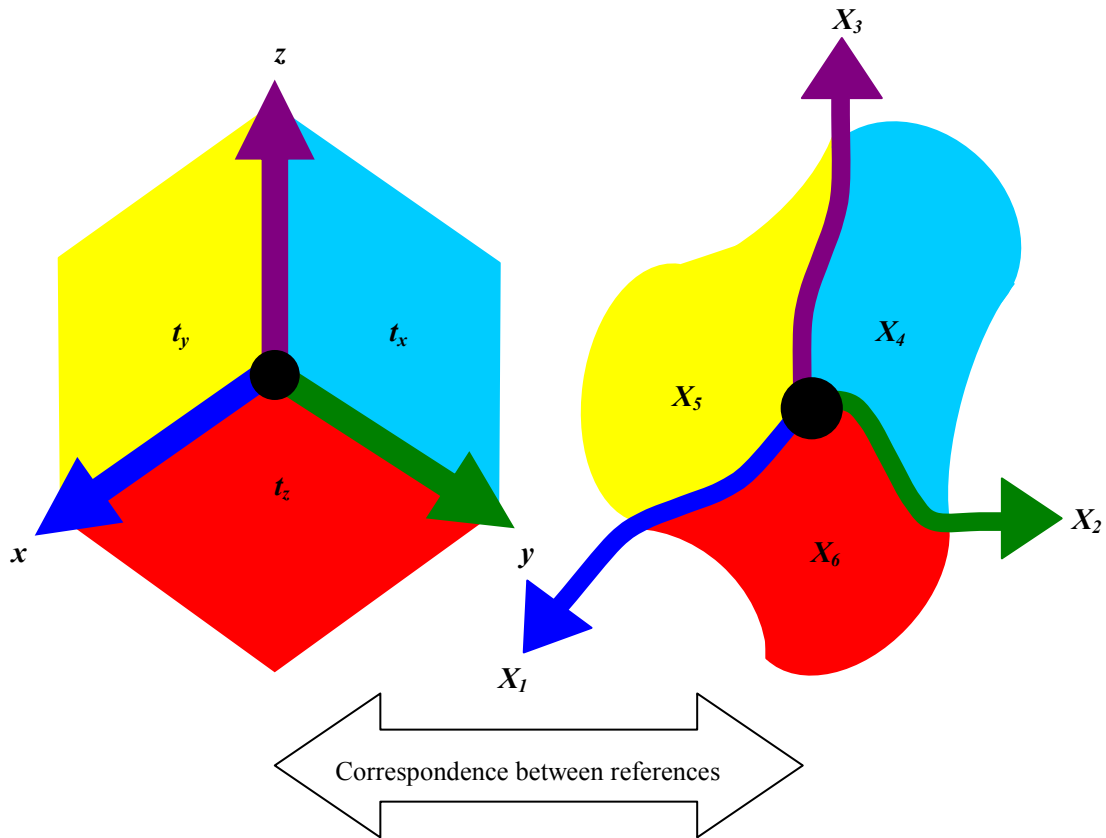
- 4.8 *The three times  $\tau, \theta, \rho$  are in biunivocal correspondence with the three times  $t_x, t_y, t_z$ . The measures in the instantaneous reference  $v\omega r\tau\theta\rho$  are univocally projected on the fixed reference  $xyz t_x t_y t_z$ .*



- 4.9 *Gaussian six-dimensional reference in a curved space-time.* The three spatial lines  $X_1, X_2, X_3$  are not necessarily neither rectilinear nor mutually orthogonal and the three temporal surfaces  $X_4, X_5, X_6$  are not necessarily neither plane nor reciprocally orthogonal. The only condition is that each event  $E(X_1, X_2, X_3, X_4, X_5, X_6)$  is unique, *i.e.* representable without ambiguity.



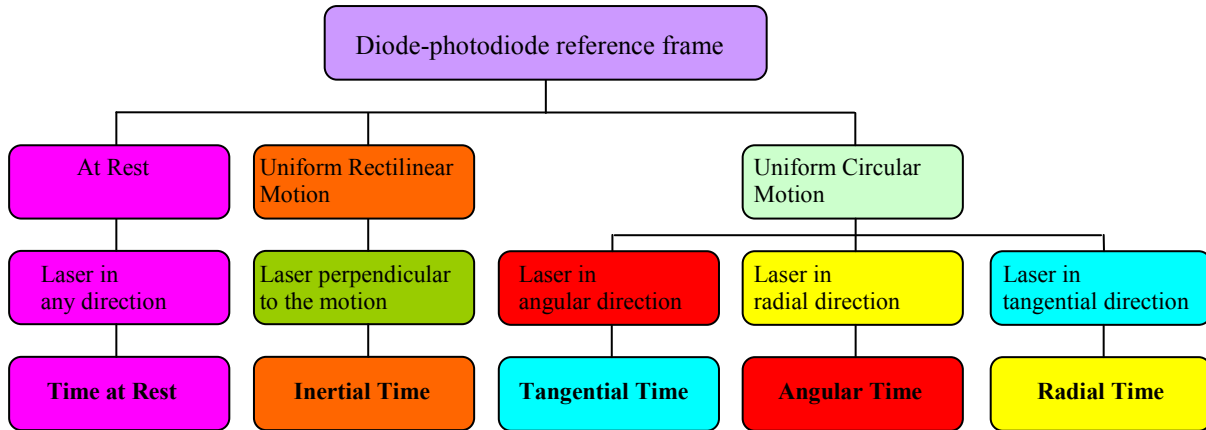
**4.10** *The position  $P(x,y,z,t_x,t_y,t_z)$  is in biunivocal correspondence with the event  $E(X_1,X_2,X_3,X_4,X_5,X_6)$ .*  
 By keeping the relativistic assumption about the quasi-Euclidean nature of space-time continuum at local level, there is the biunivocal correspondence between the measures in any Cartesian reference  $xyz,t_x,t_y,t_z$  and the same taken in a Gaussian reference  $X_1X_2X_3X_4X_5X_6$  in curved space-times locally almost flat.



**4.11** *Flux lines are proportional to the intensity of temporal measures.*

<i>Time measure</i>	<i>Flux lines</i>	<i>Graphical representation</i>
$\Delta t = \Delta t_i$	MEDIUM	
$0 < \Delta t < \Delta t_i$	THIN	
$\Delta t > \Delta t_i$	THICK	

4.12 *Flow chart of measured times.*



4.13 *Four-dimensional relativistic source tensor.*

It is symmetrical only with respect to the matrix main diagonal.

<b>Energy density</b>	$T_{00}$	$T_{21}$	$T_{22}$	$T_{23}$	<b>Energy flux</b>
<b>Momentum density</b>	$T_{30}$	$T_{31}$	$T_{32}$	$T_{33}$	<b>Momentum flux</b>
	$T_{40}$	$T_{41}$	$T_{42}$	$T_{43}$	
	$T_{50}$	$T_{51}$	$T_{52}$	$T_{53}$	

4.14 *Six-dimensional extension of the relativistic source tensor.*

It is supersymmetrical, consisting of 4 quadrants each with 9 components.

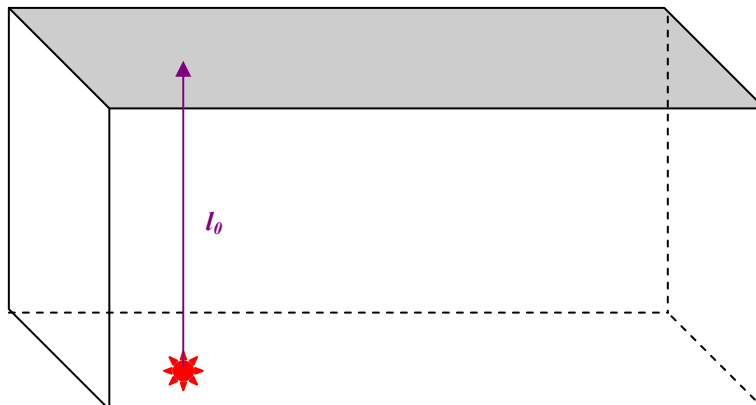
It can contain all sources: energy-momentum, electroweak and colour charges.

<b>Energy density</b>	$T_{00}$	$T_{01}$	$T_{02}$	$T_{03}$	$T_{04}$	$T_{05}$	<b>Energy flux</b>
	$T_{10}$	$T_{11}$	$T_{12}$	$T_{13}$	$T_{14}$	$T_{15}$	
	$T_{20}$	$T_{21}$	$T_{22}$	$T_{23}$	$T_{24}$	$T_{25}$	
<b>Momentum density</b>	$T_{30}$	$T_{31}$	$T_{32}$	$T_{33}$	$T_{34}$	$T_{35}$	<b>Momentum flux</b>
	$T_{40}$	$T_{41}$	$T_{42}$	$T_{43}$	$T_{44}$	$T_{45}$	
	$T_{50}$	$T_{51}$	$T_{52}$	$T_{53}$	$T_{54}$	$T_{55}$	

5 PROPOSITIONS

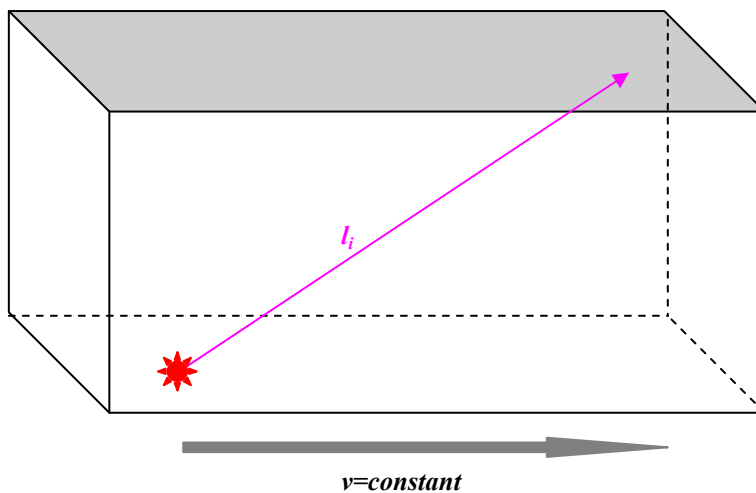
5.1 *Time at rest  $\Delta t_0$  is measured when the two parallel planes DP are immobile.*

*Proof.* Denote  $l_0$  the laser ray trajectory in an immobile DP reference:  $\Delta t_0 = l_0/c$ .

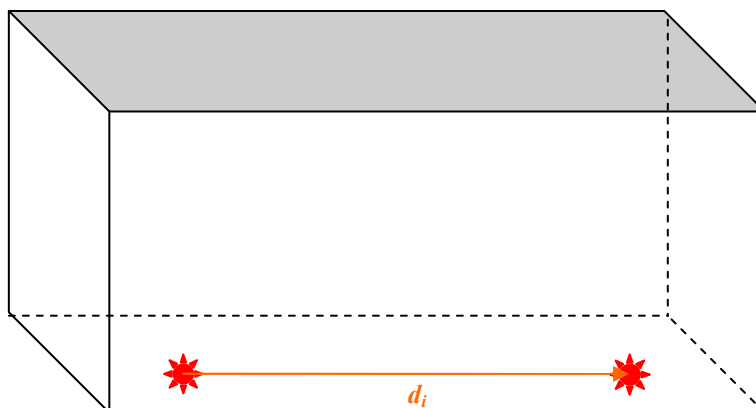


5.2 *The time measured in a reference in uniform rectilinear motion is:  $\Delta t_i = \gamma \Delta t_0$ .*

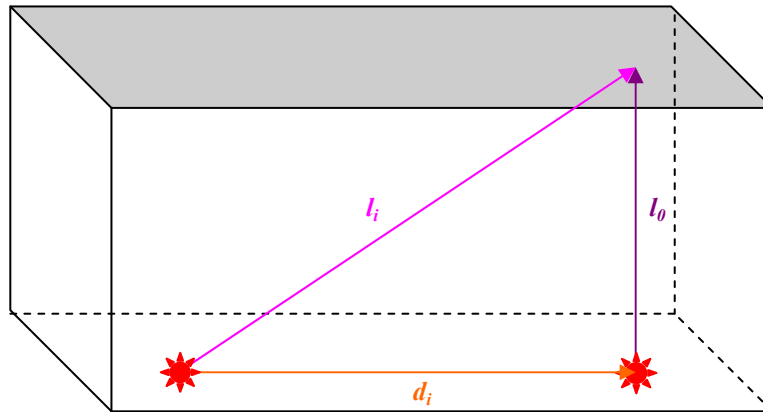
*Proof.* Denote  $l_i$  the laser ray trajectory perpendicular to the DP reference in URM:  $\Delta t_i = l_i/c$ .



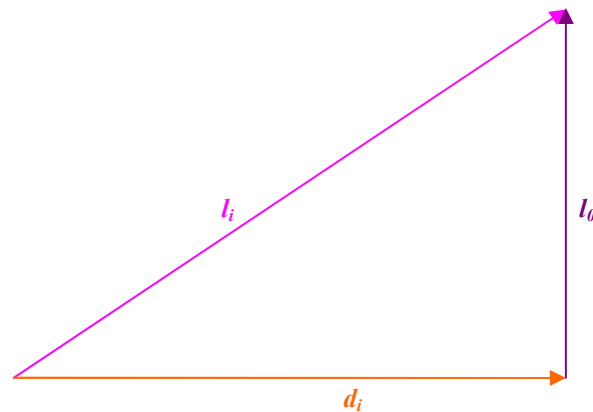
Trajectory of the diode in URM:



Composition of the trajectories in the URM:



Relationship between the time in URM  $\Delta t_i$  and the one at rest  $\Delta t_0$ :



$l_i = c\Delta t_i$  inertial laser ray trajectory, *i.e.* relative to a DP reference in URM at velocity  $v$ .

$l_0 = c\Delta t_0$  laser ray trajectory at rest, *i.e.* relative to an immobile DP reference.

$d_i = v\Delta t_i$  inertial trajectory of the diode, *i.e.* in URM at velocity  $v$ .

By Hypothesis 4.10, the locally quasi-Euclidean space-time permits the Pythagorean theorem:

$$l_i^2 = l_0^2 + d_i^2$$

$$(c\Delta t_i)^2 = (c\Delta t_0)^2 + (v\Delta t_i)^2$$

$$\Delta t_i^2 (c^2 - v^2) = c^2 \Delta t_0^2$$

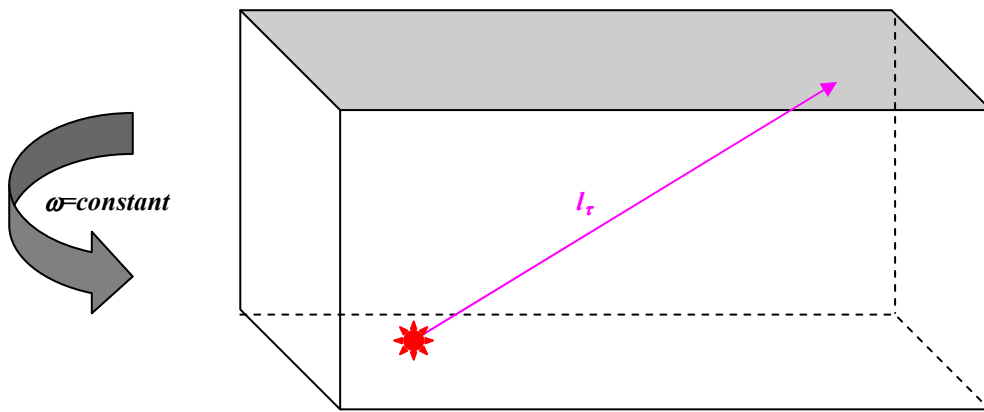
$$\Delta t_i^2 (1 - \beta^2) = \Delta t_0^2$$

$$\Delta t_i^2 = \Delta t_0^2 / (1 - \beta^2)$$

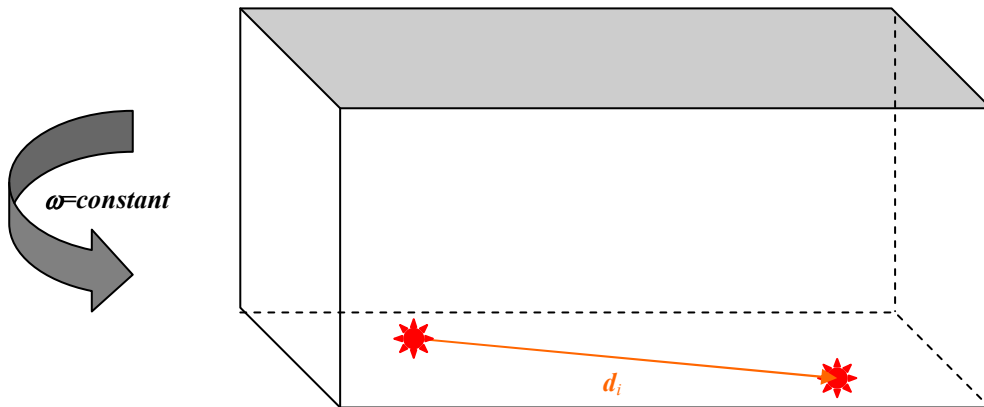
$$\Delta t_i = \gamma \Delta t_0$$

5.3 *In UCM the tangential time coincides with the inertial one:  $\Delta\tau = \Delta t_i$ .*

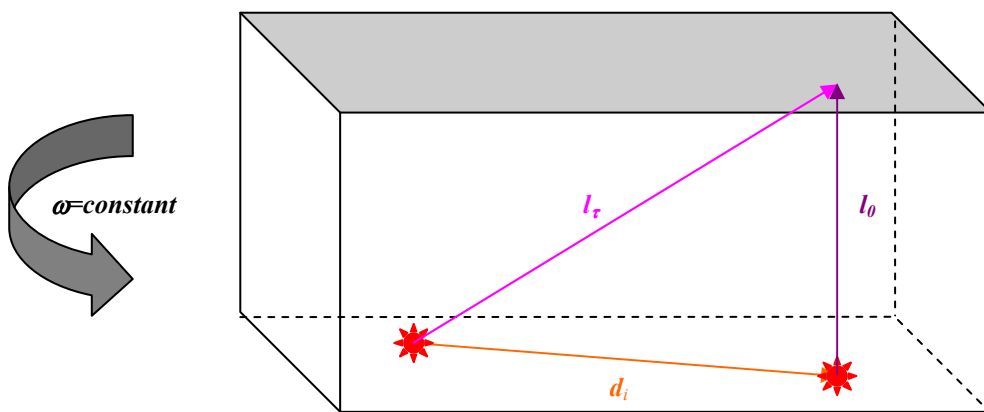
*Proof.* Denote  $l_\tau$  the laser ray trajectory emitted in *angular* direction, *i.e.* in the way of vector  $\omega$ .  $\Delta\tau = l_\tau/c$ .



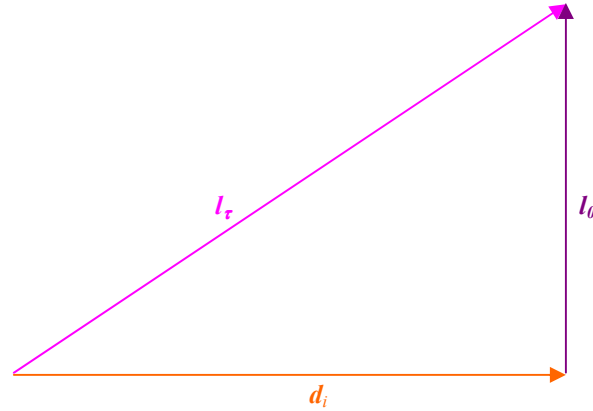
Denote  $d_i$  the inertial trajectory of the diode in UCM, *i.e.* rectified in tangential direction:



Composition of the trajectories in direction tangential to the rotation:



Relationship between the tangential time in UCM  $\Delta\tau$  and the one at rest  $\Delta t_0$ :



$l_\tau = c\Delta\tau$ , tangential laser ray trajectory, *i.e.* relative to a DP reference in UCM at velocity  $\mathbf{v} = \boldsymbol{\omega} \times \mathbf{r}$ .  
 $l_0 = c\Delta t_0$  laser ray trajectory at rest, *i.e.* relative to an immobile DP reference.  
 $d_i = v\Delta\tau$  inertial trajectory of the diode in UCM, *i.e.* rectified in tangential direction.

By Hypothesis 4.10, the locally quasi-Euclidean space-time permits the Pythagorean theorem:

$$l_\tau^2 = l_0^2 + d_i^2$$

$$(c\Delta\tau)^2 = (c\Delta t_0)^2 + (v\Delta\tau)^2$$

$$\Delta\tau^2 (c^2 - v^2) = c^2 \Delta t_0^2$$

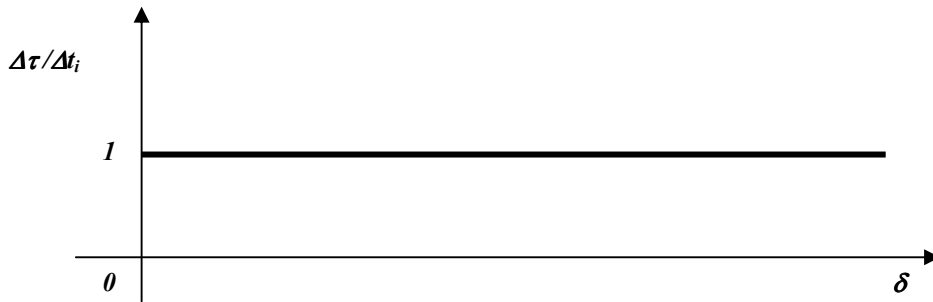
$$\Delta\tau^2 (1 - \beta^2) = \Delta t_0^2$$

$$\Delta\tau^2 = \Delta t_0^2 / (1 - \beta^2)$$

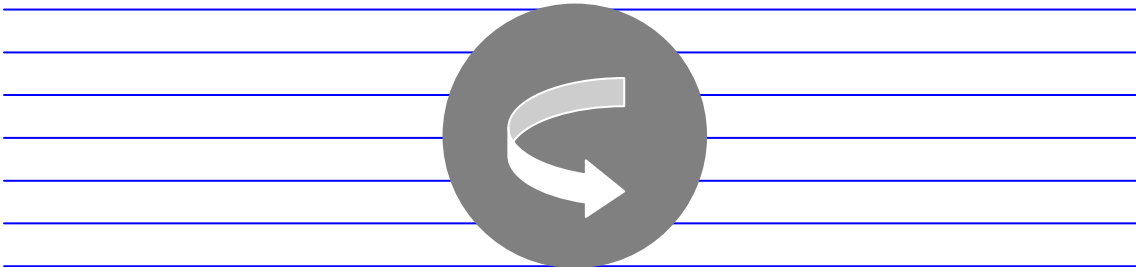
$$\Delta\tau = \gamma \Delta t_0$$

$$\Delta\tau = \Delta t_i$$

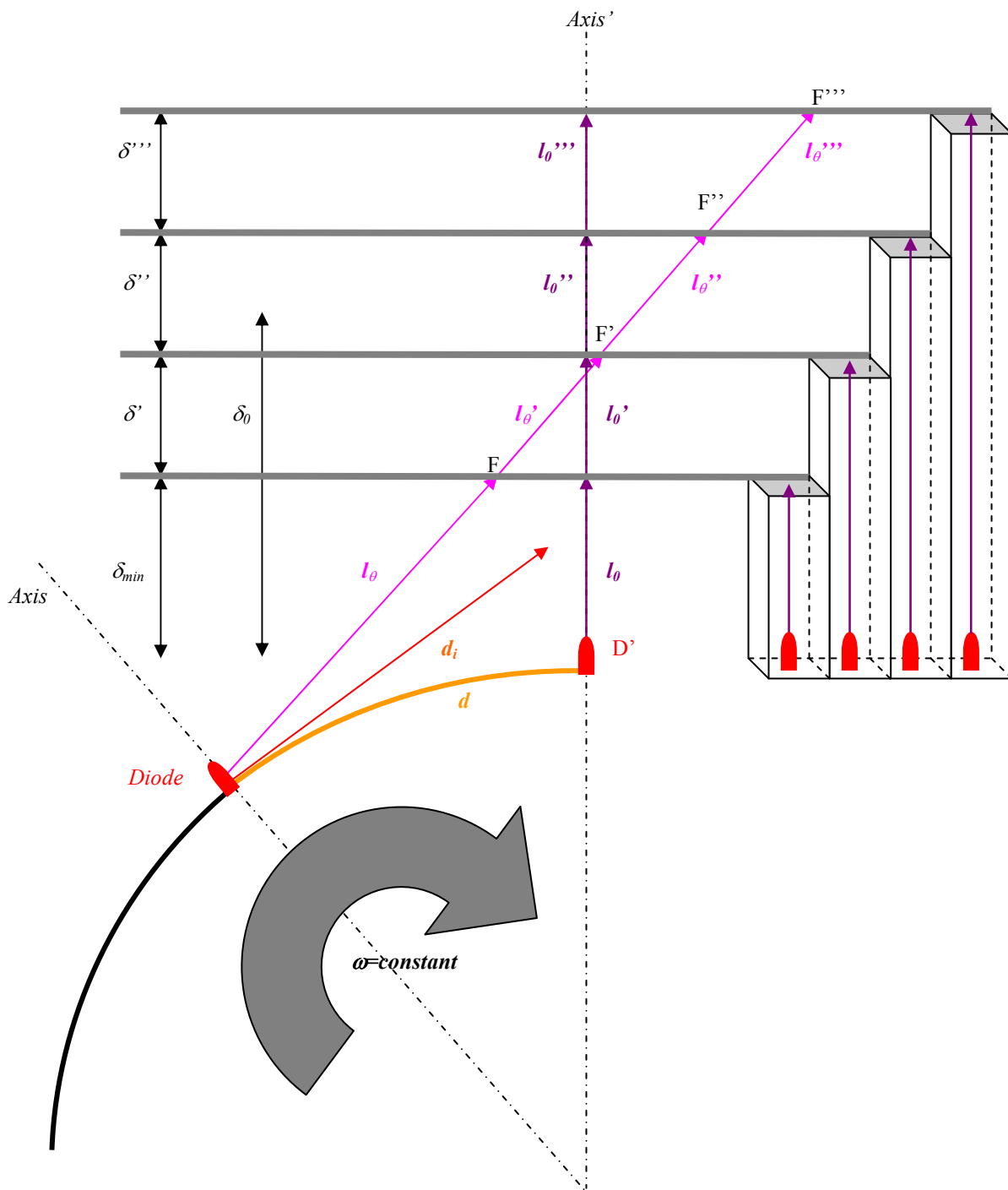
The qualitative course of tangential time (normalized regarding the inertial one)  $\Delta\tau/\Delta t_i$ , in function of the distance diode-photodiode  $\delta$ , is the following:



By Hypothesis 4.11, around a structureless sphere in UCM the tangential time flux lines  $\Delta\tau$  are medium:



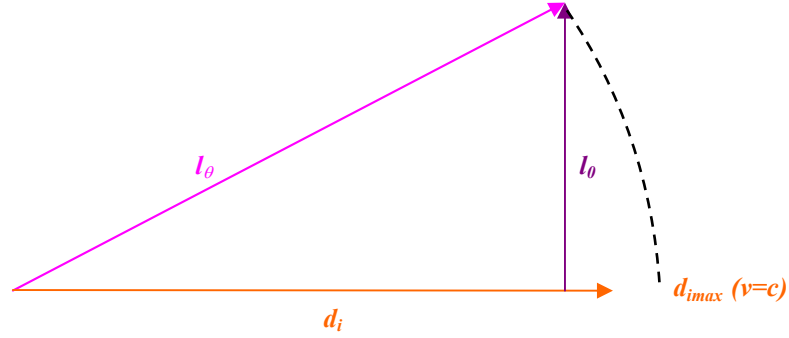
5.4 In UCM the angular time is:  $\Delta\theta < \Delta t_i$  beside and  $\Delta\theta > \Delta t_i$  increasing with the distance.  
*Proof.* Composition of the trajectories in direction tangential to rotation, at different DP distances  $\delta$ :



Denote  $\delta_0$  the diode-photodiode distance when:  $\Delta\theta = \Delta t_i$ .

Denote  $l_\theta$  the laser ray trajectory emitted in *radial* direction, i.e. in the way of vector  $r$ :  $\Delta\theta = l_\theta/c$ .

Relationship between the angular time in UCM  $\Delta\theta$  and the one at rest  $\Delta t_0$ , when  $\delta < \delta_0$ :



$l_\theta = c\Delta\theta$  angular laser ray trajectory, *i.e.* relative to a DP reference in UCM at velocity  $\mathbf{v} = \boldsymbol{\omega} \times \mathbf{r}$ .

$l_0 = c\Delta t_0$  laser ray trajectory at rest, *i.e.* relative to an immobile DP reference.

$d_i = v\Delta\theta$  inertial trajectory of the diode in UCM, *i.e.* rectified in tangential direction.

By Hypothesis 4.10, the locally quasi-Euclidean space-time permits the Pythagorean theorem:

$$l_\theta^2 < l_0^2 + d_i^2$$

$$(c\Delta\theta)^2 < (c\Delta t_0)^2 + (v\Delta\theta)^2$$

$$\Delta\theta^2 (c^2 - v^2) < c^2 \Delta t_0^2$$

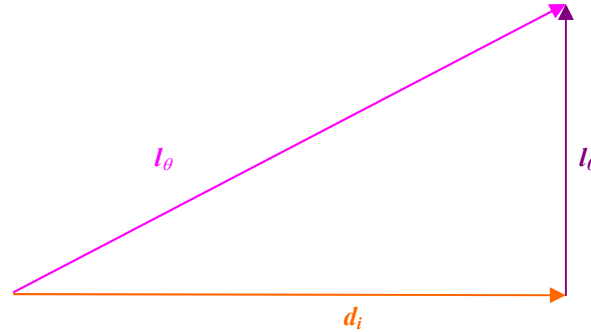
$$\Delta\theta^2 (1 - \beta^2) < \Delta t_0^2$$

$$\Delta\theta^2 < \Delta t_0^2 / (1 - \beta^2)$$

$$\Delta\theta < \gamma \Delta t_0$$

$$\Delta\theta < \Delta t_i$$

Relationship between the angular time  $\Delta\theta$  in UCM and the one at rest  $\Delta t_0$ , when  $\delta = \delta_0$ :



By Hypothesis 4.10, the locally quasi-Euclidean space-time permits the Pythagorean theorem:

$$l_\theta^2 = l_0^2 + d_i^2$$

$$(c\Delta\theta)^2 = (c\Delta t_0)^2 + (v\Delta\theta)^2$$

$$\Delta\theta^2 (c^2 - v^2) = c^2 \Delta t_0^2$$

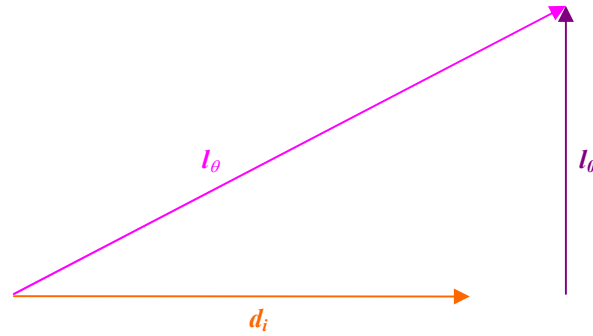
$$\Delta\theta^2 (1 - \beta^2) = \Delta t_0^2$$

$$\Delta\theta^2 = \Delta t_0^2 / (1 - \beta^2)$$

$$\Delta\theta = \gamma \Delta t_0$$

$$\Delta\theta = \Delta t_i$$

Relationship between the angular time in UCM  $\Delta\theta$  and the one at rest  $\Delta t_0$ , when  $\delta > \delta_0$ :



By Hypothesis 4.10, the locally quasi-Euclidean space-time permits the Pythagorean theorem:

$$l_\theta^2 > l_0^2 + d_i^2$$

$$(c\Delta\theta)^2 > (c\Delta t_0)^2 + (v\Delta\theta)^2$$

$$\Delta\theta^2 (c^2 - v^2) > c^2 \Delta t_0^2$$

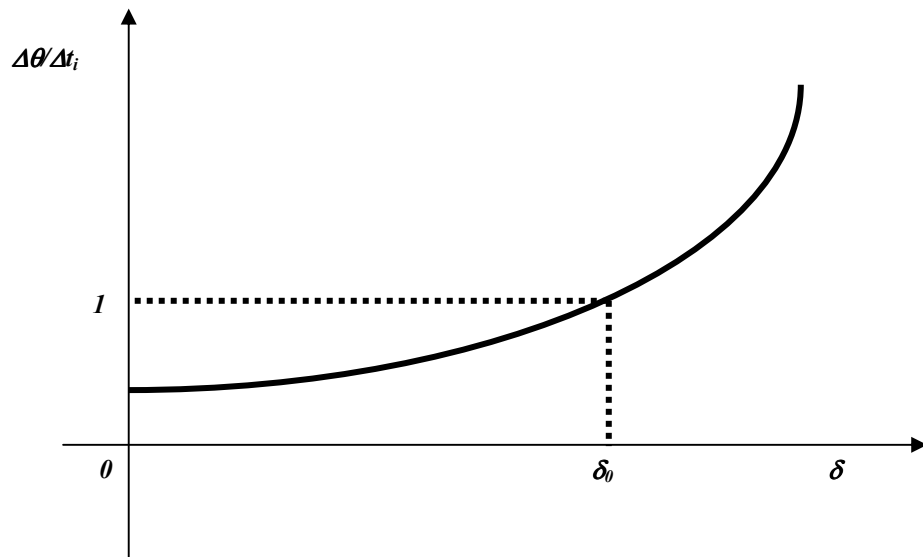
$$\Delta\theta^2 (1 - \beta^2) > \Delta t_0^2$$

$$\Delta\theta^2 > \Delta t_0^2 / (1 - \beta^2)$$

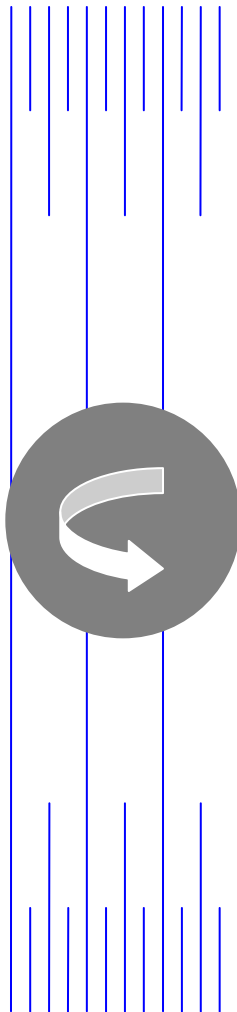
$$\Delta\theta > \gamma \Delta t_0$$

$$\Delta\theta > \Delta t_i$$

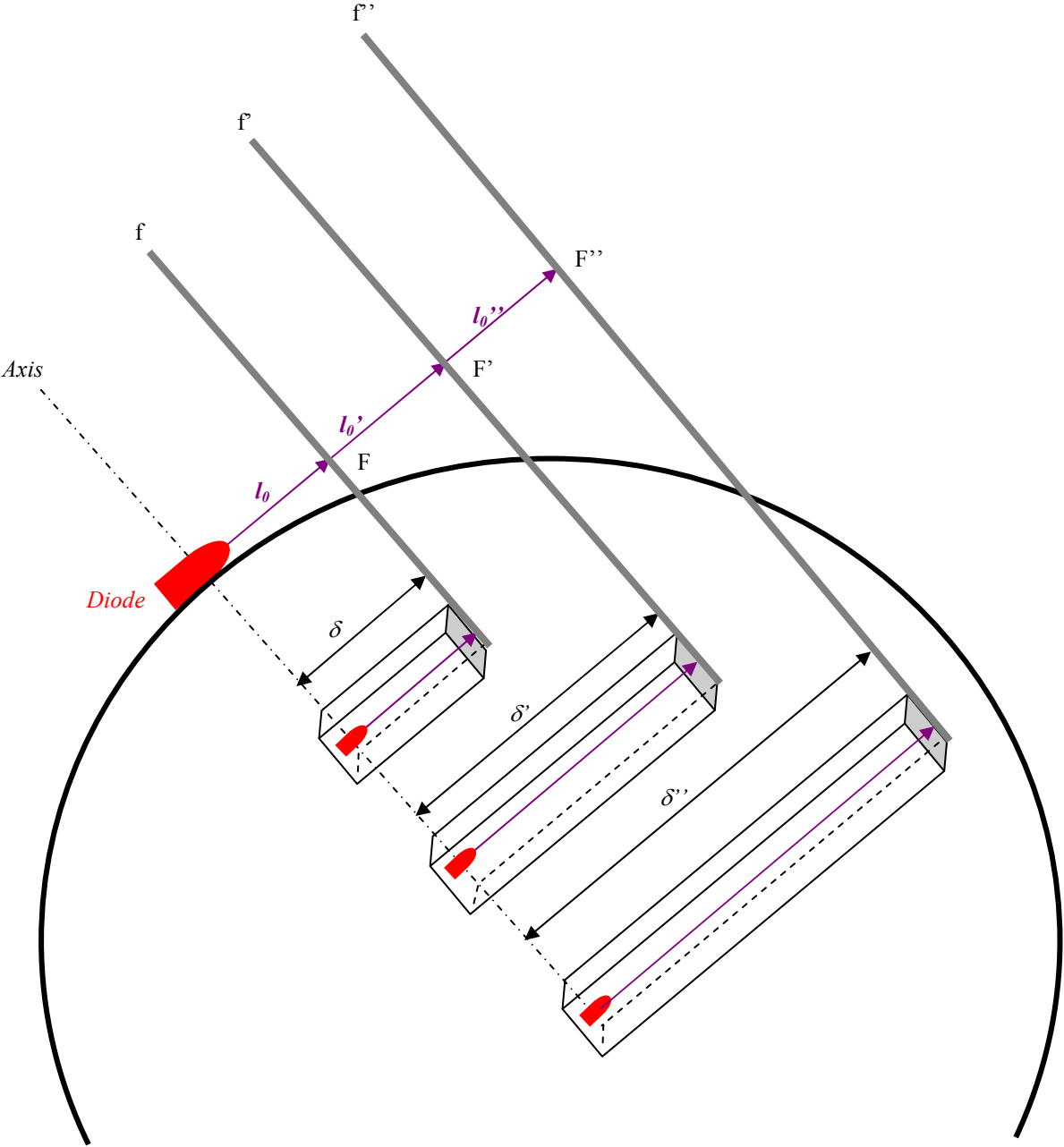
The qualitative course of the angular time (normalized regarding the inertial one)  $\Delta\theta/\Delta t_i$ , in function of the distance diode-photodiode  $\delta$ , is the following:



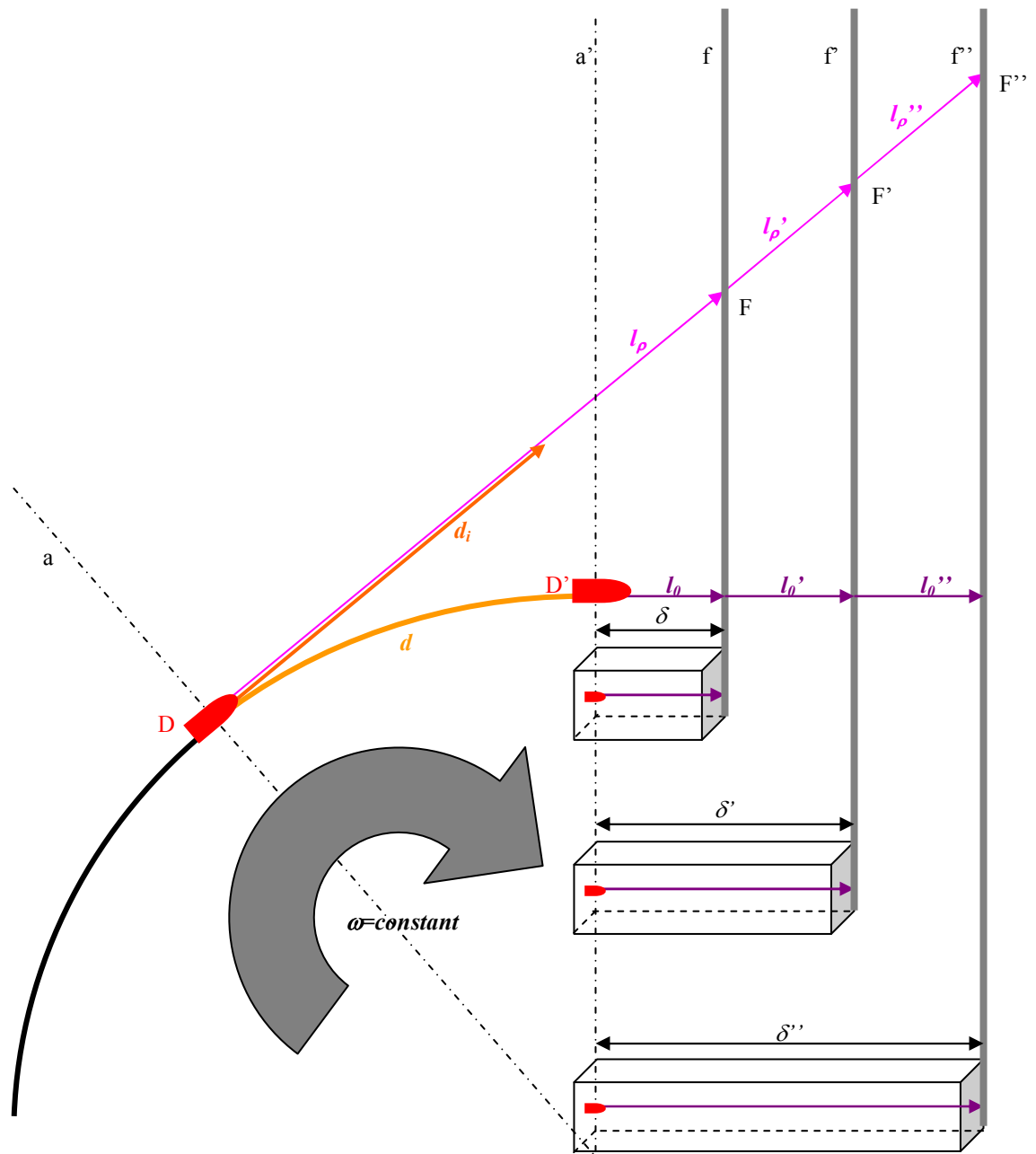
By Hypothesis 4.11, for a structureless sphere in UCM the angular time  $\Delta\theta$  flux lines are thin beside and thick far away:



5.5 In UCM the radial time is:  $\Delta\rho > \Delta t_i$ , asymptotically decreasing towards  $\Delta t_i$  with the distance.  
 Proof. Laser ray trajectory in an immobile reference, at different distances diode-photodiode  $\delta$ .

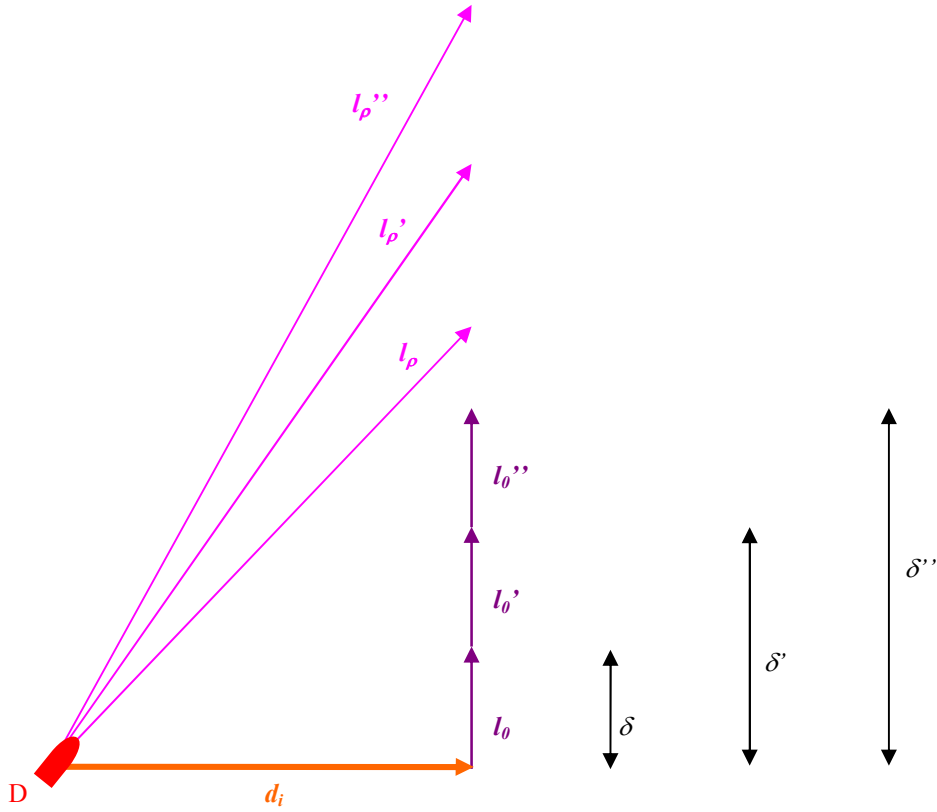


Laser ray trajectory in a DP reference in UCM, at different diode-photodiode distances  $\delta$ :

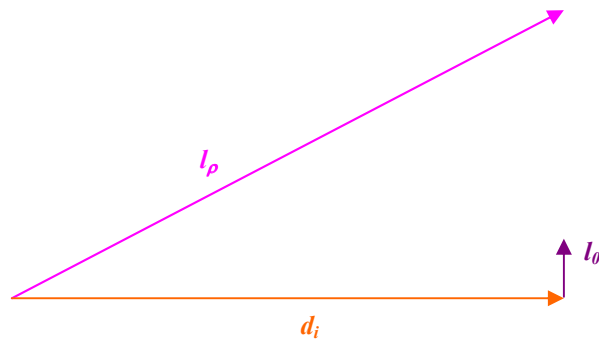


Denote  $l_p$  the laser ray trajectory emitted in *tangential* direction, *i.e.* in the way of vector  $\mathbf{v}$ :  
 $\Delta\rho=l_p/c$ .

Composition of the trajectories in direction radial to the rotation:



Relationship between the radial time in UCM  $\Delta\rho$  and the one at rest  $\Delta t_0$  beside (short  $\delta$ ):



$l_\rho = c\Delta\rho$  radial laser ray trajectory, *i.e.* relative to a DP reference in UCM at velocity  $\mathbf{v} = \boldsymbol{\omega} \times \mathbf{r}$ .

$l_0 = c\Delta t_0$  laser ray trajectory at rest, *i.e.* relative to an immobile DP reference.

$d_i = v\Delta\rho$  inertial trajectory of the diode in UCM, *i.e.* rectified in tangential direction.

By Hypothesis 4.10, the locally quasi-Euclidean space-time permits the Pythagorean theorem:

$$l_\rho^2 \gg l_0^2 + d_i^2$$

$$(c\Delta\rho)^2 \gg (c\Delta t_0)^2 + (v\Delta\rho)^2$$

$$\Delta\rho^2 (c^2 - v^2) \gg c^2 \Delta t_0^2$$

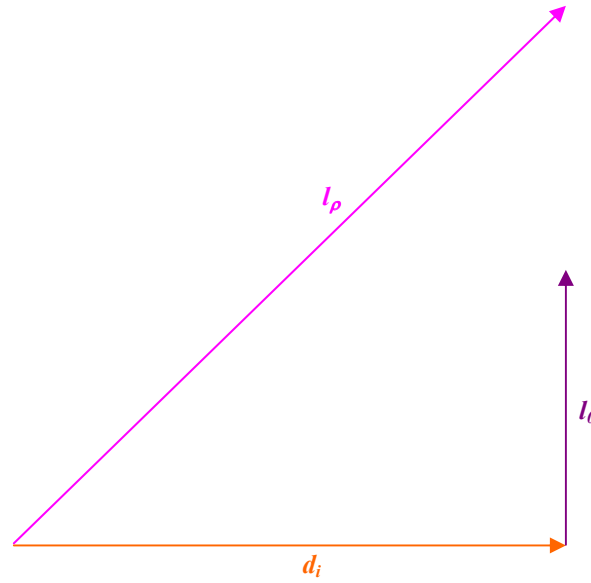
$$\Delta\rho^2 (1 - \beta^2) \gg \Delta t_0^2$$

$$\Delta\rho^2 \gg \Delta t_0^2 / (1 - \beta^2)$$

$$\Delta\rho \gg \gamma \Delta t_0$$

$$\Delta\rho \gg \Delta t_i$$

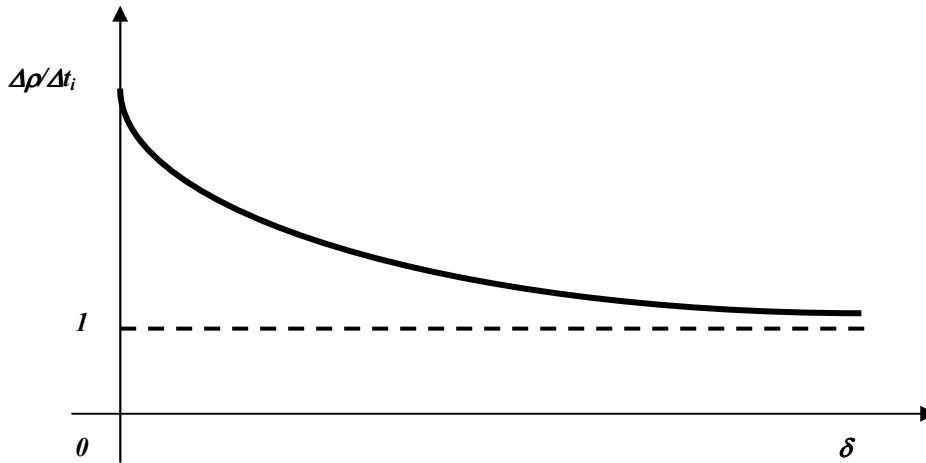
Relationship between the radial time in UCM  $\Delta\rho$  and the one at rest  $\Delta t_0$  far away (long  $\delta$ ):



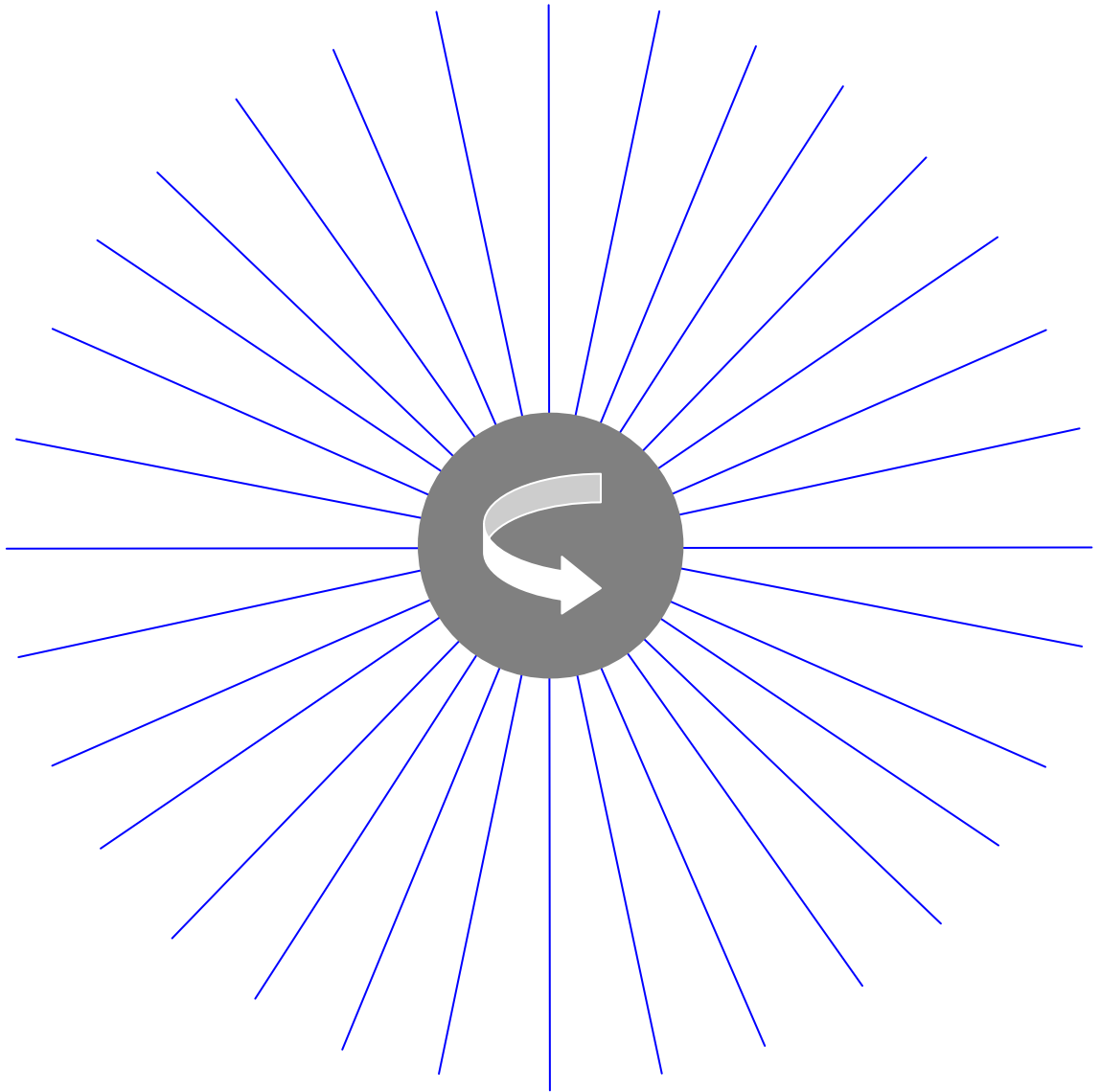
By Hypothesis 4.10, the locally quasi-Euclidean space-time permits the Pythagorean theorem:

$$\begin{aligned}
 l_\rho^2 &> l_0^2 + d_i^2 \\
 (c\Delta\rho)^2 &> (c\Delta t_0)^2 + (v\Delta\rho)^2 \\
 \Delta\rho^2 (c^2 - v^2) &> c^2 \Delta t_0^2 \\
 \Delta\rho^2 (1 - \beta^2) &> \Delta t_0^2 \\
 \Delta\rho^2 &> \Delta t_0^2 / (1 - \beta^2) \\
 \Delta\rho &> \gamma \Delta t_0 \\
 \Delta\rho &> \Delta t_i
 \end{aligned}$$

The radial time qualitative course (normalized regarding the inertial one)  $\Delta\rho/\Delta t_i$ , in function of the distance diode-photodiode  $\delta$ , is the following:

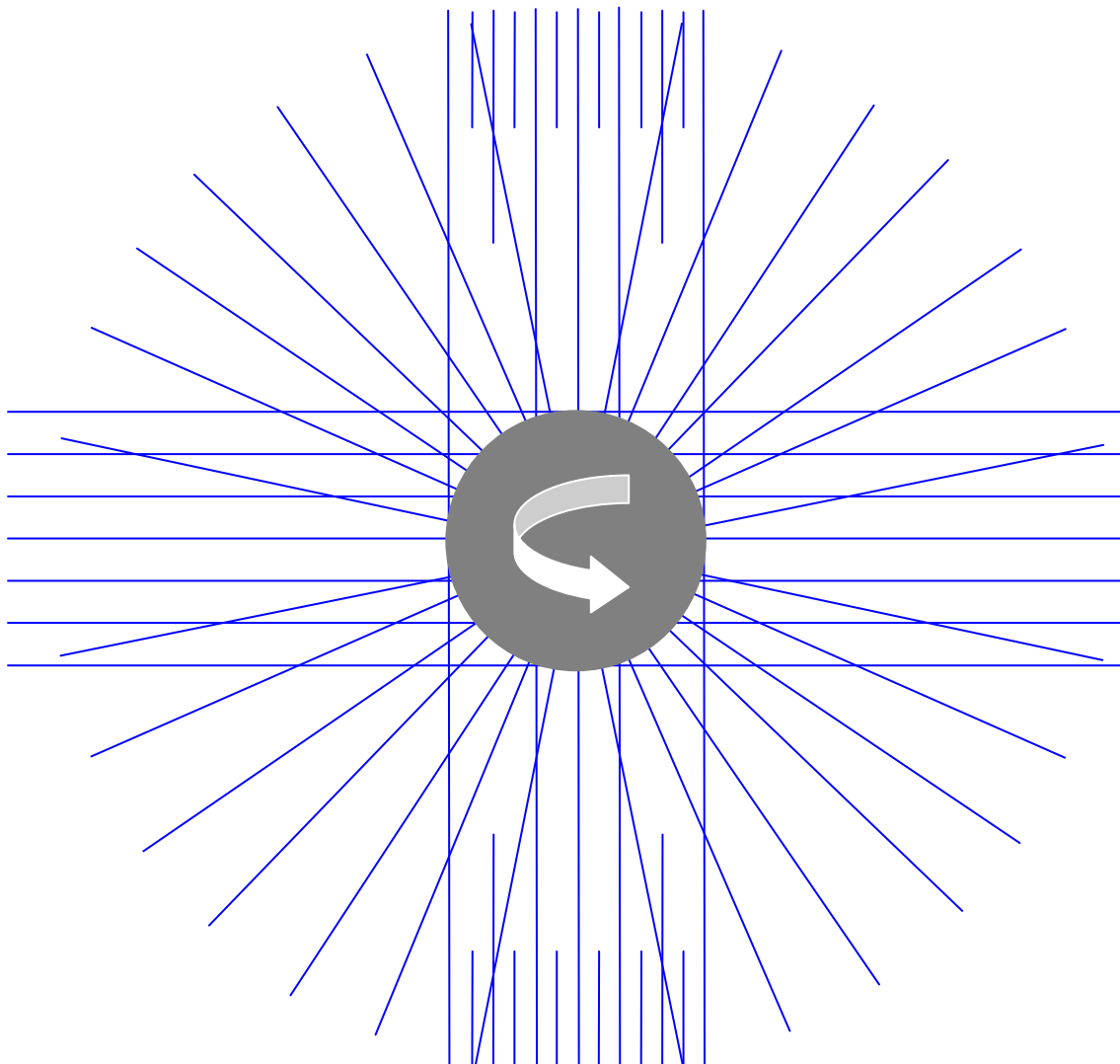


By Hypothesis 4.11, for a structureless sphere in UCM the radial time  $\Delta\rho$  flux lines are thick:



**5.6** *In UCM the time measure is different along the three orientations:  $\Delta\tau$ ,  $\Delta\rho$ ,  $\Delta\theta$*   
*Proof.* By Props. 5.3÷5.5 in UCM time assumes three different values by the orientation where it is measured.

**5.7** *Around a structureless sphere in UCM the temporal flux lines are anisotropic.*  
*Proof.* By Props. 5.3÷5.6 we get the following graphical representation of global temporal flux lines:



**5.8** *Time is at least tridimensional.*  
*Proof.* By Prop. 5.6 and according to Hypothesis 4.8 there is a biunivocal correspondence between the measures in an instantaneous Cartesian reference  $\nu\omega\tau\theta\rho$  and the same taken in a fixed Cartesian reference  $xyz_{t_x,t_y,t_z}$ , so that time's measurement is generally different on three mutually orthogonal orientations:  $t_x$ ,  $t_y$ ,  $t_z$ .

**5.9** *Space-time is at least six-dimensional.*  
*Proof.* By Prop. 5.8 and according to Hypothesis 4.10, each point of a trajectory is individuated by at least six coordinates, three spatial and three temporal, thus the *position* in a six-dimensional Cartesian reference is  $P(x,y,z,t_x,t_y,t_z)$  while the corresponding *event* in a six-dimensional Gaussian reference is  $E(X_1,X_2,X_3,X_4,X_5,X_6)$ .

## 6 THESES

- 6.1 *The metric tensor  $g_{\mu\nu}$  is at least six-dimensional:  $\mu, \nu=1,2,3,4,5,6$ .*  
*Proof.* By Prop. 5.9.
- 6.2 *The quadratic form  $ds^2=g_{\mu\nu}dx_\mu dx_\nu$  is at least six-dimensional:  $\mu, \nu=1,2,3,4,5,6$ .*  
*Proof.* By Thesis 6.1.
- 6.3 *The Ricci curvature tensor  $R_{\mu\nu}$  is at least six-dimensional:  $\mu, \nu=1,2,3,4,5,6$ .*  
*Proof.* By Thesis 6.1.
- 6.4 *The scalar curvature  $R$ , trace of  $R_{\mu\nu}$ , is at least six-dimensional:  
 $R^6=R_a^a=R_{11}+R_{22}+R_{33}+R_{44}+R_{55}+R_{66}$ .*  
*Proof.* By Thesis 6.3.
- 6.5 *The contracted Bianchi identities  $\nabla^\mu(R_{\mu\nu}-1/2Rg_{\mu\nu})=0$  are at least six-dimensional:  
 $\mu, \nu=1,2,3,4,5,6$ .*  
*Proof.* By Theses 6.3 and 6.4.
- 6.6 *The Einstein Tensor  $G_{\mu\nu}=R_{\mu\nu}-1/2g_{\mu\nu}R$  is at least six-dimensional:  $\mu, \nu=1,2,3,4,5,6$ .*  
*Proof.* By Theses 6.3÷6.5.
- 6.7 *The source tensor  $T_{\mu\nu}$  is at least six-dimensional:  $\mu, \nu=1,2,3,4,5,6$ .*  
*Proof.* By Theses 6.1÷6.6.
- 6.8 *The conservation equations  $\nabla^\mu T_{\mu\nu}=0$  are at least six-dimensional:  $\mu, \nu=1,2,3,4,5,6$ .*  
*Proof.* By Theses 6.7.
- 6.9 *The Lagrangian of matter is at least six-dimensional:  $L^6$ .*  
*Proof.* By Theses 6.1÷6.8.
- 6.10 *Einstein field equations  $G_{\mu\nu}=kT_{\mu\nu}$  must be at least six-dimensionally extended:  $\mu, \nu=1,2, \dots, 6$ .*  
*Proof.* By Theses 6.6, 6.7 and 6.7.
- 6.11 *Relativistic scalar function  $J^4=L^4-R^4/2k$  must be at least six-dimensionally extended:  
 $J^6=L^6-R^6/2k$ .*  
*Proof.* By Theses 6.4 and 6.9.
- 6.12 *Relativistic variation principle  $\delta \int^4 \sqrt{g} d^4X=0$  must be at least six-dimensionally extended:  
 $\delta \int^6 \sqrt{g} d^6X=0$ .*  
*Proof.* By Theses 6.8 and 6.11.

7 CONJECTURES

7.1 **Six-dimensional equations  $G_{\mu\nu}=kT_{\mu\nu}$  are 36, reducible to 21 in case of symmetry.**

*Proof.* Einstein four-dimensional field equations are  $4 \times 4 = 16$ , reduced to 10 because  $G_{\mu\nu}$  and  $T_{\mu\nu}$  are symmetric. The hexadimensional field equations are  $6 \times 6 = 36$ , reducible to 21 if  $G_{\mu\nu}$  and  $T_{\mu\nu}$  are symmetric.

7.2 **Six-dimensional equations  $G_{\mu\nu}=kT_{\mu\nu}$  describe all fields of forces.**

*Proof.* The four-dimensional Einstein field equations describe gravity. Their hexadimensional extension can describe all interactions: gravitational, electroweak and strong.

7.3 **The components of six-dimensional tensor  $T_{\mu\nu}$  are all the fundamental quantities.**

*Proof.* The components of the four-dimensional source tensor in GR are stress-energy-momentum. The two further components of the hexadimensional source tensor can be both electromagnetic and colour charges.

7.4 **The six-dimensional variation principle  $\delta \int \sqrt{g} d^6 X = 0$  describes all the conservation laws.**

*Proof.* The four-dimensional variation principle explains the stress-energy-momentum conservation law. The hexadimensional variation principle can also explain the conservation of both electromagnetic and colour charges.

7.5 **Temporal flux lines are proportional to the interaction intensity:**

**A)  $\Delta t = \Delta t_i$  is the condition of normal interaction along the direction of  $\Delta t$  measurement;**

**B)  $\Delta t > \Delta t_i$  is the condition of hyperinteraction along the direction of  $\Delta t$  measurement;**

**C)  $\Delta t < \Delta t_i$  is the condition of subinteraction along the direction of  $\Delta t$  measurement.**

*Proof.* In Lorentz transformations there is proportionality between time and mass:  $m/m_0 = \Delta t/\Delta t_0 = \gamma$ . Hence, according to Hypothesis 4.11, time's flux lines in quasi-Euclidean conditions provide a qualitative indication of interaction intensity.

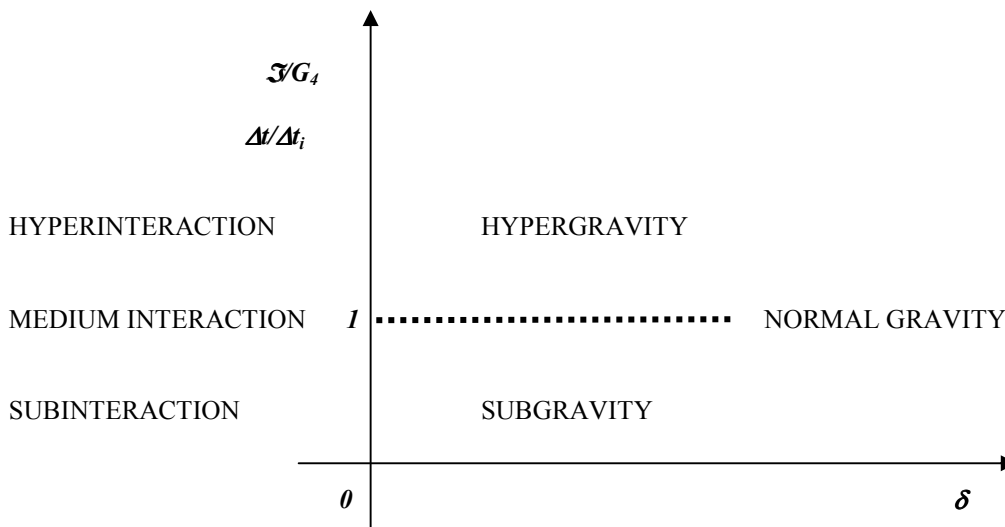
7.6 **The relativistic four-dimensional gravity  $G_4$  can be the paradigm of all the interactions  $\mathfrak{I}$ :**

**A)  $\Delta t = \Delta t_i$  is the condition of normal gravity along the direction of  $\Delta t$  measurement:  $\mathfrak{I}/G_4 = 1$**

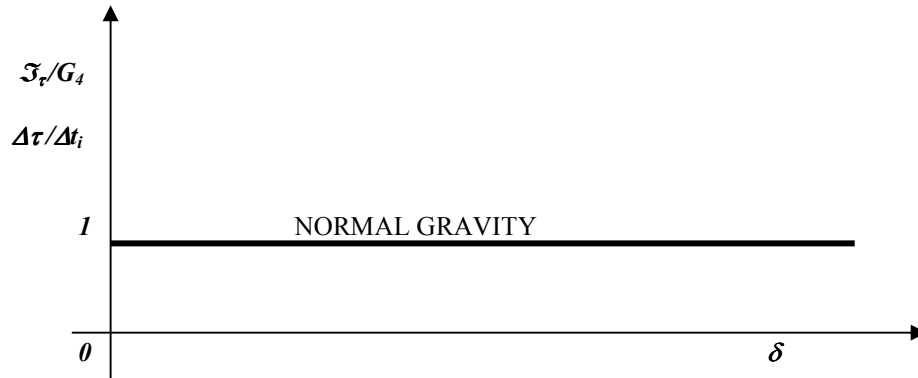
**B)  $\Delta t > \Delta t_i$  is the condition of hypergravity along the direction of  $\Delta t$  measurement:  $\mathfrak{I}/G_4 > 1$**

**C)  $\Delta t < \Delta t_i$  is the condition of subgravity along the direction of  $\Delta t$  measurement:  $\mathfrak{I}/G_4 < 1$**

*Proof.* By Conjecture 7.2, since forces are unified it is possible to denominate them collectively *gravity*, so far used to indicate only a subset of the interactive manifestation and whose relativistic value  $G_4$  is assumed as term of comparison for interaction intensity. By Conjectures 7.4 and 7.5 the interaction intensity (normalized regarding four-dimensional gravity)  $\mathfrak{I}/G_4$  is proportional to the qualitative course of temporal measure (normalized regarding the inertial one)  $\Delta t/\Delta t_i$ . The diagram in function of the diode-photodiode distance  $\delta$  is the following:



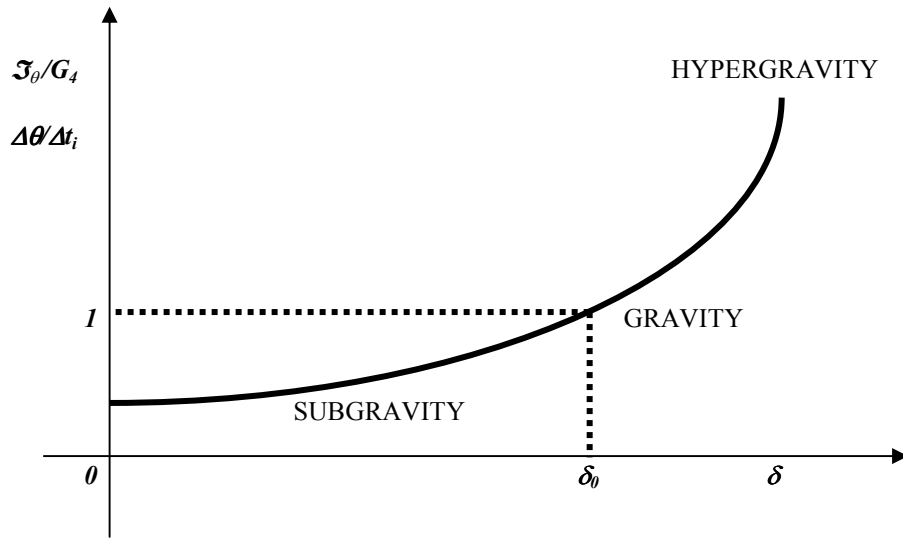
7.7 **In UCM the tangential interaction coincides with normal four-dimensional gravity:  $\mathfrak{F}_\tau = G_4$ .**  
*Proof.* By Prop. 5.3 and according to Conjecture 7.6 the tangential interaction (normalized regarding tetradimensional gravity)  $\mathfrak{F}_\tau/G_4$  is proportional to the qualitative course of tangential temporal measure (normalized regarding the inertial one)  $\Delta\tau/\Delta t_i$ . The diagram in function of the diode-photodiode distance  $\delta$  is the following:



Tangential interaction: normal gravity  $\mathfrak{F}_\tau = G_4$ , constant with the distance:

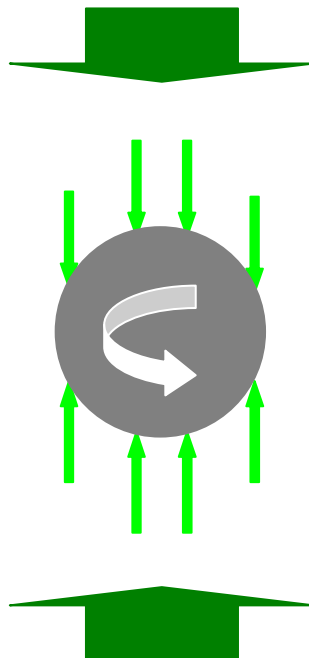


**7.8** *In UCM angular interaction is:  $\mathfrak{F}_\theta < G_4$  beside and  $\mathfrak{F}_\theta > G_4$  far, increasing with the distance.*  
*Proof.* By Prop. 5.4 and according to Conjecture 7.6 the angular interaction (normalized regarding tetradimensional gravity)  $\mathfrak{F}_\theta/G_4$  is proportional to the qualitative course of angular temporal measure (normalized regarding the inertial one)  $\Delta\theta/\Delta t_i$ . The diagram in function of the diode-photodiode distance  $\delta$  is the following:

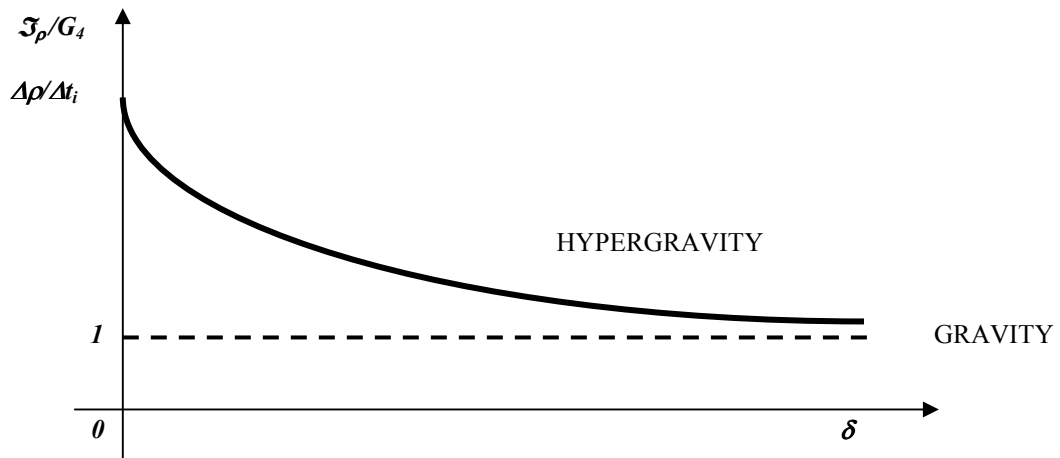


Diode-photodiode distance	Interaction	Temporal flux lines
Short: $\delta < \delta_0$	Subgravity: $\mathfrak{F}_\theta < G_4$	$0 < \Delta t < \Delta t_i$ : thin
Medium: $\delta = \delta_0$	Normal gravity: $\mathfrak{F}_\theta = G_4$	$\Delta t = \Delta t_i$ : medium
Long: $\delta > \delta_0$	Hypergravity: $\mathfrak{F}_\theta > G_4$	$\Delta t > \Delta t_i$ : thick

Angular interaction: subgravity  $\mathfrak{F}_\theta < G_4$  beside and hypergravity  $\mathfrak{F}_\theta > G_4$  far away, increasing with the distance:



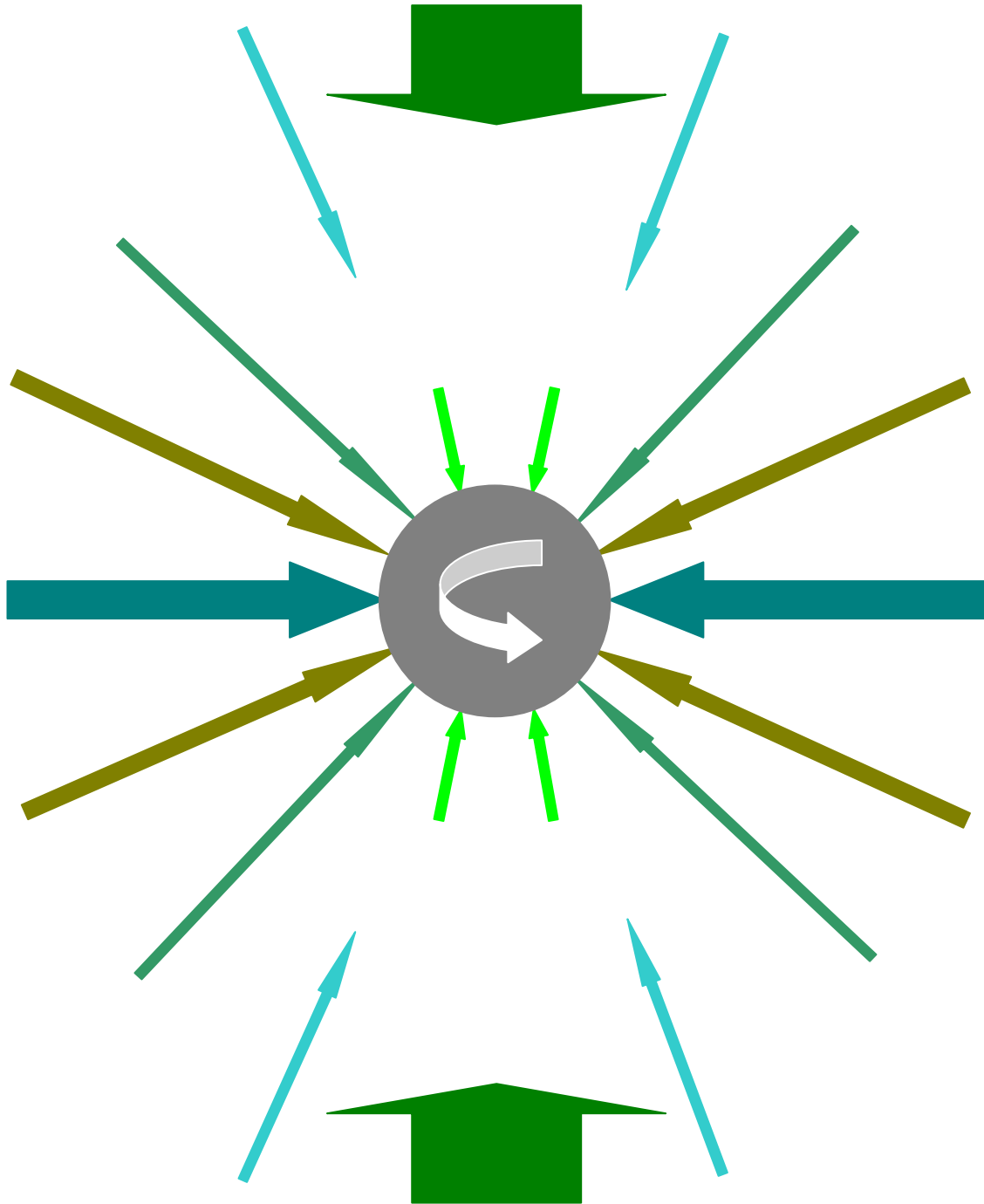
7.9 **In UCM the radial interaction is:  $\mathfrak{F}_\rho > G_4$ , asymptotically decreasing to  $G_4$  with the distance.**  
*Proof.* By Prop. 5.5 and according to Conjecture 7.6 the radial interaction (normalized regarding tetradimensional gravity)  $\mathfrak{F}_\rho/G_4$  is proportional to the qualitative course of radial temporal measure (normalized regarding the inertial one)  $\Delta\rho/\Delta t_i$ . The diagram in function of the diode-photodiode distance  $\delta$  is the following:



Radial interaction: hypergravity  $\mathfrak{F}_\rho > G_4$  decreasing with the distance:



**7.10** *Around a structureless sphere in UCM the interactions are anisotropic.*  
*Proof.* By Prop. 5.7 and by Conjecture 7.6, we get the following global interactive frame:



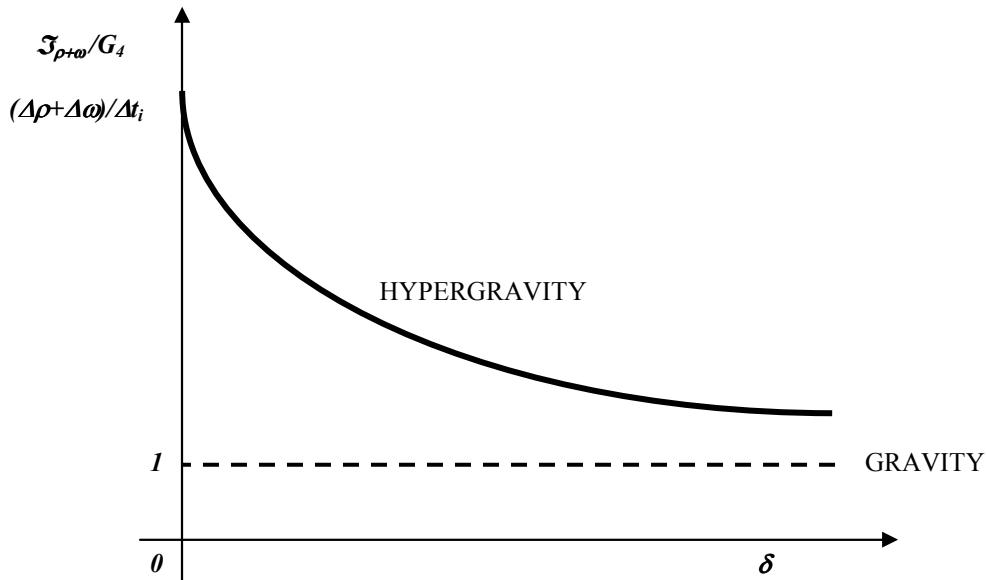
**7.11** *Around a rotating body the equatorial hyperattractive interaction explains the following phenomena:*

*A) the condensed Cooper pairs in superconductors due to alignment of electron spins;*

*B) the black hole accretion disk along its own equatorial plane;*

*C) the quasi-coplanar distribution of stars in galaxies and of planets in the solar system;*

*Proof.* By Conjectures 7.7 and 7.9 the qualitative course of the summation between radial and tangential interactions (normalized regarding tetradimensional gravity)  $\mathfrak{F}_{\rho+\omega}/G_4$ , proportional to the corresponding temporal measurement (normalized regarding the inertial one)  $(\Delta\rho+\Delta\omega)/\Delta t_i$ , in function of the distance diode-photodiode  $\delta$ , is the following:



**7.12** *Along a rotating body's axis the interaction, subattractive beside and hyperattractive far away, explains:*

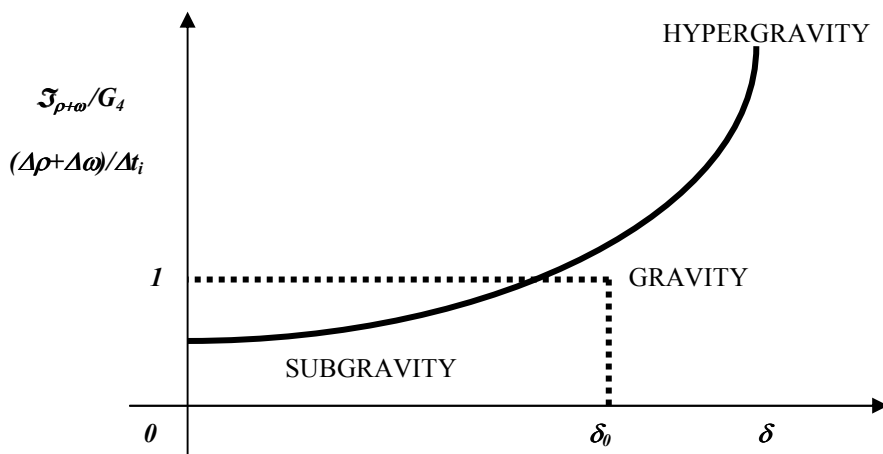
*A) the weight reduction along the rotation axis of a superconductor disk in Podkletnov effect;*

*B) the weight reduction along the rotation axis of magnetic roller rings in Searl effect;*

*C) the black hole jet along its own rotation axis;*

*D) the hadronic confinement and the asymptotic freedom of quarks.*

*Proof.* By Conjectures 7.8 and 7.9 the qualitative course of the summation between radial and tangential interactions (normalized regarding tetradimensional gravity)  $\mathfrak{F}_{\rho+\omega}/G_4$  is proportional to the corresponding temporal measurement (normalized regarding the inertial one)  $(\Delta\rho+\Delta\omega)/\Delta t_i$ . The diagram in function of the distance diode-photodiode  $\delta$ , is the following:



## 8 APPLICATIONS

There are some practical applications deriving directly from the six-dimensional theory, in particular from the model of structureless body in UCM:

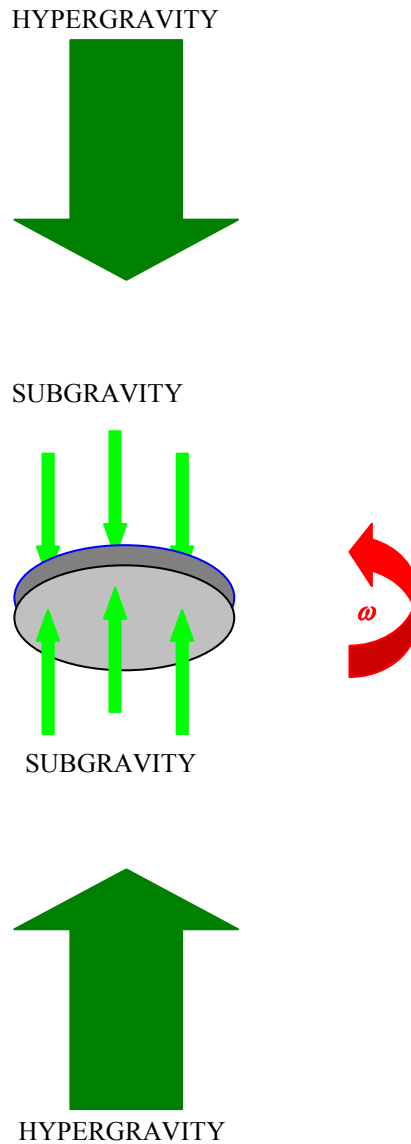
A) rotating disks assimilable to structureless flat bodies generating *hypergravity* or *subgravity*;

B) rotating cylinders assimilable to structureless filiform bodies generating *hypergravity*.

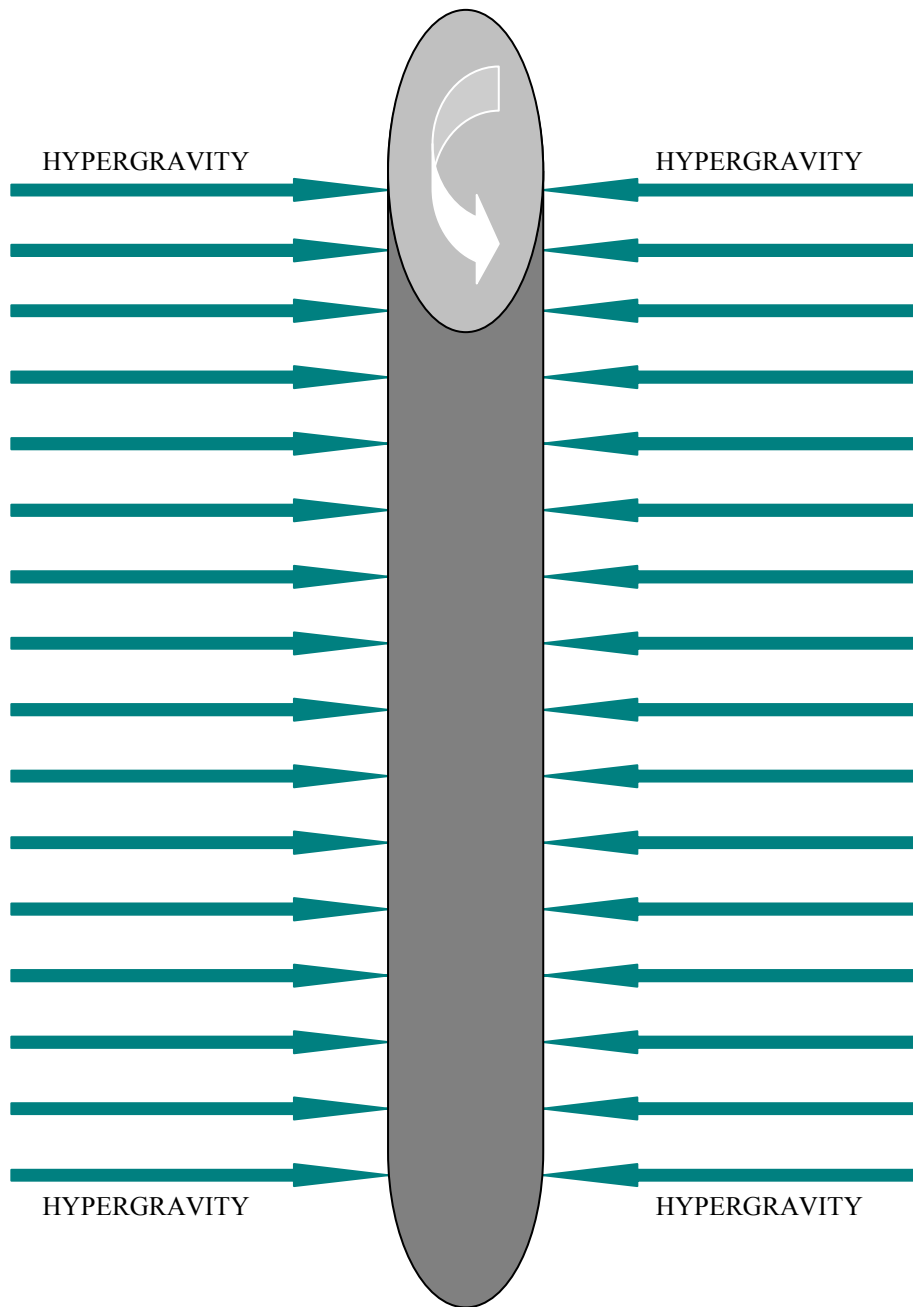
Therefore *subgravity* and *hypergravity* are possible alternative energy sources whose efficiency is however limited by building problems, because only few materials have a partial microscopic order sufficient to be assimilable to a structureless body, *e.g.*, the rare earth magnets used in the *Searl effect* or the superconductors used in the *Podkletnov shield*.

### 8.1 Production of subgravity and hypergravity by rotating structureless disks.

The flat shape privileges the subattraction until a certain distance and the hyperattraction after it, increasing with the distance, along the rotation axis.



**8.2** *Production of hypergravity by rotating structureless filiform cylinders.*  
The filiform shape privileges the hyperattractive equatorial effect.



## 9 CONCLUSIONS

In the following table there is the General Relativity compared with its hexadimensional extension:

Characteristics of the theory	GR by A. Einstein	GR Extension by E. Bonacci
Trajectory of a material point	Continuous	Continuous
Space-time continuum	Four-dimensional	Six-dimensional
Spatial Cartesian coordinates	x, y, z	x, y, z
Temporal Cartesian coordinates	t	$t_x, t_y, t_z$
Relation between space and time coordinates	Asymmetry: 3+1	Symmetry: 3+3
Cartesian reference	xyzt	xyzt <sub>x</sub> t <sub>y</sub> t <sub>z</sub>
Space-time position	P(x,y,z,t)	P(x,y,z,t <sub>x</sub> ,t <sub>y</sub> ,t <sub>z</sub> )
Gaussian reference	X <sub>1</sub> X <sub>2</sub> X <sub>3</sub> X <sub>4</sub>	X <sub>1</sub> X <sub>2</sub> X <sub>3</sub> X <sub>4</sub> X <sub>5</sub> X <sub>6</sub>
Space-time event	E(X <sub>1</sub> ,X <sub>2</sub> ,X <sub>3</sub> ,X <sub>4</sub> )	E(X <sub>1</sub> ,X <sub>2</sub> ,X <sub>3</sub> ,X <sub>4</sub> ,X <sub>5</sub> ,X <sub>6</sub> )
Space-time geometry	Hyperbolic	Ultrahyperbolic
Line element: ds	$\delta \int ds=0$	$\delta \int ds=0$
Metric tensor: $g_{\mu\nu}$	Four-dimensional: $\mu, \nu=1,2,3,4$	Six-dimensional: $\mu, \nu=1,2,3,4,5,6$
Invariant quadratic form: $ds^2=g_{\mu\nu}dx_\mu dx_\nu$	Four-dimensional: $\mu, \nu=1,2,3,4$	Six-dimensional: $\mu, \nu=1,2,3,4,5,6$
Ricci curvature tensor: $R_{\mu\nu}$	Four-dimensional: $\mu, \nu=1,2,3,4$	Six-dimensional: $\mu, \nu=1,2,3,4,5,6$
Scalar curvature, trace of tensor $R_{\mu\nu}$ : $R_a^a$	Four-dimensional: $R^4$	Six-dimensional: $R^6$
Source tensor $T_{\mu\nu}$	Four-dimensional: $\mu, \nu=1,2,3,4$	Six-dimensional: $\mu, \nu=1,2,3,4,5,6$
Stress-energy-momentum	Components of $T_{\mu\nu}$	Components of $T_{\mu\nu}$
Electromagnetical, weak and colour charges	Not included in $T_{\mu\nu}$	Components of $T_{\mu\nu}$
Conservation equations: $\nabla^\mu T_{\mu\nu}=0$	Four-dimensional: $\mu, \nu=1,2,3,4$	Six-dimensional: $\mu, \nu=1,2,3,4,5,6$
Contracted Bianchi identities: $\nabla^\mu (R_{\mu\nu} - \frac{1}{2}Rg_{\mu\nu})=0$	Four-dimensional: $\mu, \nu=1,2,3,4$	Six-dimensional: $\mu, \nu=1,2,3,4,5,6$
Einstein tensor: $G_{\mu\nu}=R_{\mu\nu}-\frac{1}{2}Rg_{\mu\nu}$	Four-dimensional: $\mu, \nu=1,2,3,4$	Six-dimensional: $\mu, \nu=1,2,3,4,5,6$
Field equations: $G_{\mu\nu}=kT_{\mu\nu}$	Four-dimensional: $\mu, \nu=1,2,3,4$	Six-dimensional: $\mu, \nu=1,2,3,4,5,6$
Field equations' total number: $\mu \times \nu$	4x4=16	6x6=36
Field equations' reduced number	10, for $G_{\mu\nu}$ and $T_{\mu\nu}$ are symmetric	21, if $G_{\mu\nu}$ and $T_{\mu\nu}$ are symmetric
Lagrangian of matter: L	Four-dimensional: $L^4$	Six-dimensional: $L^6$
Scalar function: $J=L-R/2k$	Four-dimensional: $J^4=L^4-R^4/2k$	Six-dimensional: $J^6=L^6-R^6/2k$
Variation principle: $\delta \int J^n \sqrt{g} d^4X=0$	Four-dimensional: $\delta \int J^4 \sqrt{g} d^4X=0$	Six-dimensional: $\delta \int J^6 \sqrt{g} d^6X=0$
Conservation laws	Stress-energy-momentum	Stress-energy-momentum-charges
Described interactions	Gravitational	Gravitational-electroweak-strong

# Absolute Relativity

## 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 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 equivalent.

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 self-interaction, 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.

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 self-interaction*, 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 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 self-interacting *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 is the electric field, that is  $E$  acting in the ring's circle (while it turns out  $B \perp E$  and therefore  $B$  is perpendicular to the same ring, being not involved in any interaction), we will define  $\Omega_E$  such structure. Well, in a *STL irf* the ring  $\Omega_E$ , 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 is a consequence of the magnetic field's extreme weakness ( $3 \times 10^8$  times medium inferior to that electric according to  $E=cB$ ) in closing the  $\Omega_B$  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 standing wave, i.e. based on the number of wavelengths  $\lambda$  distributed along the circumference (even, in order to enable the self-interaction);
- 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 standing 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 standing waves on equal wavelength  $\lambda$ ;
- 6) the *neutrality* of some particles, turning out of complex structures in which an even number of stationary waves expressing equal and opposite charges are arranged alternated and concentrically; an example is the neutron, with the electron inner standing 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  $v_x < v_l$  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 a six-dimensional continuum, that is a (3,3) space-time which describes nature through an only one  $6 \times 6$  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  $v = c$ ,  $\gamma$  being the symbol of photon.
- 3.20 Denote  $\Omega_E$  the *EM* wave stationarily folded as a ring, by electric self-interaction, in *SOL irf*.
- 3.21 Let *electromass* be the temporal development, circular or helical, of  $\Omega_E$  in *STL irf*.
- 3.22 Let *electric charge*  $q_E$  and *magnetic spin*  $s_B$  be the quantities characterizing the electroparticles.
- 3.23 Denote  $\Omega_B$  the *EM* wave stationarily folded as ring, by magnetic self-interaction, in *SOL irf*.
- 3.24 Let *magnetomass* be the temporal development, circular or helical, of  $\Omega_B$  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* be 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  $\Psi = e^{iP \cdot x / \hbar}$  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.**

*Expl.* 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 joint action and reaction.**

*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.**

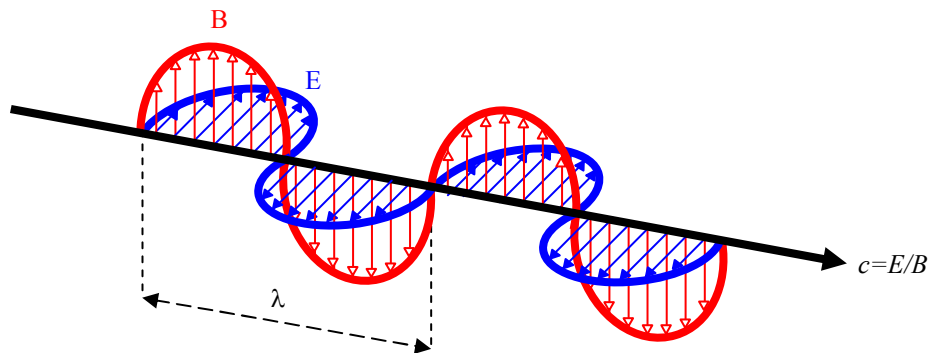
*Expl.* According to Hypothesis 4.4, by Lorentz equations at  $v=c$  the time stands still ( $\Delta t = \infty$ ).

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  $E \perp B$  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:

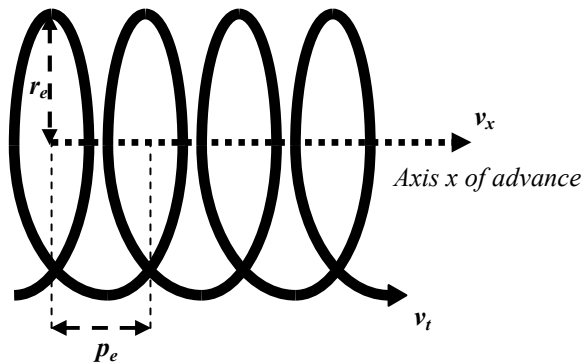
$$v_t = v_x * [1 + (2\pi r_e / p_e)^2]^{1/2}, \text{ thus } v_t > v_x$$

Relation radius-pitch:

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

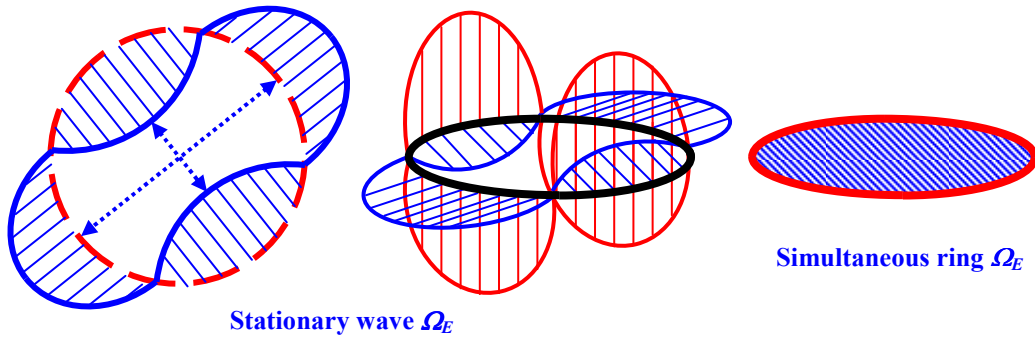
Centrifugal acceleration:

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



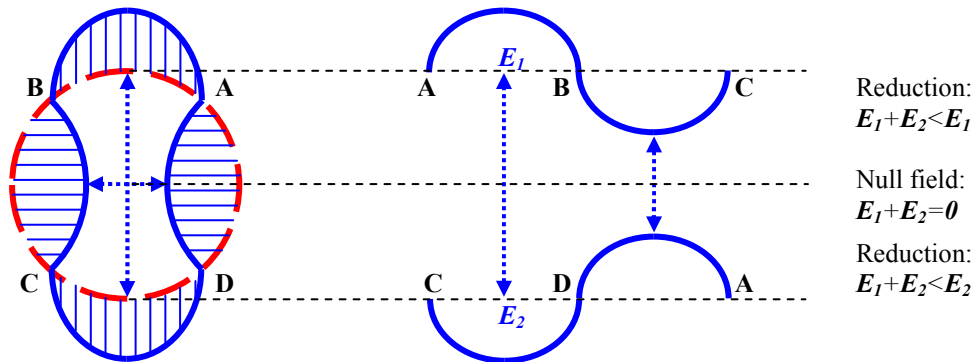
4.9 **The EM wave can close to simultaneous ring  $\Omega_E$  by electric self-interaction.**

*Expl.* EM wave stationarily closed on itself, through the electric field, by a whole number of wavelengths  $\lambda$ . For an observer at  $v=c$  such ring  $\Omega_E$  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:



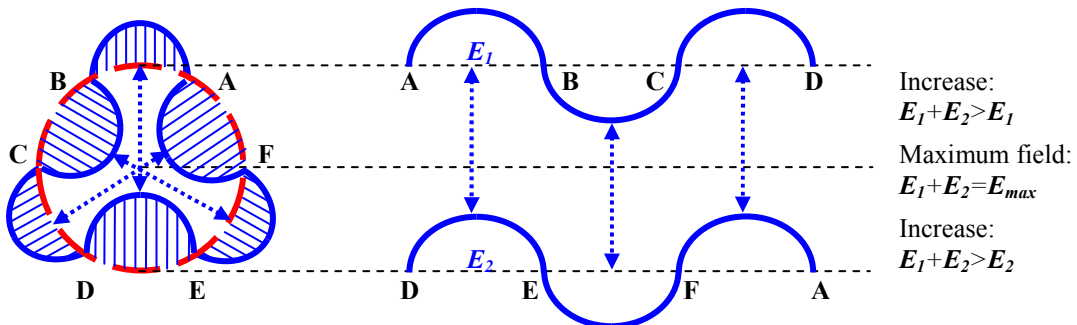
4.9.1 **With an even number of wavelengths  $\lambda$  the ring  $\Omega_E$  is stable.**

*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  $\Omega_E$  the electric field's strength 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  $\Omega_E$  and the *rectified* outline:



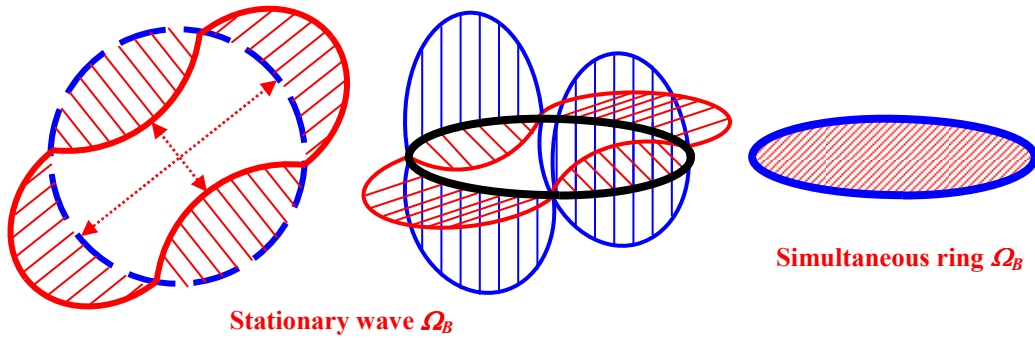
4.9.2 **With an odd number of wavelengths  $\lambda$  the ring  $\Omega_E$  is unstable.**

*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  $\Omega_E$  the electric field's strength 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  $\Omega_E$  and the *rectified* outline:



**4.10 The EM wave can close to simultaneous ring  $\Omega_B$  by magnetic self-interaction.**

*Expl.* EM wave stationarily closed on itself, through the magnetic field, by a whole number of wavelengths  $\lambda$ . For an observer at  $v=c$  such ring  $\Omega_B$  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:



**4.10.1 With an even number of wavelengths  $\lambda$  the ring  $\Omega_B$  is stable.**

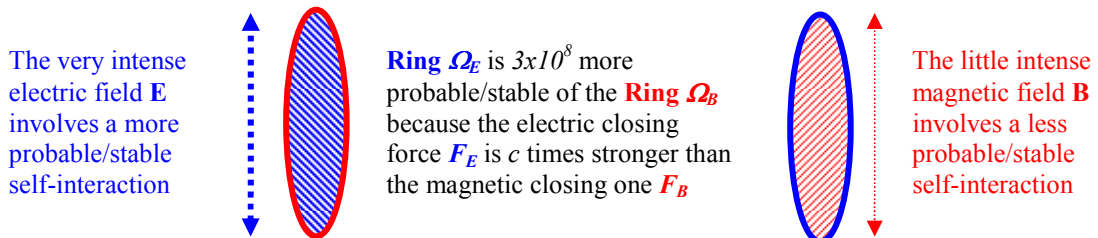
*Expl.* Similarly to Hypothesis 4.9.1, the even number of wavelengths allows equal and opposite circular sectors, which are mutually compensated, supplying a result smaller than the single interacting portions of wave. Inside the ring  $\Omega_B$  the magnetic field's strength is therefore *inferior* 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 With an odd number of wavelengths  $\lambda$  the ring  $\Omega_B$  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  $\Omega_B$  the magnetic field's strength 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  $\Omega_E$  prevails on the magnetic one  $\Omega_B$  by the factor  $c=3 \times 10^8$ .**

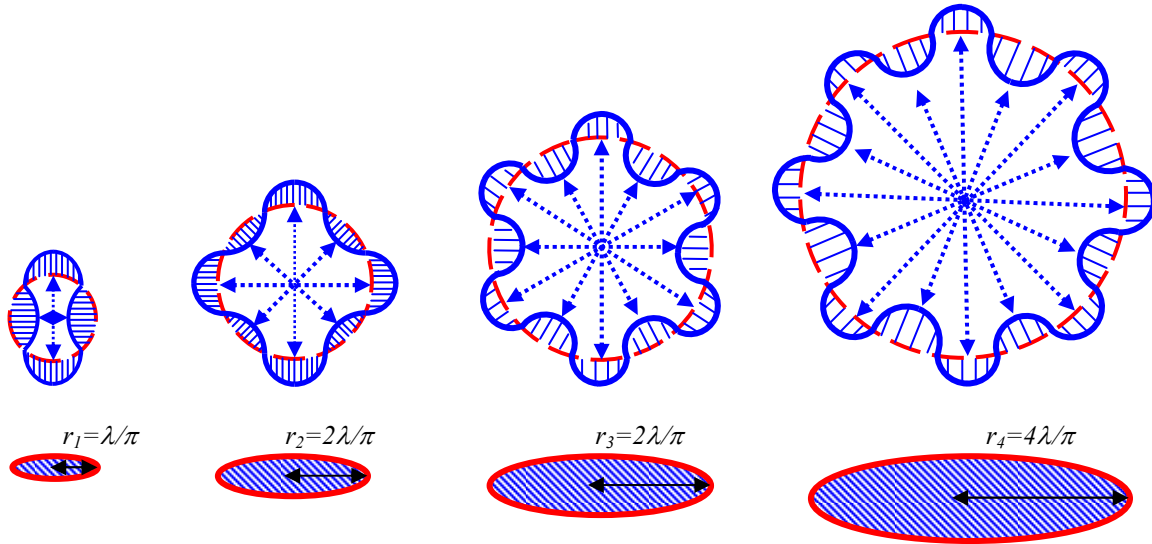
*Expl.* The EM wave's force of closing on its own it depends on the nature of the self-interacting field, both the electric force  $F_E$  and the magnetic one  $F_B$  being proportional to the respective fields  $E$  and  $B$ . Since medium  $E/B=c$ , the electric field  $E$  is  $3 \times 10^8$  times more intense than magnetic induction field  $B$ ; consequently the formation of the ring  $\Omega_E$  is  $3 \times 10^8$  times more probable than that one of the ring  $\Omega_B$ , *i.e.* the electrically originated ring  $\Omega_E$  is  $3 \times 10^8$  times more stable than that one magnetically originated  $\Omega_B$ :



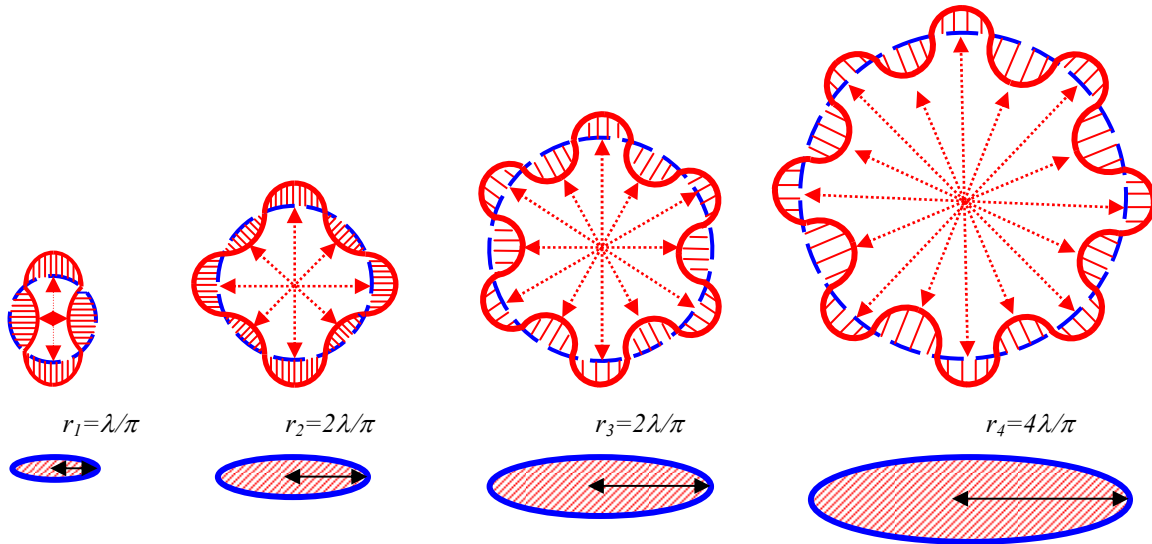
**4.12 Quantization of the  $\Omega_E$  and  $\Omega_B$  rings' radius on equal wavelength for an observer at  $v=c$ .**

*Expl.* The rings  $\Omega_E$  and  $\Omega_B$  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 self-attraction 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  $\Omega_E$  ring's radius.**

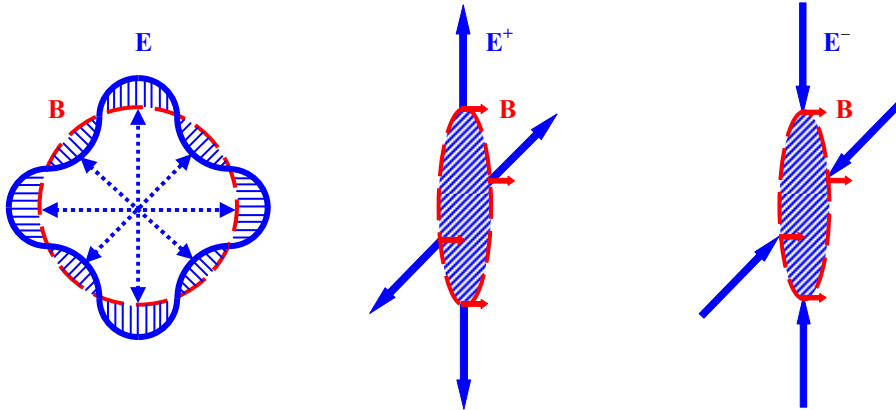


**4.12.2 Quantization of the hypothetical  $\Omega_B$  ring's radius.**



**4.13 The  $\Omega_E$  ring emits a radial electric field and an axial magnetic field.**

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



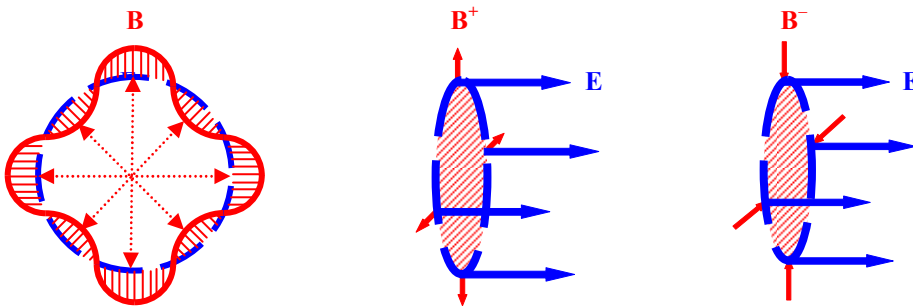
The field  $E$  is positive or negative:

Positive ring  $\Omega_E^+$

Negative ring  $\Omega_E^-$

**4.14 The  $\Omega_B$  ring emits a radial magnetic field and an axial electric field.**

*Expl.* For an observer at  $v=c$  the simultaneous standing wave is characterized by two fields  $E \perp B$ . The magnetic self-attraction 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*.



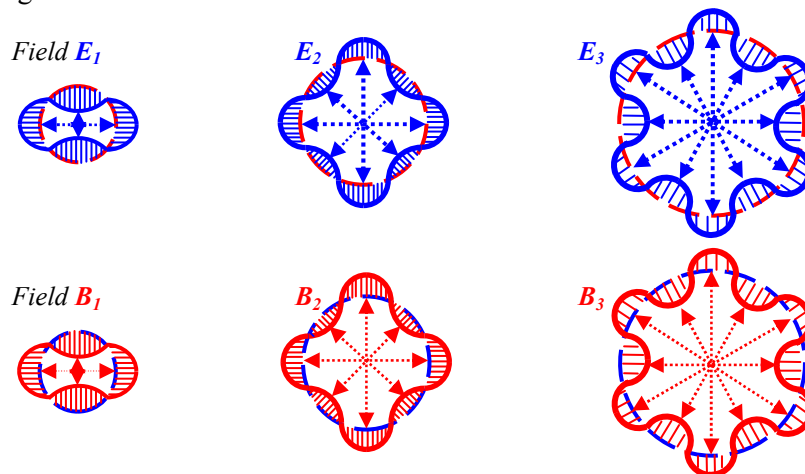
The field  $B$  is positive or negative:

Positive ring  $\Omega_B^+$

Negative ring  $\Omega_B^-$

**4.15  $\Omega_E$  and  $\Omega_B$  rings' radial fields depend on stationary wave's shape only.**

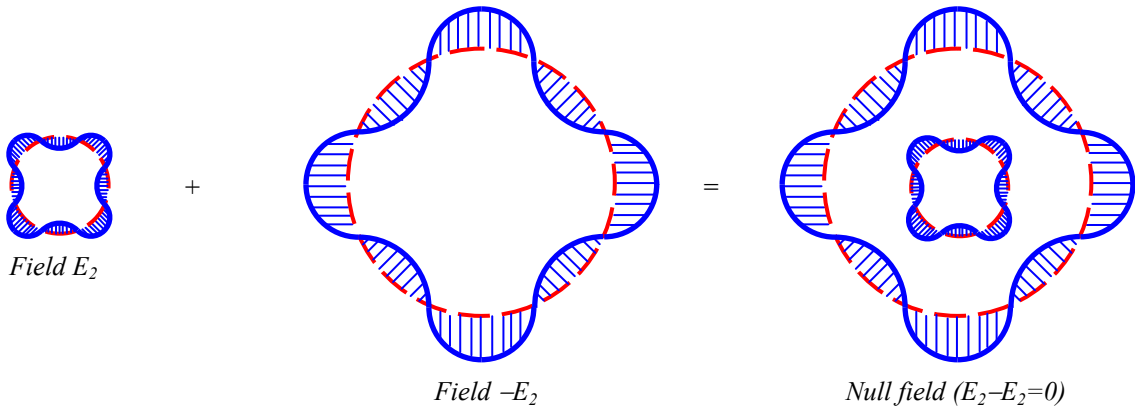
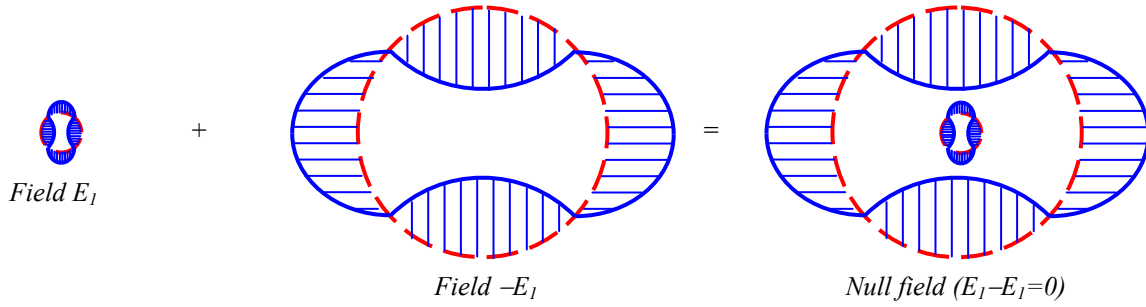
*Expl.* The radial field's intensity is proportional to the number of wavelengths on the circumference, *i.e.* it only depends on the profile of the standing wave that generates the simultaneous ring.



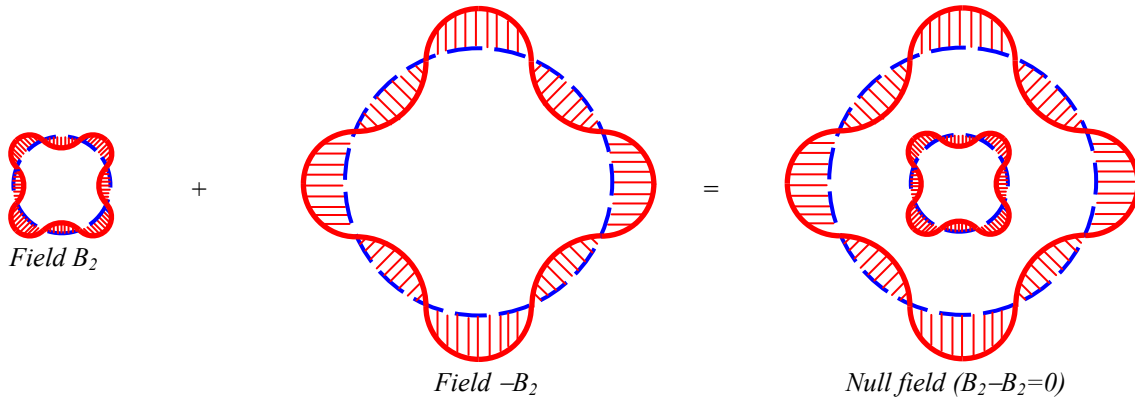
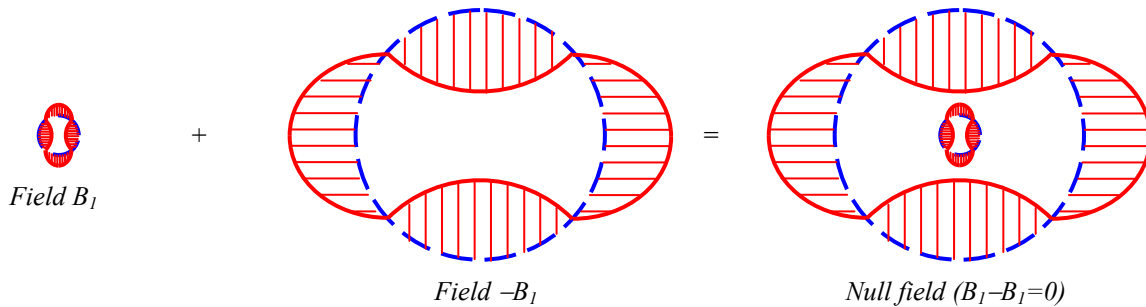
**4.16 Originated from concentric stationary waves with the same shape, opposite fields cancel each other out.**

*Expl.* By Hypothesis 4.15, standing waves with the same profile they emit same intensity fields; if two fields are opposite then their result is null.

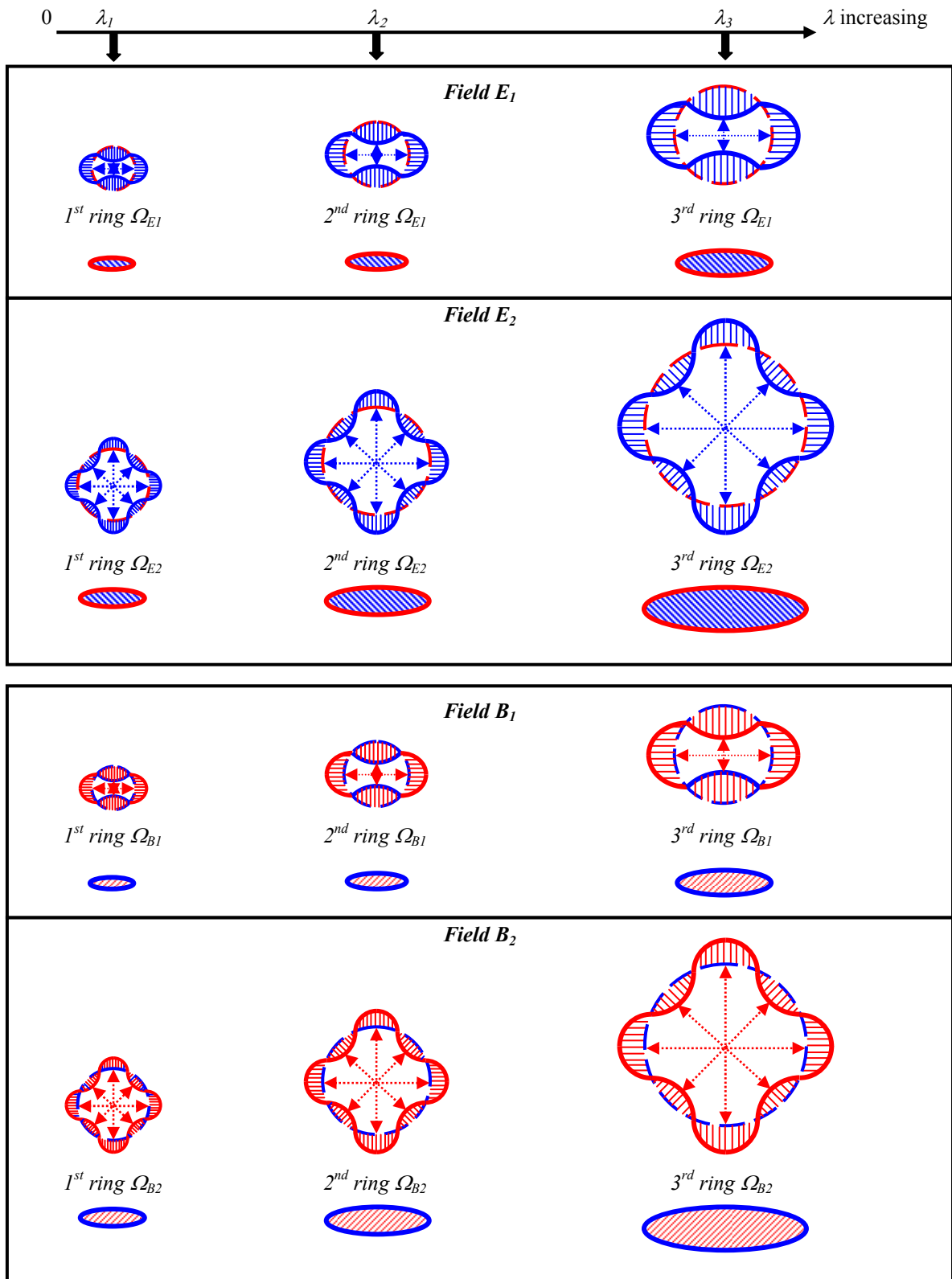
**4.16.1 Examples of neutralization for the radial electric field.**



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



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



5 PROPOSITIONS

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

*Expl.* 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.

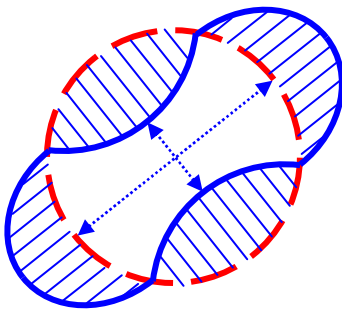
5.2 *The self-interacting electric ring  $\Omega_E$  generates the electroparticles in STL irf.*

*Expl.* At  $v=c$  the self-interacting electric ring  $\Omega_E$  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:

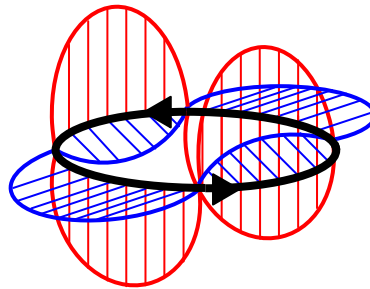
5.2.1 *Hypothetical generation of electrically charged rest mass.*

In SOL irf:



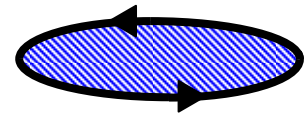
Instantaneous ring  $\Omega_B$

In STL irf:



Circular trajectory

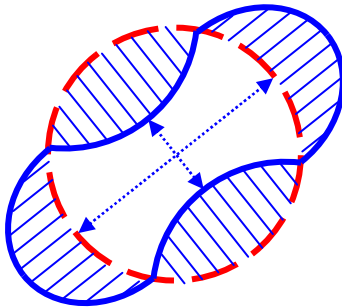
In STL irf:



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

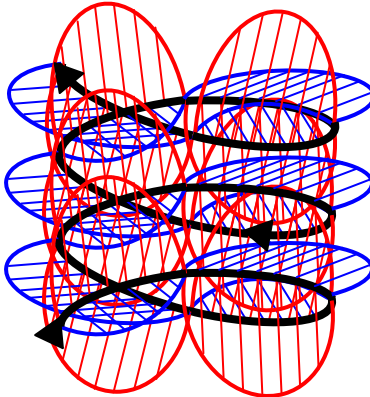
5.2.2 *Generation of electrically charged moving mass.*

In SOL irf:



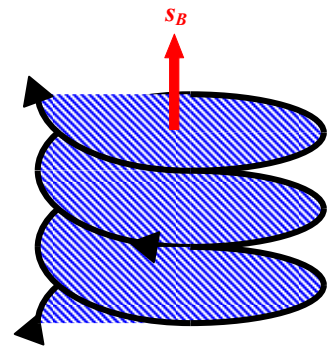
Quasi-instantaneous ring  $\Omega_E$  (the discrepancy with the ring is infinitesimal, the closing is almost perfect).

In STL irf:



Helical trajectory

In STL irf:



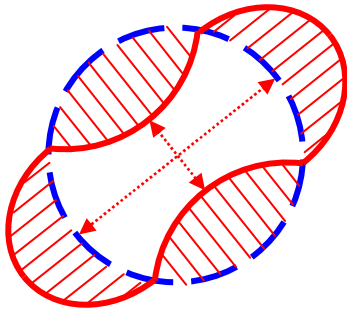
Moving mass, with electric charge  $q_E$  and magnetic spin  $s_B$  in the advancing direction.

**5.3 The self-interacting magnetic ring  $\Omega_B$  would generate the magnetoparticles in STL irf.**

*Expl.* At  $v=c$  the self-interacting electric ring  $\Omega_B$  is possible because *simultaneous*, but its constitution is a three hundred million times less probable/stable than  $\Omega_E$  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:

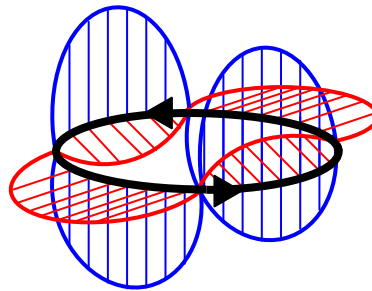
**5.3.1 Hypothetical generation of magnetically charged rest mass.**

In SOL irf:



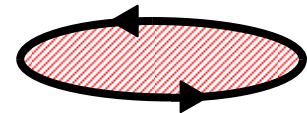
Instantaneous ring  $\Omega_B$

In STL irf:



Circular trajectory

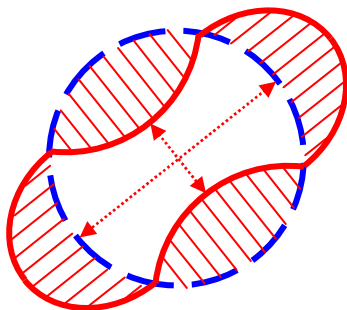
In STL irf:



Hypothetical mass at rest with magnetic charge  $q_B$  but without spin ( $s_E=0$ ).

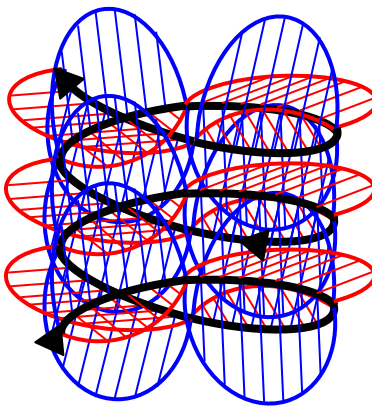
**5.3.2 Generation of magnetically charged moving mass.**

In SOL irf:



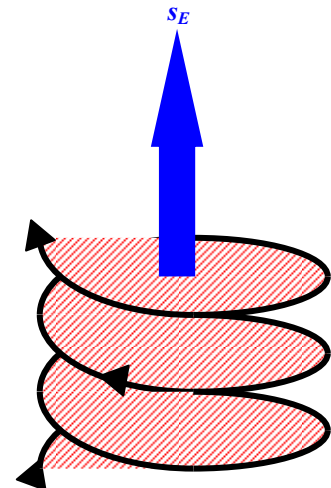
Quasi-instantaneous ring  $\Omega_B$  (the discrepancy with the ring is infinitesimal, the closing is almost perfect).

In STL irf:



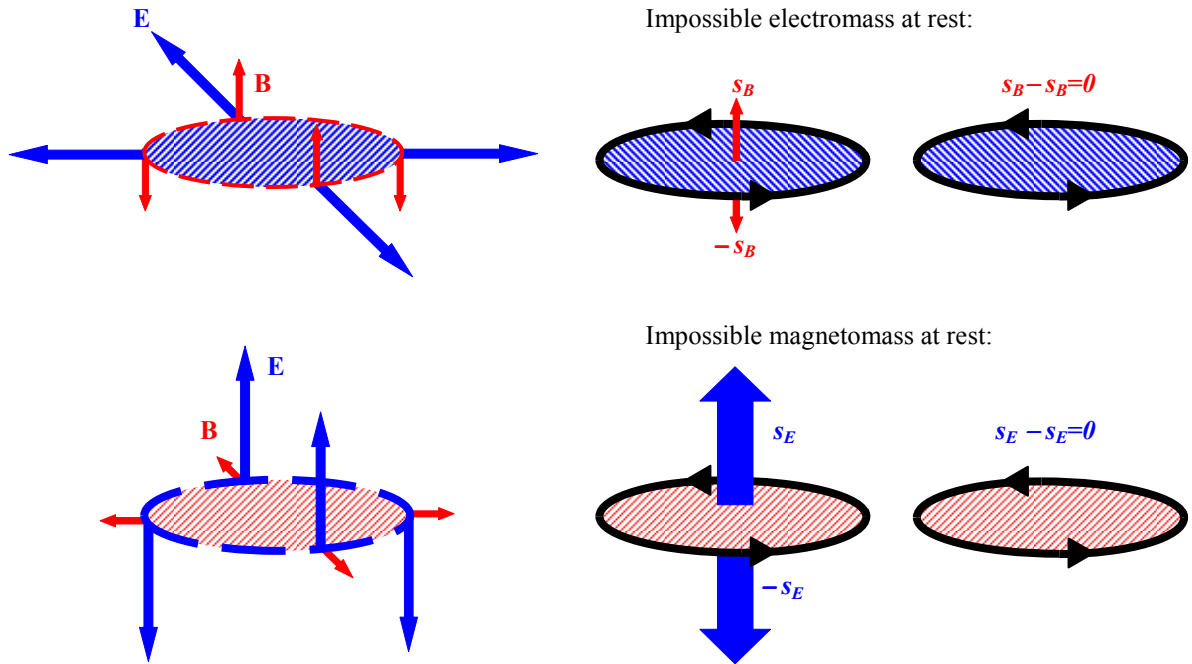
Helical trajectory

In STL irf:

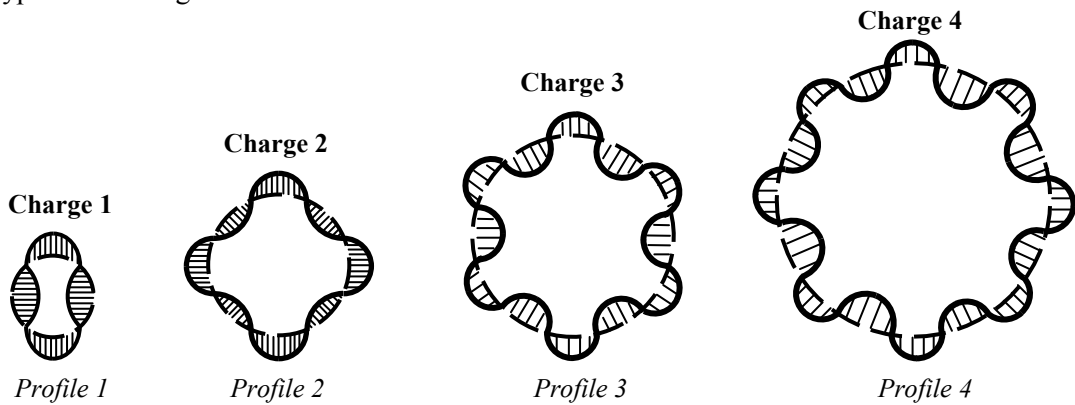


Moving mass, with electric charge  $q_B$  and magnetic spin  $s_E$  in the advancing direction.

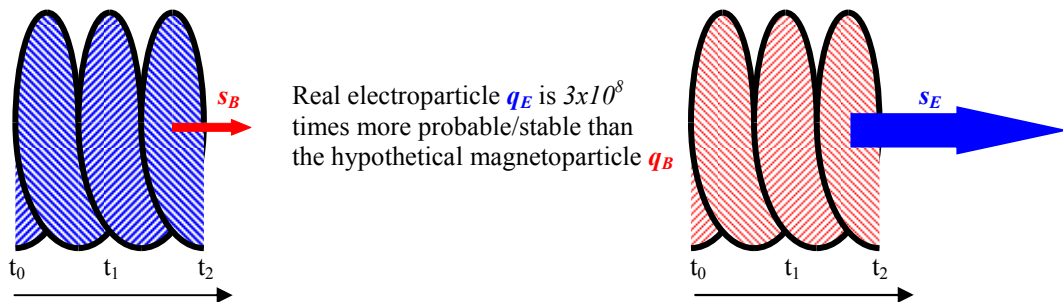
**5.4** *The rest mass is impossible, since immobility would violate the spin conservation.*  
*Expl.* By Props. 5.2 and 5.3, the spin of the electromagnetic helix arises in its direction of motion. In movement absence the fields developed perpendicularly to the ring's two faces are perfectly balanced,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



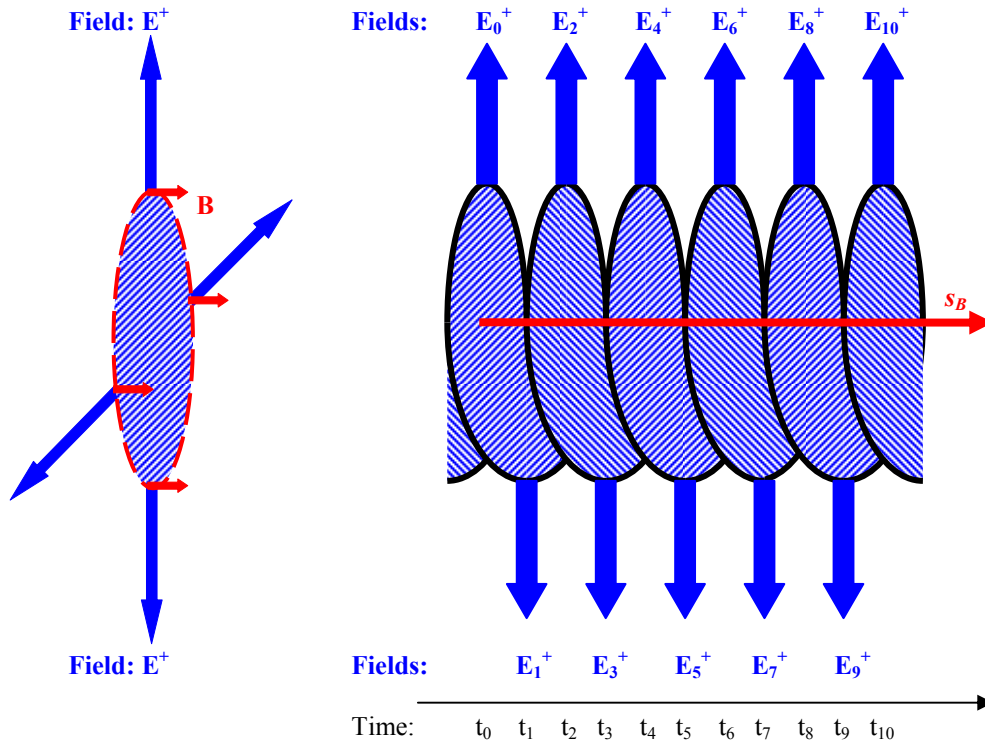
**5.5** *The electric charge  $q_E$  and the hypothetical magnetic monopole  $q_B$  are quantized.*  
*Expl.* By Hypothesis 4.15, the charge associated with the particle is proportional to the radial field, whose intensity depends on standing wave's shape only. Since the wave's profile is not continuous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



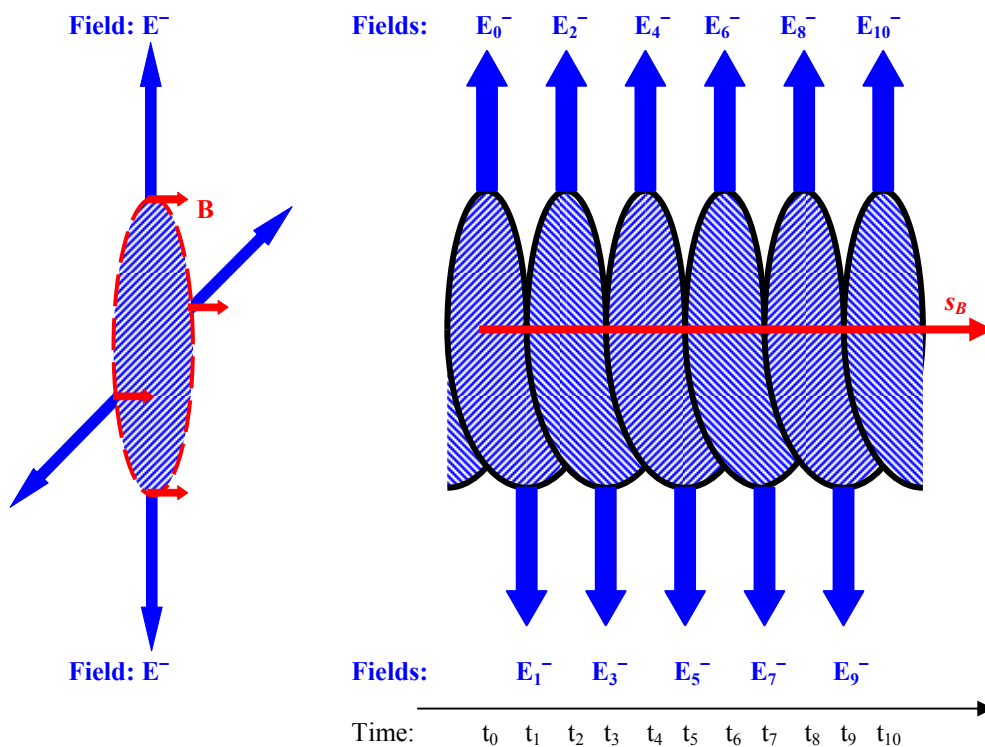
**5.6** *The electric charge is  $3 \times 10^8$  times more probable/stable than the magnetic charge.*  
*Expl.* By Hypothesis 4.11, because ring  $\Omega_E$  is  $c$  times more probable/stable than ring  $\Omega_B$ .



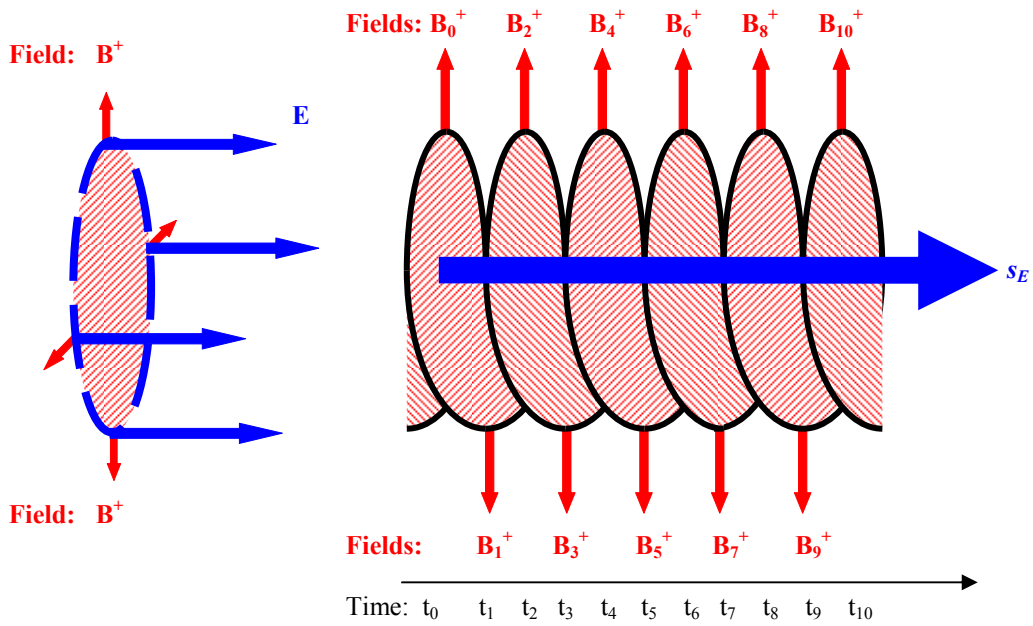
5.7 *In STL irf the ring  $\Omega_E^+$  is an electric positive charge with magnetic spin.*  
*Expl. The ring  $\Omega_E^+$  in SOL irf is a space-time extended helix in STL irf:*



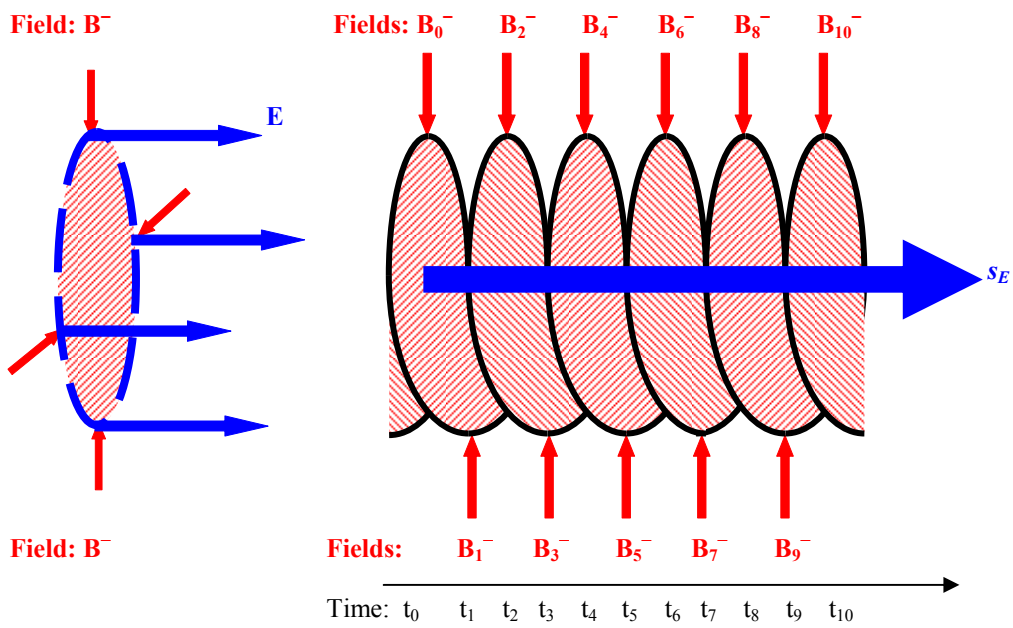
5.8 *In STL irf the ring  $\Omega_E^-$  is an electric negative charge with magnetic spin.*  
*Expl. The ring  $\Omega_E^-$  in SOL irf is a space-time extended helix in STL irf:*



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 is a space-time extended helix in STL irf:



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 is a space-time extended helix in STL irf:



**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:

$$v_p=c/[1+(2\pi r_p/p_e)^2]^{1/2}, \text{ thus } v_p < c$$

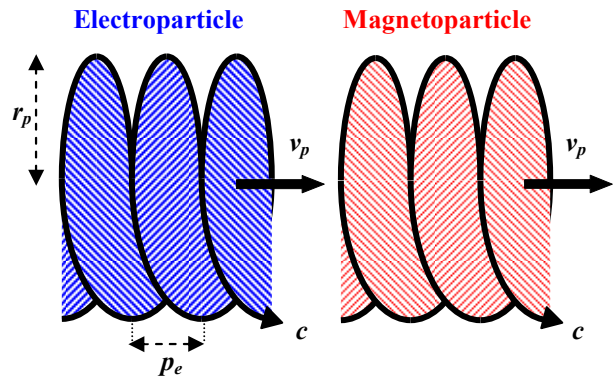
Radius of the particle:

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

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:  $v_p < c$ .



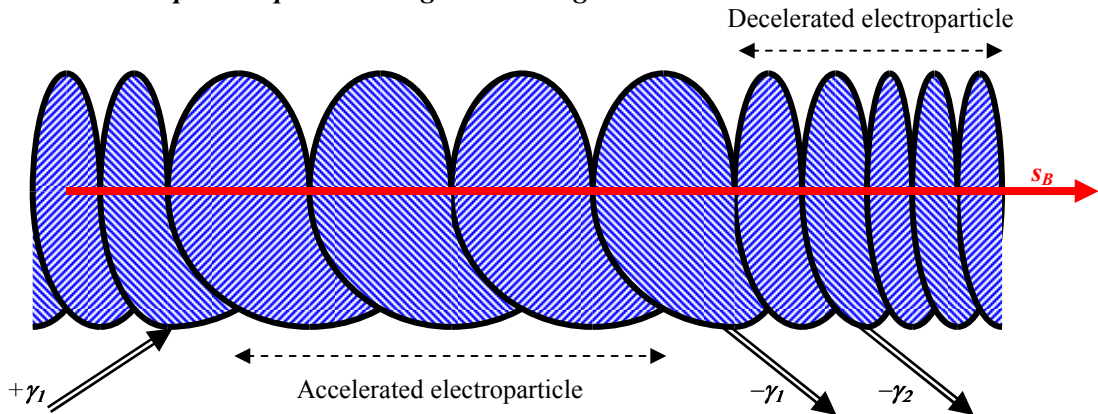
**5.12 The helical model effectively describes the energy exchanges in particle-photon interaction.**

*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:  $E=E(p_e)$ .

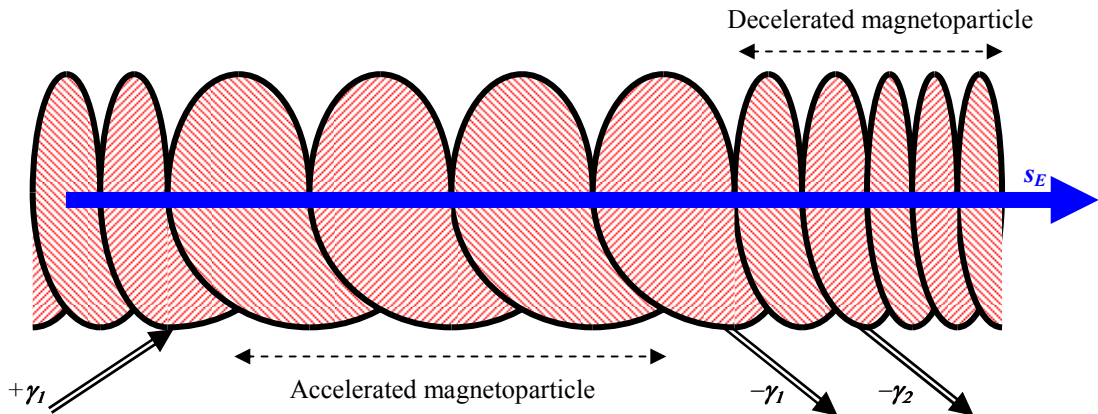
The relations are  $v_p=c/[1+(2\pi r_p/p_e)^2]^{1/2}$  and  $E=E_0/[1+(v_p/c)^2]^{1/2}$ .

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:  $p_e \propto \Delta$ .

**5.12.1 Electroparticle-photon energetic exchanges.**

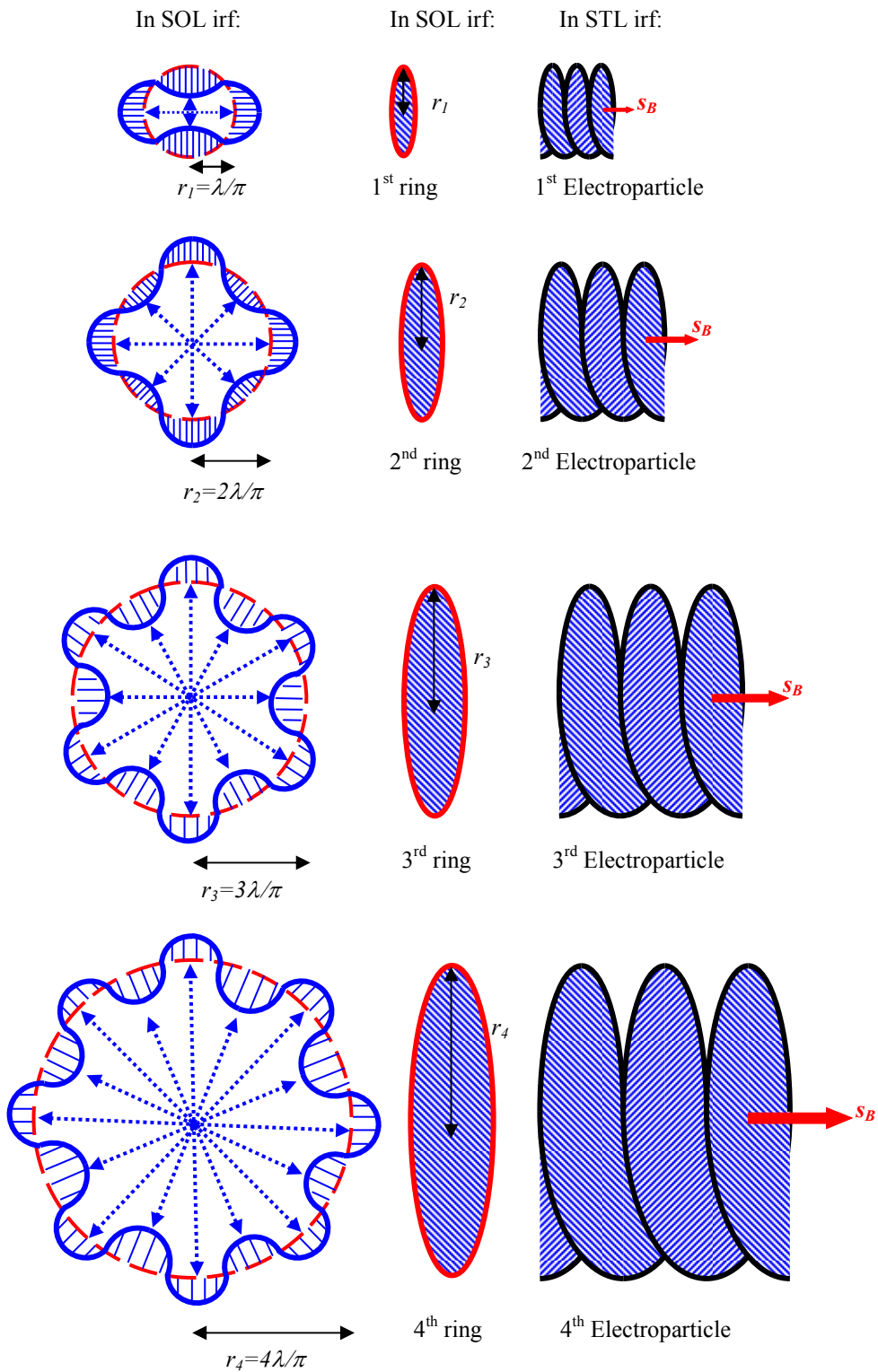


**5.12.2 Hypothetical magnetoparticle-photon energetic exchanges.**



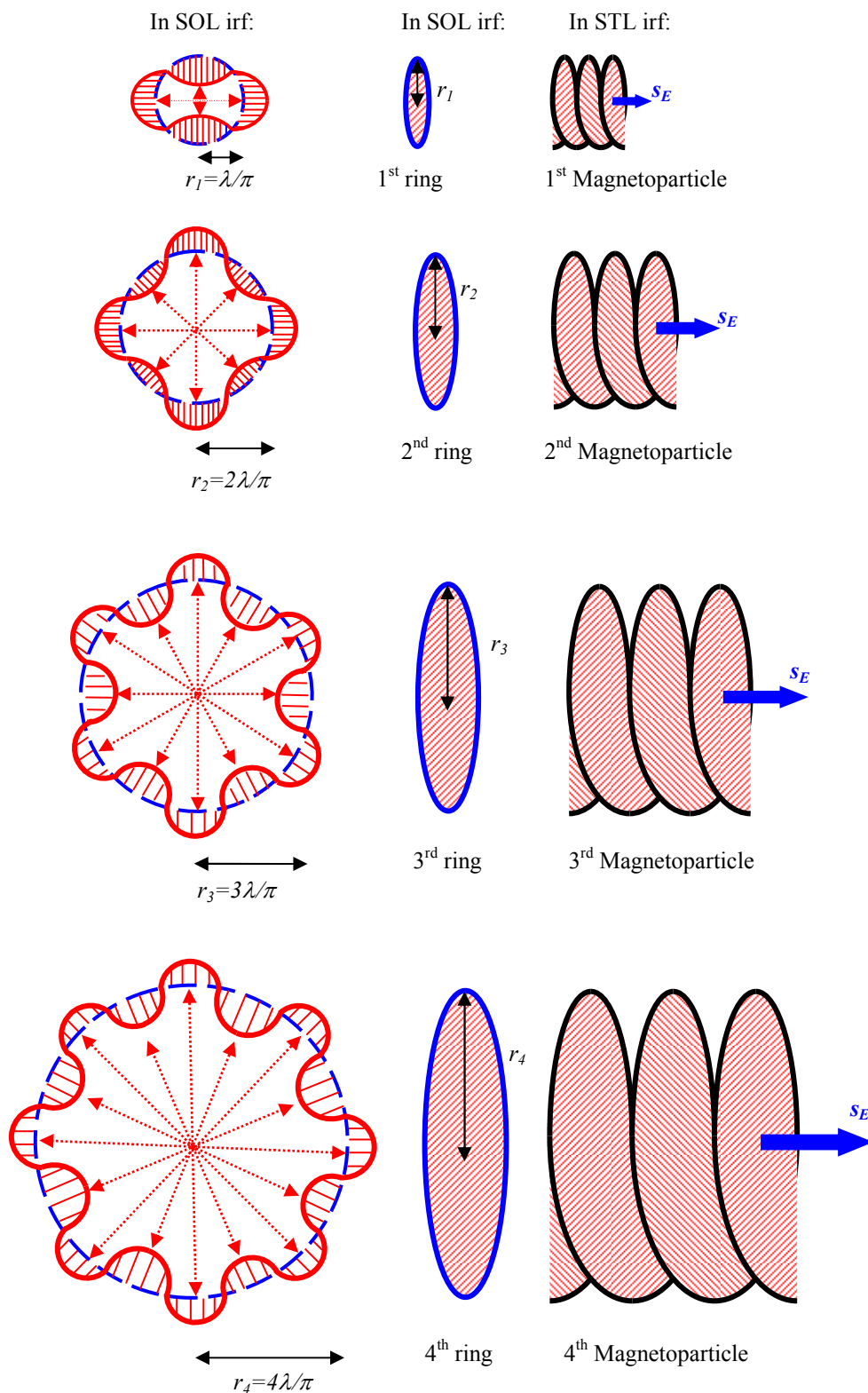
**5.13 Quantization of the electroparticle's radius on equal wavelength for a STL observer.**

*Expl.* By Hypothesis 4.12, the stable standing 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  $n \in \mathbb{Z}^+$ .



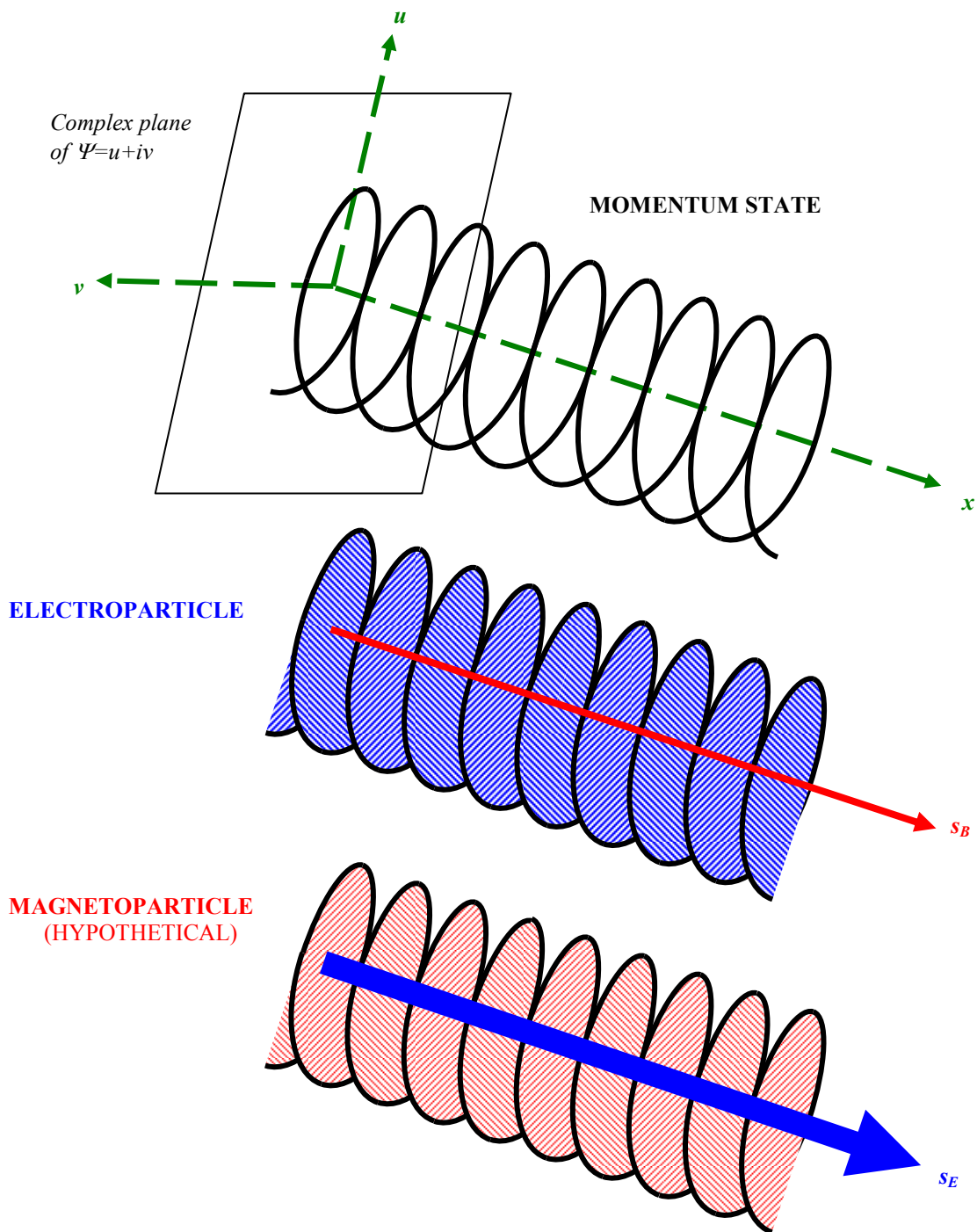
**5.14 Quantization of the magnetoparticle's radius on equal wavelength for a STL observer.**

*Expl.* By Hypothesis 4.12, the stable standing 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  $n \in \mathbb{Z}^+$ .



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

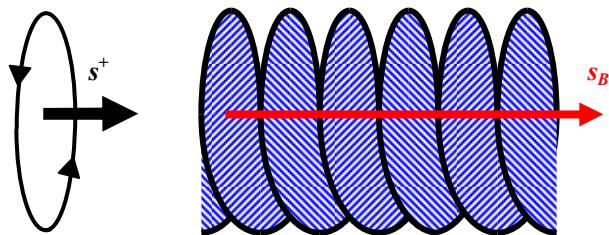
*Expl.* Denote  $\Psi = u + iv$  the wave function of a particle in the complex plane  $(u, v)$ . The particle's momentum state  $\Psi = e^{iP \cdot x / \hbar}$  is described just by a helix in the real direction  $x$ .



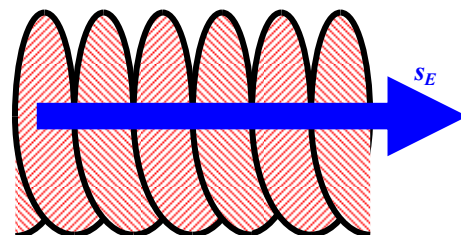
**5.16 The helical model is consistent with a particle's helicity.**

*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.

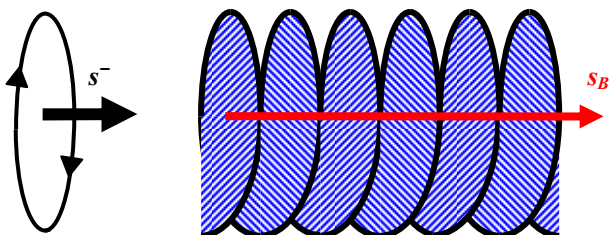
Right-handed spin: Electroparticle with positive helicity:



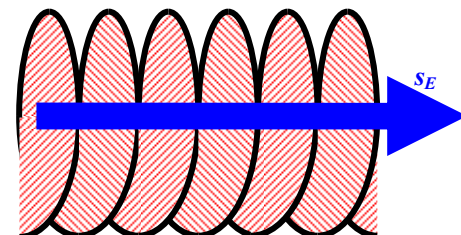
Magnetoparticle with positive helicity:



Left-handed spin: Electroparticle with negative helicity:



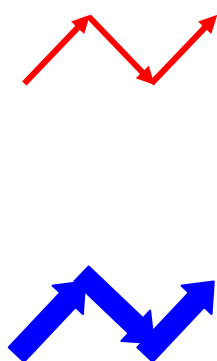
Magnetoparticle with negative helicity:



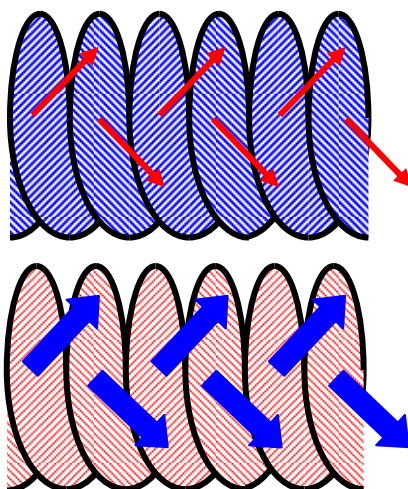
**5.17 The helical model is consistent with a particle's ZBW.**

*Expl.* Spin is the result of the zigzag associated with different inclinations of the helix spirals.

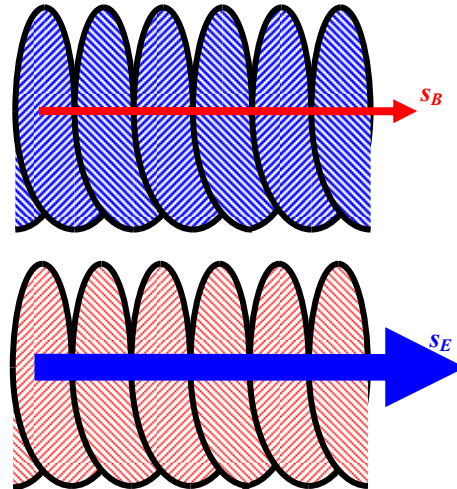
Zitterbewegung:



Zigzag oriented spin:



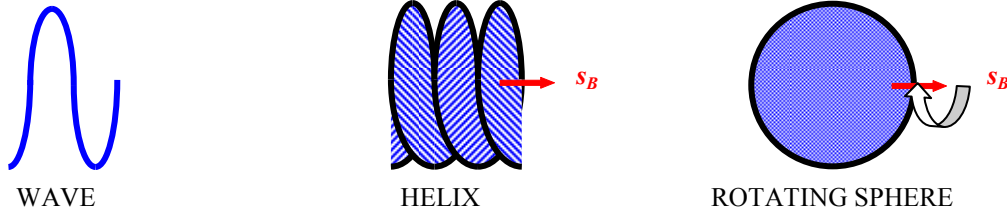
Resulting spin:



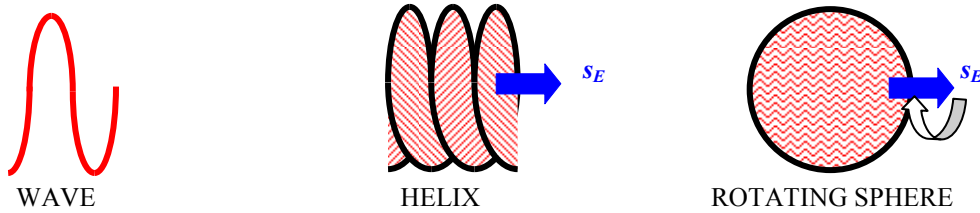
**5.18 Origin of the wave-particle duality for a STL observer.**

*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.**



**5.18.2 Hypothetical magnetic charge with electric spin.**



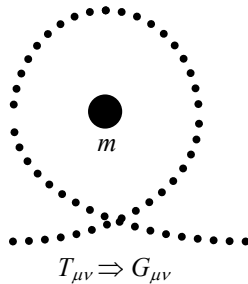
**5.19 The principle of reciprocity explains matter as space-time's ripple.**

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

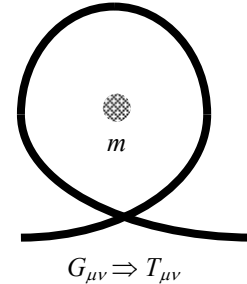
$T_{\mu\nu} \Rightarrow G_{\mu\nu}$  (the presence of matter generates a space-time curvature),

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

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.



**5.20 The principle of reciprocity explains the space-time's six-dimensionality (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 speed of the body generates the length's contraction in the movement direction), and in the reversal:

$\Delta x < \Delta x_0 \Rightarrow 0 < v < c$  (the length's contraction in a certain direction generates the speed of the body). Similarly, based on reciprocity and time's three-dimensionality, 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 speed of the body generates the time dilation in the movement direction), and in the reversal:

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

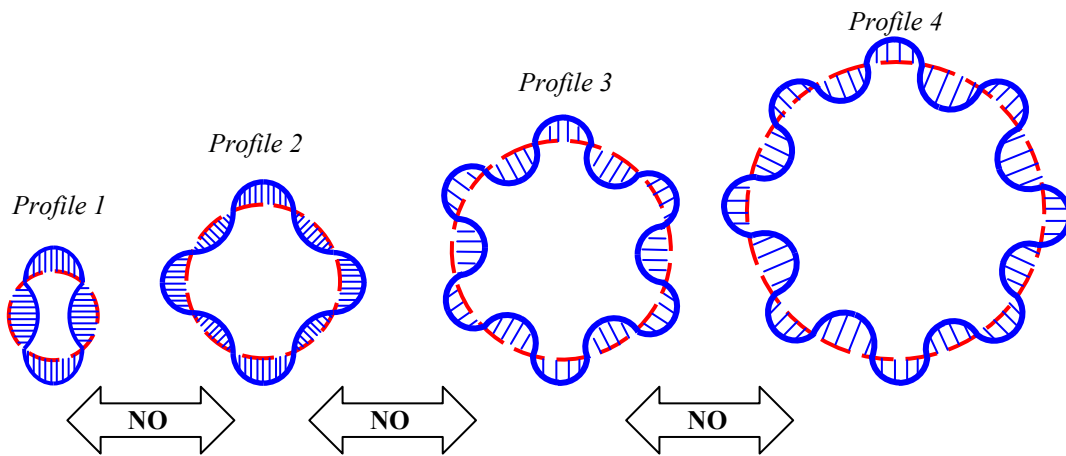
If time were not three-dimensional, the second interpretation would not be possible; in fact, without a *direction* identifying  $\Delta t$ , a temporal dilation could not be associated with a specific vector velocity  $v$ .

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

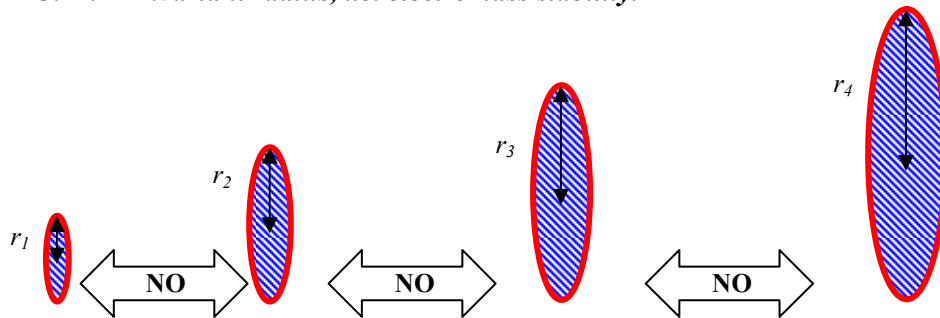
**5.21 Origin of the electric charge conservation and of mass stability.**

*Expl.* The invariance of both the size 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  $\Omega_E$ .

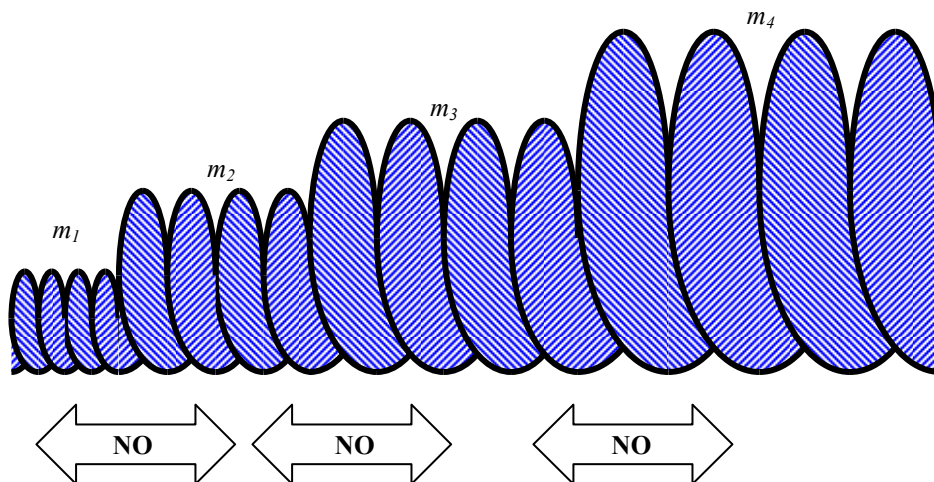
**5.21.1 Invariant shape, i.e. conservation of electric charge.**



**5.21.2 Invariant radius, i.e. electromass stability.**



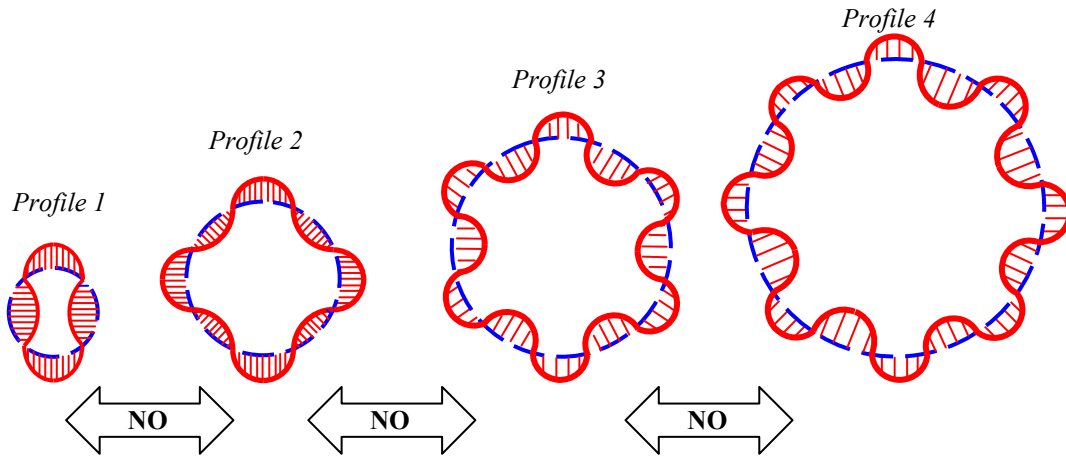
**5.21.3 Invariant electroparticle's size.**



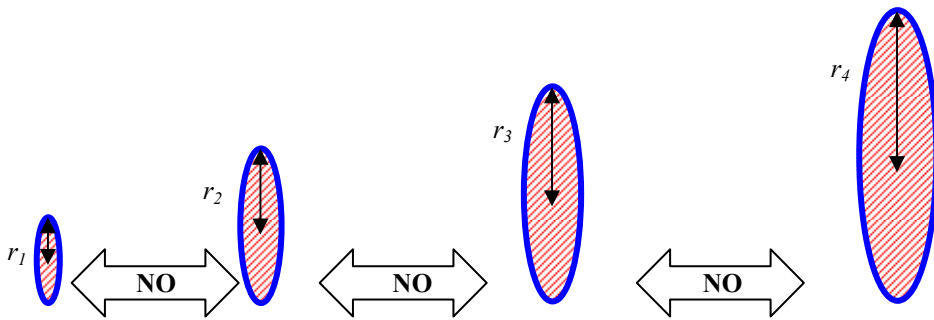
**5.22 Origin of the magnetic charge conservation and of mass stability.**

*Expl.* The invariance of both the size 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  $\Omega_B$ .

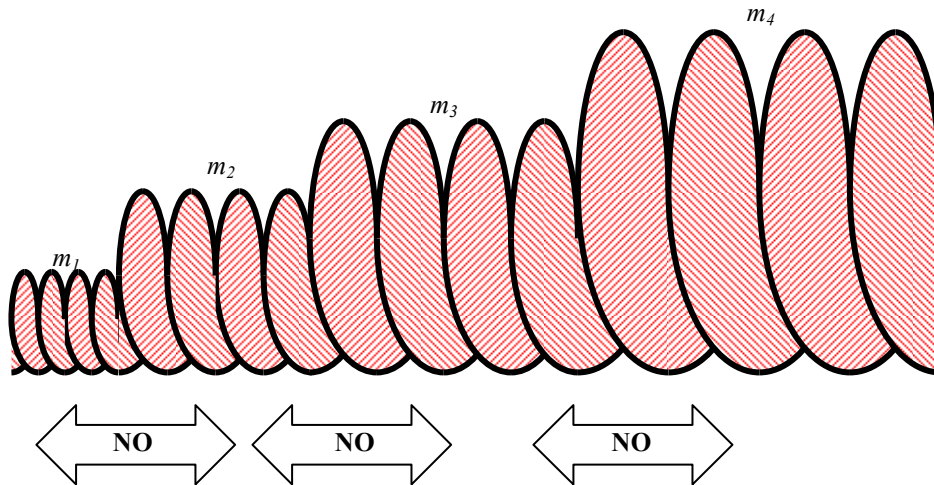
**5.22.1 Invariant shape, i.e. conservation of magnetic charge.**



**5.22.2 Invariant radius, i.e. magnetomass stability.**



**5.22.3 Invariant magnetoparticle's size.**

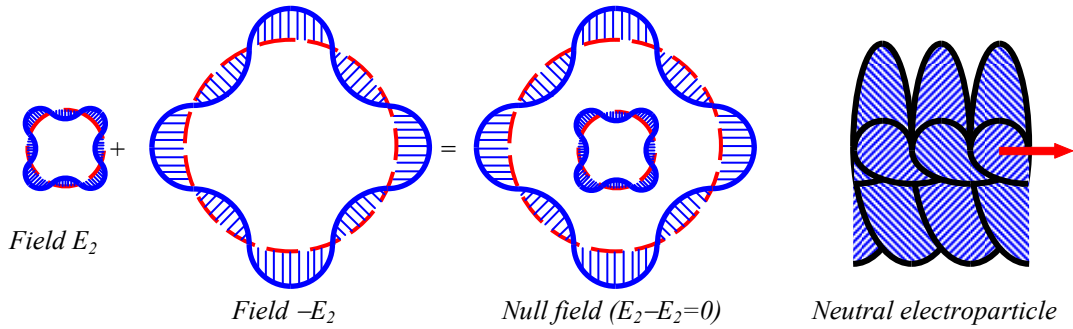
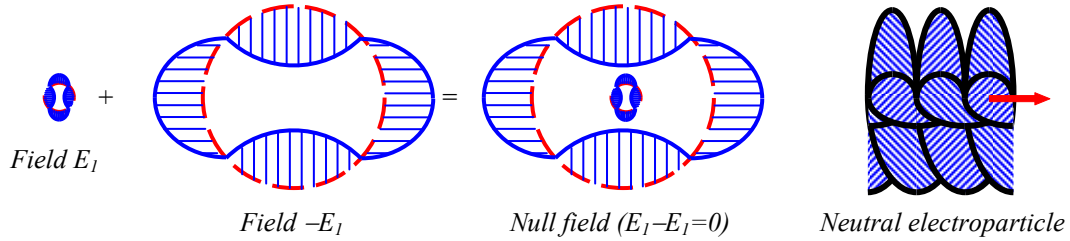




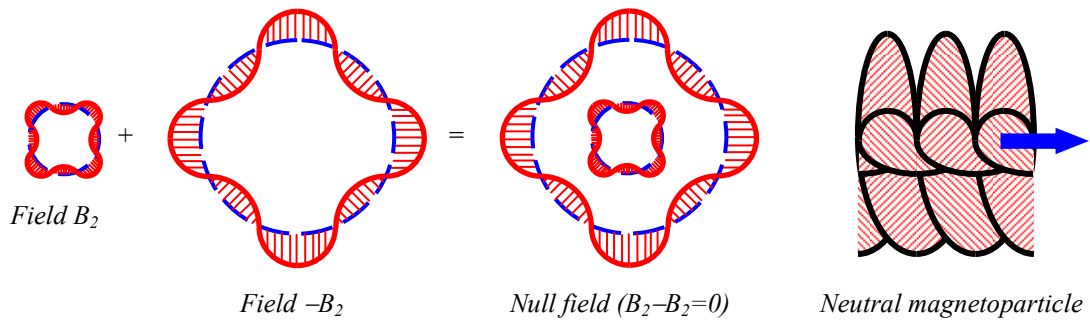
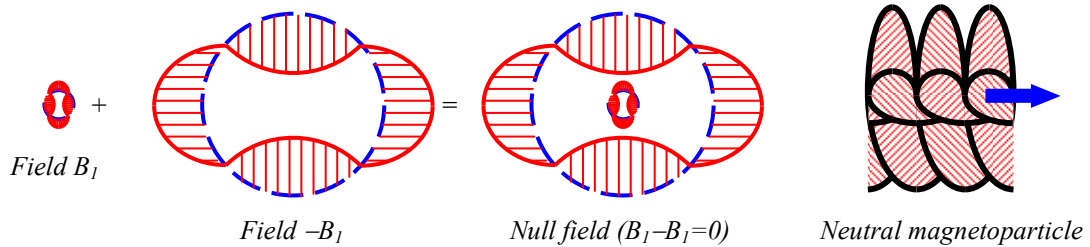
**5.24** *Originated from concentric stationary waves with the same shape, opposite fields cancel each other out.*

*Expl.* By Prop. 5.23 and by Hypothesis 4.15, the total charge depends on the radial field, which depends on the standing wave's profile only.

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



**5.24.2** *Examples of radial magnetic field's neutralization.*



## 6 THESES

### 6.1 *The AR explains the acausal correlations.*

*Expl.* 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 standing wave, *i.e.* according to the number of wavelengths  $\lambda$  distributed along the circumference (even, in order to permit the self-interaction). 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 standing 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  $\Omega_B$  ( $3 \times 10^8$  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 standing waves on equal wavelength  $\lambda$ .

### 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 six-dimensional space-time (3,3) and source tensor $T_{\mu\nu}$ with $\mu, \nu=1,2,\dots,6$ .*

*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 six-dimensional 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 standing 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 standing 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

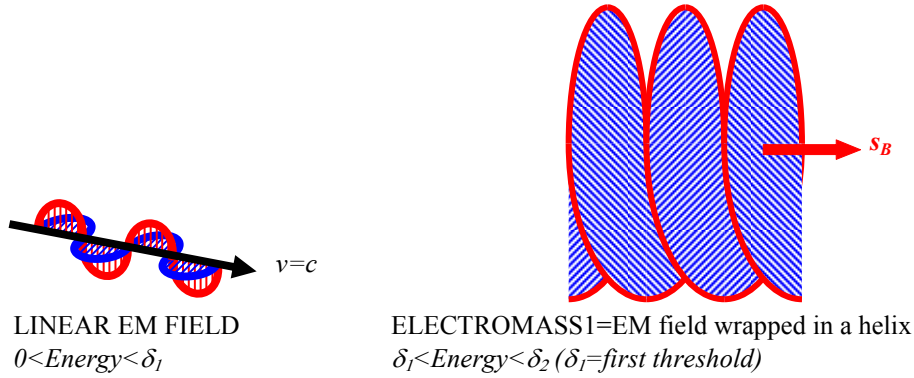
7.1 **The helical pattern could be recursive according to the energy supplied to the system.**

*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.

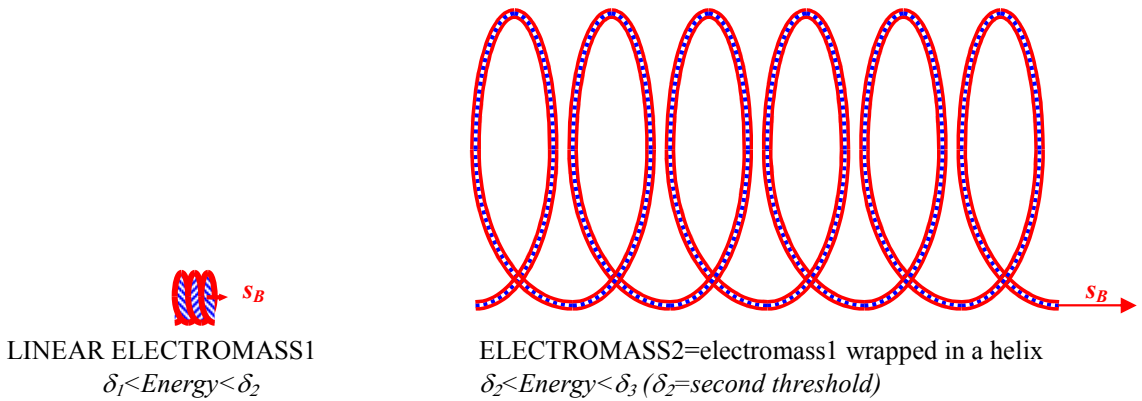
7.2 **The covering can regard the electromass.**

*Expl.* Starting from the linear EM field, the model is reiterable *ad infinitum*.

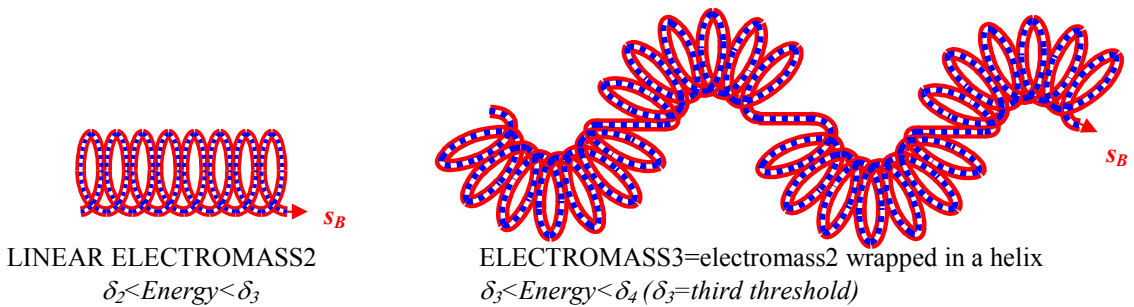
7.2.1 **First covering: electromagnetic wave wrapped in a simple helix through the field E.**



7.2.2 **Second covering: helix of the electric helix of the electromagnetic wave.**

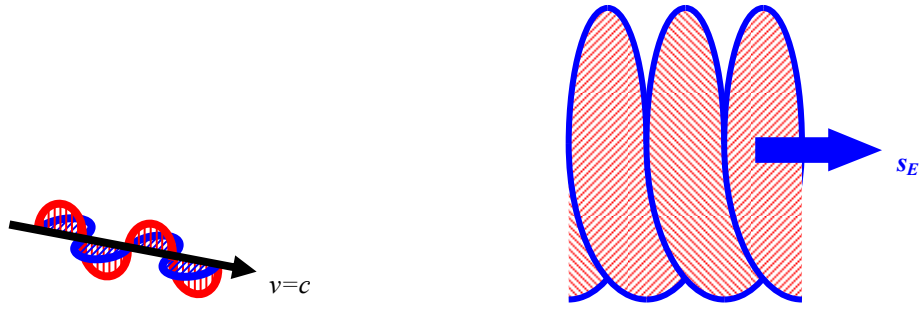


7.2.3 **Third covering: helix of the helix of the electric helix of the electromagnetic wave.**



7.3 **The covering can regard the hypothetical magnetomass.**  
*Expl.* Starting from the linear EM field, the model is reiterable *ad infinitum*.

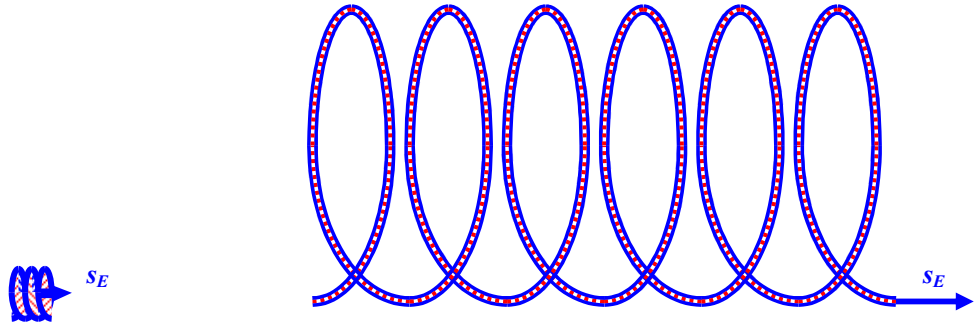
7.3.1 **First covering: electromagnetic wave wrapped in a simple helix through the field B.**



LINEAR EM FIELD  
 $0 < \text{Energy} < \delta_1$

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

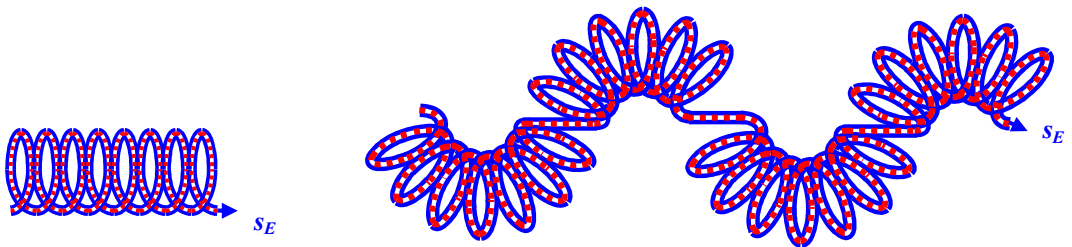
7.3.2 **Second covering: helix of the magnetic helix of the electromagnetic wave.**



LINEAR MAGNETOMASS1  
 $\delta_1 < \text{Energy} < \delta_2$

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

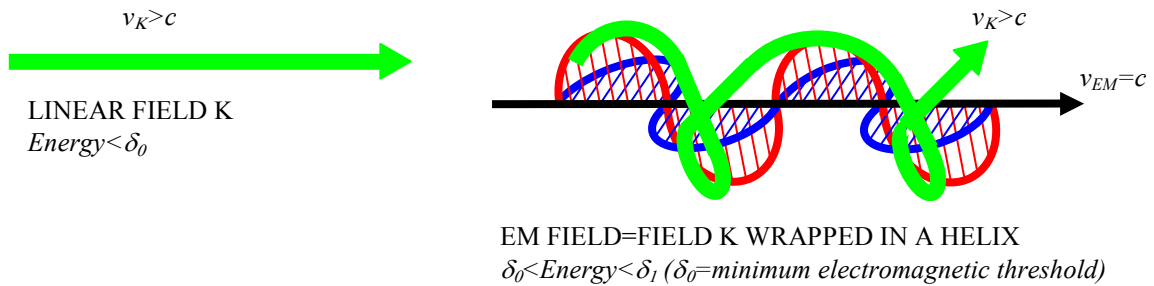
7.3.3 **Third covering: helix of the helix of the magnetic helix of the electromagnetic wave.**



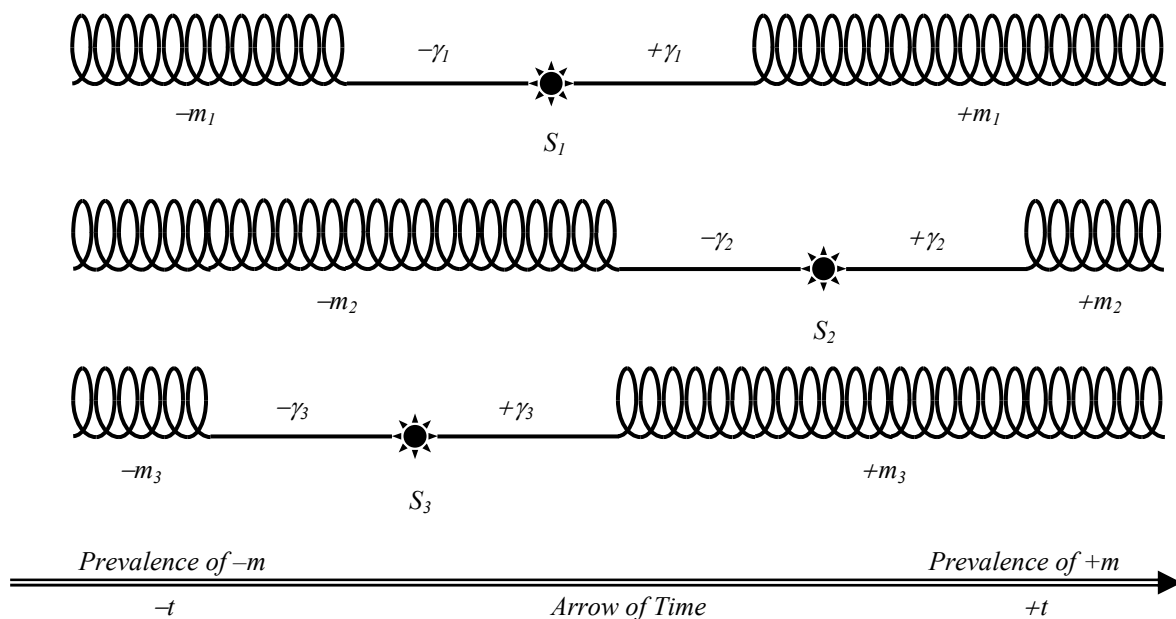
LINEAR MAGNETOMASS2  
 $\delta_2 < \text{Energy} < \delta_3$

MAGNETOMASS3=magnetomass2 wrapped in a helix  
 $\delta_3 < \text{Energy} < \delta_4$  ( $\delta_3$ =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  $c$ , is always minor than the tangential speed  $v_K$ ).



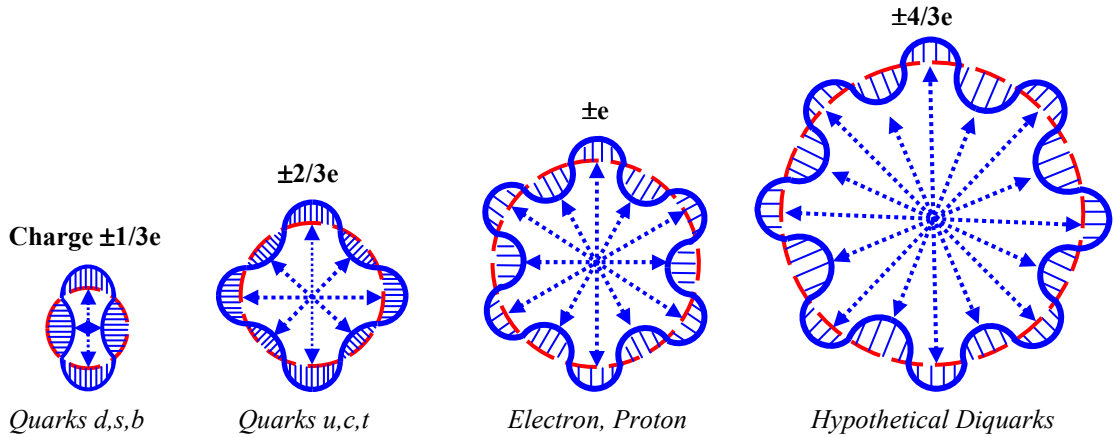
**7.5 Violation of the matter-antimatter symmetry along time's arrow.**  
*Expl.* Assuming valid also the negative solutions of Maxwell's equations, for each electromagnetic field  $+\gamma$  developing along time's arrow, there must exist an equal and temporally opposite  $-\gamma$ , emitted from the same source  $S$  and assuming invariant regarding 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 is perfectly reversible, so that going backwards in time to a remote past the percentage of antimatter should prevail on the ordinary matter's:



**7.6 Calculation of the helical pitch for the electron in a hydrogen atom.**  
*Expl.* The electron velocity in an atom is  $v_e = \alpha c / n$ , being  $\alpha$ =fine structure constant and  $n$ =principal quantum number. With the hydrogen atom such formula leads to:  $v_e = 2.42 \cdot 10^6$  (m/s), while the classical electron radius is:  $r_e = 2.82 \cdot 10^{-15}$  (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:  $p_e = 2\pi r_p / [(c/v_p)^2 - 1]^{1/2} = 2\pi (2.82 \cdot 10^{-15}) / [(3 \cdot 10^8 / 2.42 \cdot 10^6)^2 - 1]^{1/2} = 1,4310 \cdot 10^{-16}$  (m/s) Hence the ratio between the electron radius in an H atom and the pitch of the associated helix is:  $r_e/p_e = 19.71$ . The electronic pitch is round 1/20 of electronic radius.

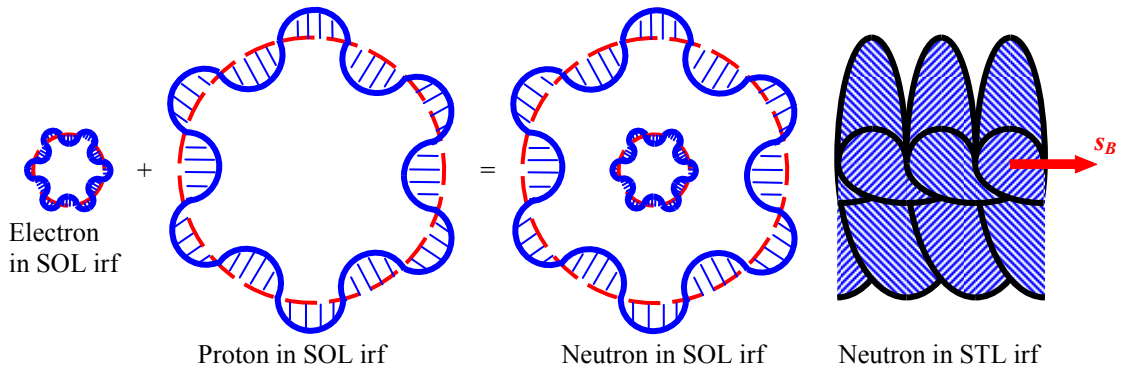
**7.7 Correspondence shape-charge according to the currently available information.**

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



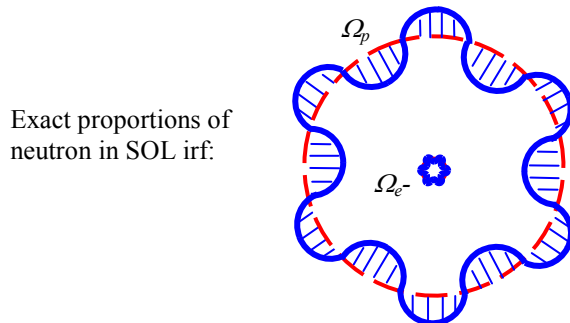
**7.8 In SOL irf the neutron is obtained by overlapping a ring protonic  $\Omega_p$  and electronic  $\Omega_{e^-}$ .**

*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:



**7.9 In SOL irf, between neutron's rings protonic  $\Omega_p$  and electronic  $\Omega_{e^-}$  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:

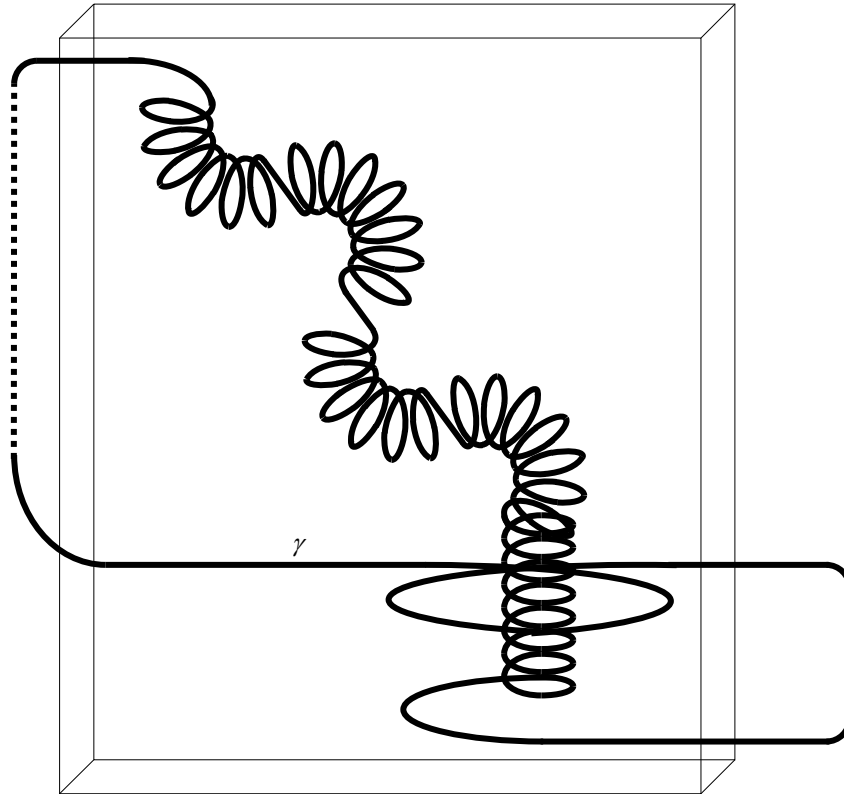


**7.10 The electromagnetic field could be the only material reality.**

*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:

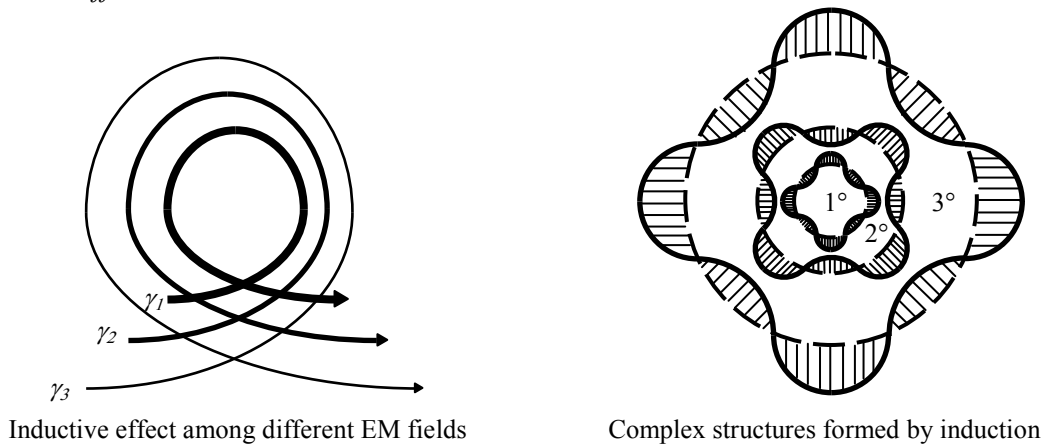
**7.10.1 A unique electromagnetic field could be the only material reality.**

*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  $\gamma$  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 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*:



## 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 acasual correlations already evidenced in Quantum Mechanics and makes possible the hypothesis that the radiant energy, closed to helix by self-interaction, 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  $6 \times 6$ .

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*. 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  $6 \times 6$  in a hexadimensional 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*.

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