

# THE RELATIVISTIC CORRECTION ACCORDING TO THE DOUBLING THEORY [1]

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## Abstract

The doubling theory [1] completes the basic principles of modern physics without throwing away existing laws. We will give the main point of this theory again. We will see that a new definition of the time flow gives the possibility to calculate and justify the relativistic correction :

$$\gamma = (1-v^2/c^2)^{-1/2} \quad c \text{ is the light speed, } v \text{ is the velocity of a moving masse.}$$

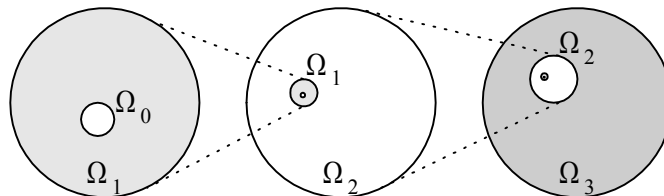
## 1 Introduction

This theory introduces a discontinuous flow of time which is defined by a succession of observation instants separated by non observation instants. Our usual lighting (50 Hz) is apparently continuous : switching off 50 times per second, this lighting is discontinuous or stroboscopic (a stroboscopic lighting alternates luminous flashes and dark times).

In the same way, we can define a stroboscopic time. This discontinuous time is apparently continuous for an observer which is moving in this time. The frequency of this temporal stroboscopy is the fundamental characteristic of the time flow into the horizon of the observation.

Used for the particles in quantum mechanics, this horizon notion is a physical reality in the whole Universe. An atom, a planet, a galaxy or any universe is an horizon of interactive particles but also an internal particle in an horizon.

In this theory, a particle in its horizon is always an horizon of particles : as Russian dolls, a particle can be the horizon of internal constituents and its horizon can be also a constituent of an external horizon (figure 1).

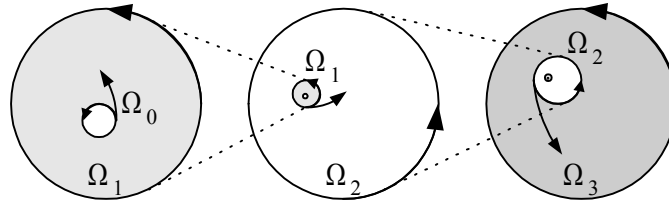


**Figure 1**

So, the proton or neutron particle can be the horizon of quarks which would constitute this particle. In the cosmos, an horizon is the surface which limits signals of its internal

particles towards the infinite. For a black hole, the horizon is the limit of its signals : nothing can go out of this limit.

A flow of time can be defined by a periodical motion of a space into the horizon of the observer. Different horizons can limit observations and interactions. They can define different time flows (figure 2).



**Figure 2**

A particular periodical motion can differentiate time flows between an internal particle of an intermediate horizon and an external horizon where this intermediate horizon is a particle. The transformation of an internal horizon into a particle of an external horizon uses a constant number of intermediate horizons, embedded by this particular motion. This motion can be accelerated by this embedding. This acceleration is also the acceleration of the time flow, defined by this motion into each horizon.

So, a fundamental motion can define different time flows. In fact, this motion is defined by several periodical motions into a three-dimensional space. It is the fundamental basis of the doubling theory. With two different time flows, the initial external horizon can anticipate the result of an action or interaction which is made into an internal horizon where the time flow is accelerated.

This anticipation [2&3] could be the result of a doubling of space and time.

This doubling motion gives to an horizon a time flow which is not the time flow of its particles. This relativity of the time flow depends on the embedding of horizons (or particles). The constant number of the embedded horizons into each initial horizon (or particle) is the characteristic of this doubling transformation. This characteristic implies a quantification of the time flow which depends on the horizon of the observer.

With discontinuous energies and discontinuous masses into an discontinuous Universe, a discontinuous time seems to be logical. So, the Heisenberg's relation ( $\Delta E \Delta t \geq h/4\pi$ ) and the Einstein's equation ( $E=mc^2$ ) would use only discontinuous and quantifiable sizes. Einstein [4] has been talking about a time which would be a succession of moments but he never uses a time discontinuity which is the cause of the relativity [1].

The temporal discontinuity of the doubling theory is a succession of measurable moments which can define an accelerated time between two successive measurable moments. This accelerated time is virtual inside the horizon of the measurable time. Virtual particles exist in particles mechanics : using this notion, the doubling theory introduces virtual times. With this logic, a real observable time into an horizon can be a virtual accelerated time into a virtual horizon. The observable exchanges of interactions into any horizon could use the differences of times which depend on the systematical and dynamical embedding of each horizon. These exchanges would be accelerated or decelerated on the boarders of these horizons.

The doubling theory leads us [1] to conclude that the solar system is a system of horizons embedded into the same dynamical transformation : that explains the discontinuous and observed variations of the solar particles velocity (solar wind).

Each horizon corresponds to an initial real time. This time corresponds to a virtual internal time (where the initial time is accelerated) and to a virtual external time (where the initial time is decelerated). So, any particle can become an internal particle (accelerated time) or external particle (decelerated time). These exchanges of paths give to the particle the possibility to anticipate interactions into the initial horizon (initial time). They are not perceptible into the initial horizon of the particle because they take place in an accelerated time. The reverse exchange gives to the initial particle a virtual instantaneous potential in its real horizon. This virtual potential is the consequence of a real interaction in the accelerated time of a virtual internal horizon which, by definition, is not observable.

The principle of relativity of Einstein says that once the laws of physics have been derived in one initial reference frame, these laws can be applied without any modification in any other initial reference frame. In relativity, the electromagnetism's laws are true as well in one inertial reference frame as in any other inertial reference frame.

The light speed ( $c=299\,792\text{ km/s}$  in vacuum) is one of the constants which appears in the electromagnetism's laws. According to the principle of relativity, this experimental value must be the same in each of two inertial reference frames and in uniform relative motion. The principle of relativity says that the light speed, which is isotropic in one inertial frame, is also isotropic in all other inertial frames that share the same space-time area.

The discontinuous time does not appear in relativity. This new notion does not refute the principle of relativity but give us a fundamental complement.

The Lorentz transformations were used to account for the invariance of the light speed. The change from Galilean relativity to special relativity has immediate kinetical consequences for material objects moving with a velocity less than the light speed. The simplest and the most important is the time dilation of moving clocks. Today, these basic consequences still divide the scientific community [5].

The rectilinear uniform translation  $v$  of the reference frame  $xyz$  on the axis  $x$  gives us the Lorentz transformations :

$$x' = (x - vt)\gamma \quad y' = y \quad z' = z \quad t' = (t - vx/c^2)\gamma \quad \text{with : } \gamma = (1 - v^2/c^2)^{-1/2}$$

The time interval  $t'(x'y'z')$  is different than the time interval  $t(xyz)$ .

We can consider that the time can be dilated or contracted. The notion of stroboscopic time gives us the possibility to explain this dilation or contraction. We will see that the fundamental motion which define different time flows is never rectilinear. The different reference frames are periodically observable on a rectilinear axis. That gives us the impression of an uniform translation. But it is only rotations.

However, we can find the Lorentz transformation again by using particular transformations (called pure Lorentz transformations) corresponding to rotations.

If  $\psi$  is the rotation of reference frame around its center, the old coordinates are connected with the new relations [6] :

$$x + i\theta = e^{i\psi}(x' + i\theta') \quad x = x' \cos\psi - \theta' \sin\psi \quad \theta = x' \sin\psi + \theta' \cos\psi$$

with :  $\theta = ict \quad x = vt \quad$  that implies :  $\operatorname{tg}\psi = i(v/c)$ ,

we obtain the Lorentz transformations:

$$x = (x' + t')\gamma \quad y = y' \quad z = z' \quad t = (t' + (v/c^2)x')\gamma \quad \text{with } \gamma = 1/(1-v^2/c^2)$$

But these relations don't explain the periodical reconstitutions on a radial axis which transform a non observable circular motion into a rectilinear observable motion. The fundamental doubling motion of embedded horizons produces apparent translations which are only the result of simultaneous different rotations.

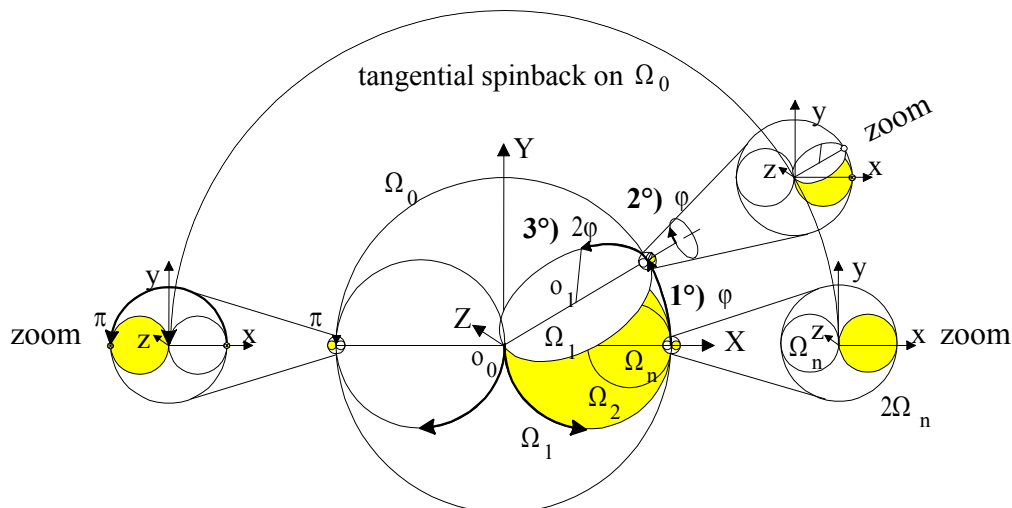
## 2 Fundamental Doubling Motion [1]

### 2.1 Definition of « spinbacks ».

Three simultaneous rotations (into the horizon  $\Omega_0 = 2\Omega_1$ ) compose the fundamental motion (figure 3) :

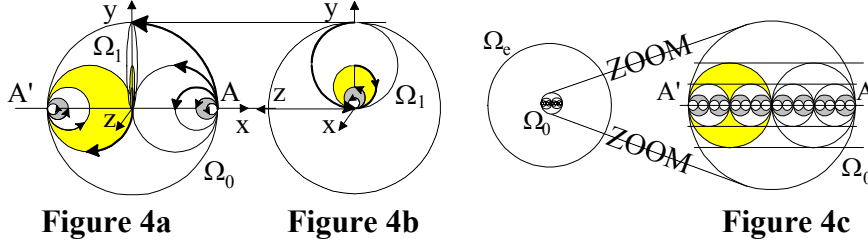
- 1) A rotation  $\varphi$  (center  $o_0$ ) of the radius of  $\Omega_0$  (diameter de  $\Omega_1$ ).
- 2) A rotation  $\varphi$  of  $\Omega_1$  around this diameter.
- 3) A rotation  $2\varphi$  de  $\Omega_1$  around itself.

When  $\varphi = \pi$ , this motion is called "spinback" of the particle (or horizon)  $\Omega_0$ .

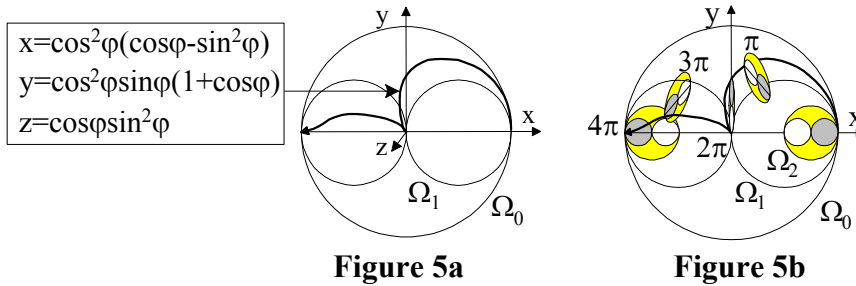


**Figure 3** : fundamental motion or spinback.

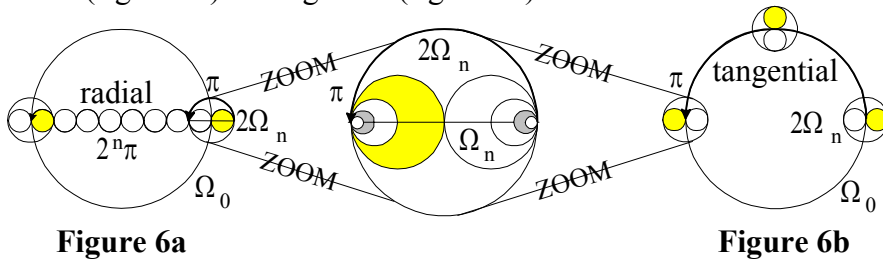
Two spinbacks ( $\varphi=2\pi$ ) of  $\Omega_0$  give again the initial conditions ( $\varphi=0$ ).  
 The particle  $\Omega_n=\Omega_0/2^n$  (with  $n$  whole  $\geq 0$ ) is also an horizon. It executes the same spinback into the horizon  $2\Omega_n$  during the spinback of  $\Omega_0$ .  
 This spinback of  $2\Omega_n$  on  $\Omega_0$  is called "tangential spinback" (see zoom fig. 3).  
 The spinback of  $\Omega_0$  implies a dissociation of  $\Omega_0, \Omega_1, \Omega_2, \dots, \Omega_n$  in A and a reconstitution in A' (figure 4a). This reconstitution in the plane  $\Omega_0$  turns back the plane  $\Omega_1$  and put  $\Omega_2, \Omega_3, \dots, \Omega_n$  in the same sense.



During the spinback of  $\Omega_0$ ,  $\Omega_n$  makes  $2^n$  spinbacks. These spinbacks imply several intermediate reconstitution into  $\Omega_0$  and one reconstitution of  $\Omega_1, \Omega_2, \dots, \Omega_n$  in the plane (yz) (figure 4b). So all the paths are "radial" into  $\Omega_0$ .  
 These "radial spinbacks" are not observable in the external horizon  $\Omega_e$  when  $\Omega_0$  is a particle (figure 4c). The paths of  $\Omega_1, \Omega_2, \dots, \Omega_n$  are radial virtual paths into  $\Omega_0$  on the radial axis AA'. It is important to explain the charge C, the symmetry P and the time T of the transformation CPT of the antiparticles. The real motion of the internal tangential particle  $\Omega_n$  on the horizon  $\Omega_1$  corresponds to the real radial path into  $\Omega_0$  (figure 5a).



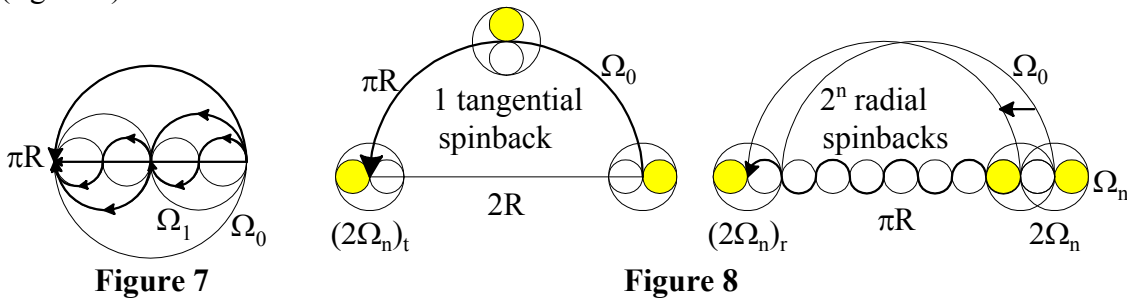
The motion of  $\Omega_n$  carries away the horizons  $\Omega_2, \Omega_3, \dots, \Omega_{n-1}$ , which do respectively  $2^2, 2^3, \dots, 2^{n-1}$  spinbacks during the spinback of  $\Omega_0$  (figure 5b).  
 By definition, the spinback of  $\Omega_n$  takes place into the horizon  $2\Omega_n, \forall n$ .  
 It can be radial (figure 6a) or tangential (figure 6b).



The tangential spinback of  $2\Omega_n$  on  $\Omega_0$  corresponds to 2 radial spinbacks of  $\Omega_n$  into  $2\Omega_n$ . It corresponds to  $2^n$  radial spinbacks of  $\Omega_n$  into  $\Omega_0$  when  $\Omega_0$  is motionless. But, by definition, horizons and particles are never motionless.

**2.2 Relativity of the Stroboscopic Flow of Time.**

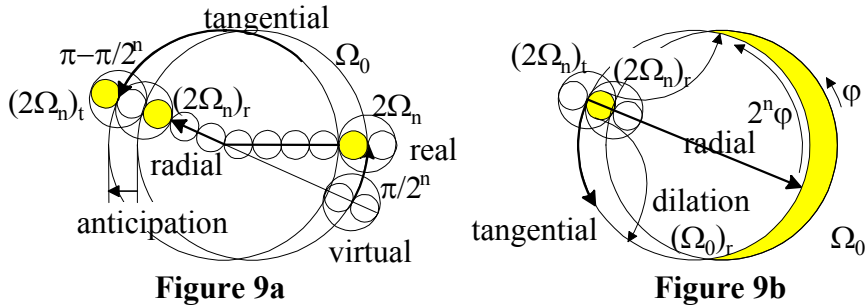
$\forall n$ ,  $2^n$  spinbacks of  $\Omega_n$  (radius  $R/2^n$ ) correspond in  $\Omega_0$  (radius  $R$ ) to a radial path  $\pi R$  (figure 7). But, in the external horizon  $\Omega_e$  (where  $\Omega_0$  is a particle), the radial diametrical path of  $\Omega_n$  (with  $n \rightarrow \infty$ ) seems to be rectilinear and equals to  $2R$ . So, a scaling of time can transform an horizon of particles in a particle in an horizon if  $\pi R$  can become  $2R$  (figure 8).



So, the radial path of  $\Omega_n$  into the tangential horizon  $(2\Omega_n)_t$  is  $2^n$  slower than the radial path of  $\Omega_n$  into the radial horizon  $(2\Omega_n)_r$ . The clock in the tangential horizon  $(2\Omega_n)_t$  and the clock in the radial horizon  $(2\Omega_n)_r$  are the same but their hands have not the same velocity.

**2.3 Anticipation of the Radial Particle**

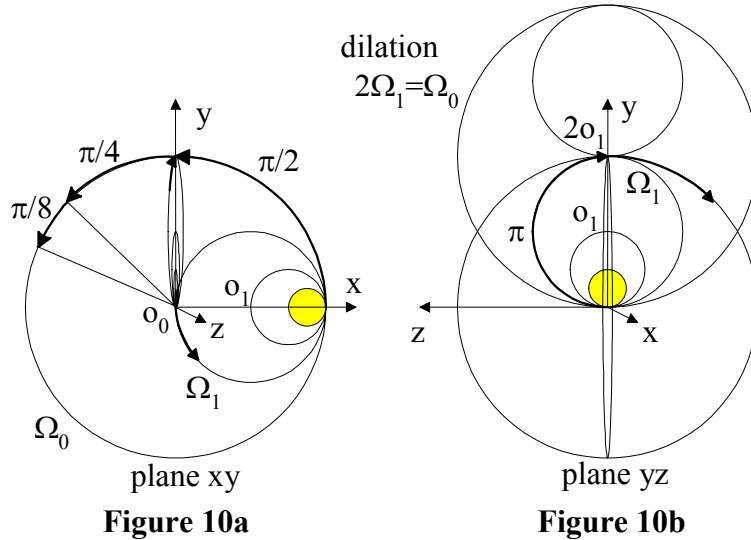
By definition, the tangential rotation  $\pi - \pi/2^n$  of the horizon  $(2\Omega_n)_t$  corresponds to  $2^{n-1}$  radial spinbacks of  $\Omega_n$  (figure 9a). The horizons  $(2\Omega_n)_r$  and  $(2\Omega_n)_t$  include the same particle  $\Omega_n$ . This particle is tangential in  $(2\Omega_n)_t$  where the spinback is not finished. It is radial in  $(2\Omega_n)_r$  where the spinback ends. This radial spinback is an anticipation of the tangential spinback. A virtual initial rotation  $\pi/2^n$  of  $\Omega_0$  implies a tangential virtual (or anticipative) spinback of  $\Omega_0$  before its real spinback (figure 9a). This virtual spinback implies a virtual radial path  $2R/2^n$  of  $\Omega_0$  which corresponds to an anticipation of this initial horizon.



**2.4 Dilation (or Expansion) of the Radial Particle (or Horizon) :  $2^n = 8$ .**

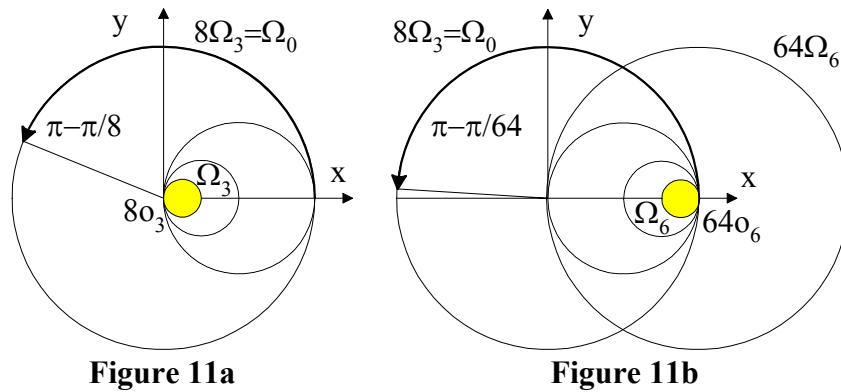
We assume that the radial particle  $(\Omega_n)_r$  is dilated and becomes  $(2^n \Omega_n)_r = (\Omega_0)_r$ , similar to  $\Omega_0$ , after the rotation  $\pi - \pi/2^n$ . In this case,  $(2\Omega_n)_t$  becomes the initial particle of the initial horizon  $(\Omega_0)_r$ . After its real radial spinback,  $(\Omega_0)_r$  seems to be an initial horizon which makes its spinback  $2^n$  more quickly (figure 9b). In a three dimensional space, this dilation ( $\times 2^n$ ) of the radial particle uses three successive dilations ( $\times 2$ ) :  $n=3$ .

When the initial particle  $o_0$  (figure 10a) carries away by the motion of the first spinback of  $\Omega_1$ , it is moving with its horizon  $\Omega_0$  (figure 10b).



After the rotation  $\pi/2$  of  $\Omega_0$ , the velocity of  $o_0$  into the plane yz is double into a double space  $2\Omega_1$ . So, it becomes  $2o_1$  at the center of  $2\Omega_1$  (figure 10b). A rotation  $\pi/2$  of  $2\Omega_1$  into this new initial plane yz corresponds to the rotation  $\pi/4$  de  $\Omega_0$  (figure 10a).

With the velocity of  $o_2$  into the plane xz, the initial particle  $o_0$  becomes  $4o_2$  into the dilated horizon  $4\Omega_2$ . A rotation  $\pi/2$  of  $4\Omega_2$  into the plane zx corresponds to the rotation  $\pi/8$  of  $\Omega_0$  (figure 10a). So, the initial particle  $o_0$  becomes  $8o_3$  into the dilated horizon  $8\Omega_3$ , which is the static initial horizon  $\Omega_0$  (figure 11a).



In the same way, the rotation  $\pi-\pi/8$  of  $8\Omega_3$  corresponds to the rotation  $(\pi-\pi/8)8$  of  $\Omega_0$ . So, the particle  $8\Omega_3$  becomes the dilated particle  $64\Omega_6$  into the dilated horizon  $d64\Omega_6$  (figure 11b). The horizon  $64\Omega_6$  seems to be the initial position of  $\Omega_0$  before its two radial spinbacks into  $2\Omega_0$ , which correspond to the tangential spinback of  $\Omega_6$  on  $\Omega_0$  (figure 12a).

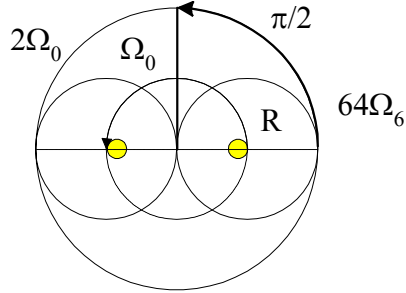


Figure 12a

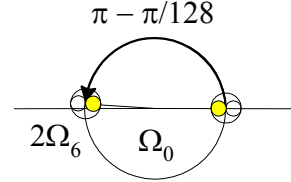


Figure 12b

The spinback of  $\Omega_0$  corresponds to the rotation  $\pi/2$  de  $2\Omega_0$ . It is 64 times slower than the spinback of  $64\Omega_6$ . So, this dilated horizon  $64\Omega_6$  makes its first spinback before the first spinback of  $\Omega_0$  and before the rotation  $\pi-\pi/128$  of  $\Omega_0$ . (figure 12b).

## 2.5 Exchange of Radial and Tangential Paths.

After the dilation ( $\times 2^3$ ) of  $\Omega_3$  (after the rotation  $\pi-\pi/8$  de  $\Omega_0$ ) the dilated horizon  $(\Omega_0)_r$  and the initial horizon  $\Omega_0$  are similar but the radial axis of  $(\Omega_0)_r$  and the radial axis of  $\Omega_0$  are separated by a rotation  $\pi/8$  (figure 14).

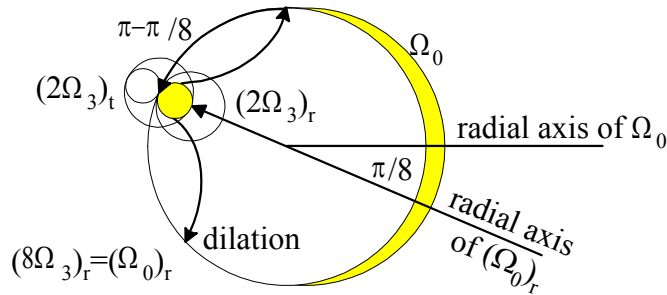


Figure 14

This internal dilation of the particle  $(\Omega_3)_r$  in its horizon is not observable in the external horizon  $\Omega_e$  where  $\Omega_0$  is a particle.

Initially (figure 15a), the horizon  $2\Omega_3$  on  $\Omega_0$  is virtual on the radial axis of  $(\Omega_0)_r$ .

The dilation of the particle  $(\Omega_3)_r$ , which becomes  $(\Omega_0)_r$ , seems produce a real particle  $(\Omega_6)_r$ , which becomes the dilated particle  $(8\Omega_6)_r = (\Omega_3)_r$  (figure 15b). The anticipation of  $(\Omega_0)_r$  on the radial axis of  $(\Omega_0)_r$  gives to the tangential rotation  $\pi-\pi/8$  de  $(2\Omega_3)_t$  a supplementary real rotation  $\pi/8$ . So,  $(2\Omega_3)_t$  ends its spinback before the spinback of  $\Omega_0$ .



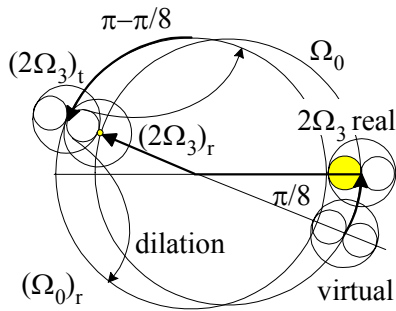


Figure 15a

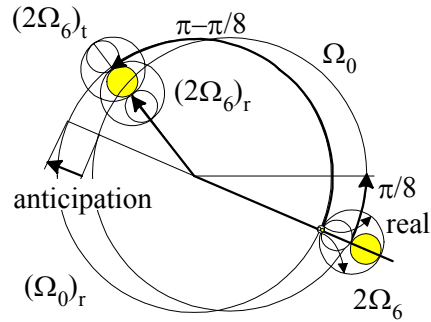


Figure 15b

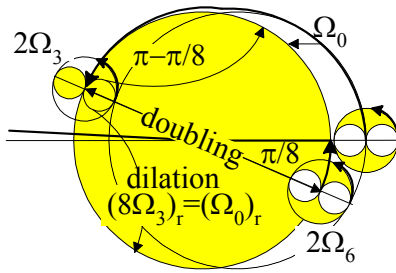


Figure 16a

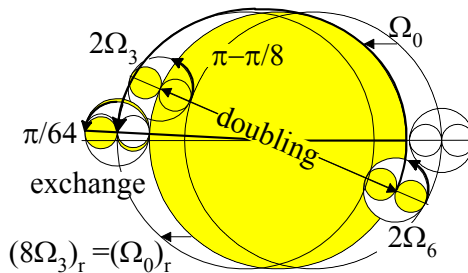


Figure 16b

This end of the spinback of  $(\Omega_0)_r$  implies a doubling of the initial particle and the possibility to exchange the radial and the tangential before the end of the spinback of  $\Omega_0$ . This end is the end of this doubling (figure 16). Because of this exchange, the particle moves around its horizon with another flow of time.

### 2.6 Acceleration of the Time Flow

In the external horizon  $\Omega_e$  of the particle  $\Omega_0$ , the internal dilations of  $\Omega_3$  and  $\Omega_6$  into  $\Omega_0$  are not perceptible. Because of the radial motion of  $\Omega_0$ , the exchange of radial and tangential is not perceptible. This exchange is made during the 9<sup>th</sup> radial spinback of  $\Omega_3$  (figure 17a). It is into the horizon  $\Omega_0$  which contains 9 radial spinbacks of  $\Omega_3$ . This horizon corresponds to a limit of perception within  $\Omega_e$  (figure 17b).

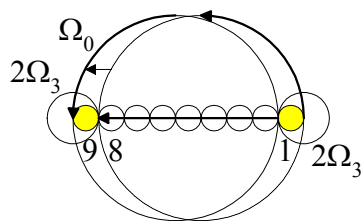


Figure 17a

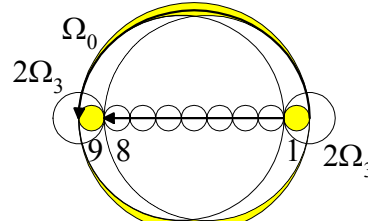
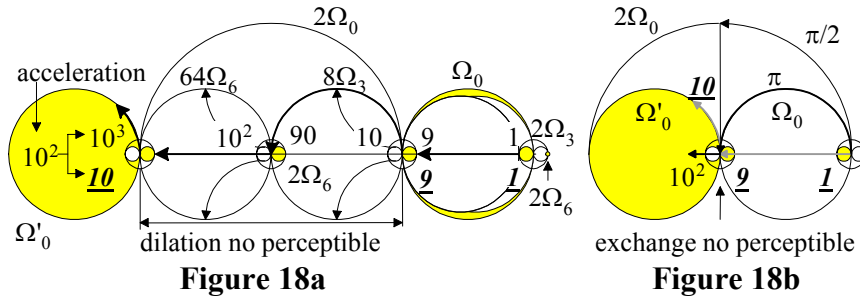


Figure 17b

This exchange is not perceptible out of  $\Omega_0$ . It corresponds to an accelerated time in  $\Omega_3$ . Because of the dilation of  $\Omega_3$  within  $8\Omega_3$ , the motion of  $\Omega_3$  is similar to the motion of  $\Omega_0$  but it is 8 times faster (figure 18a).



In the same way in  $8\Omega_3$ , a no perceptible exchange begins after the 9<sup>th</sup> spinback of  $\Omega_6$ . The time is accelerated in  $\Omega_6$  because of the dilation of  $\Omega_6$  (which becomes  $64\Omega_6$ ). The motion of  $\Omega_6$  and  $\Omega_0$  are the same but the motion of  $\Omega_6$  is 64 times faster than the motion of  $\Omega_0$ . So, the 10<sup>th</sup> radial spinback is the first tangential spinback when  $\Omega_3$  becomes  $8\Omega_3$  or  $\Omega_6$  becomes  $64\Omega_6$ .

To exchange radial and tangential the time flow is accelerated from 1 to 10.

That implies an acceleration from 1 to  $10^3$ , during the two exchanges into  $8\Omega_3$  and  $64\Omega_6$ . In the same time, the acceleration in  $\Omega_0$  comes from 1 to 10. At the end of the spinback of  $8\Omega_3$  or  $64\Omega_6$ , the difference is always  $10^2$  (figure 18b).

At the end of the spinback of  $\Omega_0$ , the radial (=10) and the tangential (=1) in  $\Omega_0$  become the radial (=10<sup>2</sup>) and the tangential (=10) in  $\Omega'_0$ .

The exchange of radial and tangential is made with a time acceleration from 1 to 10. This acceleration is the same for the radial and the tangential paths.

## 2.7 The Necessary Seven Stroboscopic times of the Doubling.

These exchanges of particles are made in a no perceptible time outside the horizon. They use six intermediate stroboscopic times, defined by seven embedded horizons from  $\Omega_0$  to  $\Omega_6$ .

The external particle  $\Omega_0$  is the first horizon, the intermediate particle  $\Omega_3$  is the 4<sup>th</sup>, and the internal particle  $\Omega_6$  is the 7<sup>th</sup>.

The anticipation and the first exchange are made into the 8<sup>th</sup> one

The 9<sup>th</sup> corresponds to the reverse exchange.

The 10<sup>th</sup> gives the initial conditions again.

When the doubling transformation ends, the seven horizons are juxtaposed.

The exchanges of particles are possible.

The next doubling transformation is beginning : the 7<sup>th</sup> and last horizon  $2(64\Omega_6)$  of the first doubling becomes the first horizon  $\Omega_{-1}=2\Omega_0$  of the second doubling.

### 3 Conditions and Exchange Equation [1]

We use a new formalism :  $R_0$  and  $\Omega_0$  are respectively the radius  $R_0$  and the horizon  $\Omega_0$  "observable inside the horizon  $\Omega_0$ ". So,  $(R_0)_1$  or  $(\Omega_0)_1$  are  $R_0$  or  $\Omega_0$  "observable inside the horizon  $\Omega_1$ ".

The exchange of radial and tangential implies a condition :

The tangential path  $(\pi R)_0$ , observable inside  $\Omega_0$  is made during the time of one spinback of  $\Omega_0$ . This time is measured by the rotation  $(\pi)_0$  (figure 19a). It is the time  $(\pi)_0$  of the doubling (radial and tangential) into  $\Omega_0$  between two reconstitution.

So,  $(\pi R)_0/(\pi)_0=(R)_0$  is the tangential velocity on  $\Omega_0$  during the doubling time  $(\pi)_0$ .

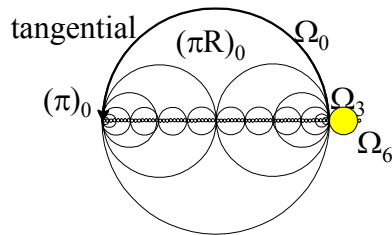


Figure 19a

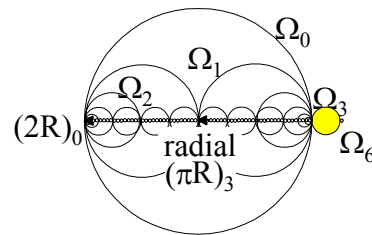


Figure 19b

The radial path  $(\pi R)_3$  observable inside  $\Omega_3$  (figure 19b) is made during the time measured by the distance  $(2R)_3$  which separates two reconstitution on  $\Omega_0$ .

With the intermediate reconstitution at the center of  $\Omega_0$  (after the rotation  $\pi/2$  of  $\Omega_0$  and the dilation of  $\Omega_1$  into  $2\Omega_1$ ), this time corresponds to two doubling of  $\Omega_3$  (radial and tangential).

So,  $(\pi)_3=(2\pi R)_3/(2R)_3$  is the radial velocity into  $\Omega_0$  during the doubling time  $(R)_3$ .

The exchange of radial and tangential is possible if the radial velocity  $(R)_0$  can become the tangential velocity  $(\pi)_0$ . It is the same condition for  $(R)_3$  and  $(\pi)_3$ .

However, the diameter  $(2R)_0$  of  $\Omega_0$  must be the radial path  $(\pi R)_3$  (see paragraph 2.2. figure 8). So, the tangential path  $(\pi R)_0$  must be equal to  $(\pi^2 R/2)_3$  (figure 20b).

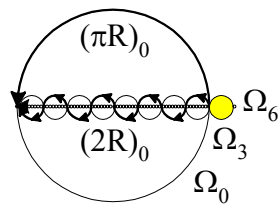


Figure 20a

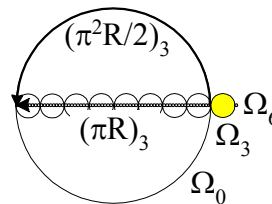


Figure 20b

The exchange of  $\pi$  and  $R$  in  $(\pi R)_0$  gives  $(\pi R)_0$  again.

The exchange of  $\pi$  and  $R$  in  $(\pi^2 R/2)_3$  gives  $(\pi R^2/4)_3$ .

So, the exchange condition (noted  $\rightleftarrows$ ) must be :  $(\pi R^2)_3 \rightleftarrows (4\pi R)_0$  (1)

This fundamental condition implies a correspondence between a surface and a length. In fact, the end of the doubling corresponds to the end of the spinback of  $\Omega_0$  when  $\Omega_0$  is dilated into  $2\Omega_0$ . This dilation needs a reference with a unitary radius  $\rho$  at the beginning and the end of the doubling, so that the rotation  $\pi$  corresponds to the path  $\pi\rho$ . So, the exchange condition (4) becomes the exchange equation :

$$(\pi R^2)_3 = (4\pi\rho R)_0 \quad (1')$$

The equation (1) needs scaling of time and space of spinback between the intermediate horizon  $\Omega_3$  and the external horizon  $\Omega_0$ . These scaling ( $e_d$ ) and ( $e_t$ ) are so that :

$$e_t = 1/e_d = 2\pi^{1/2} \quad (2)$$

$$4R_0 = e_d\pi R_3 = \pi^{1/2}R_3/2 \quad (2')$$

$$\theta_0^2 = e_t\theta_3 = 2\pi^{1/2}\theta_3 \quad (2'')$$

$\theta_0$  and  $\theta_3$  are respectively the rotation of  $\Omega_0$  and  $\Omega_3$ . At the moment of the final reconstitution ( $\theta_0=\theta_3=\pi$ ), the relations (2') and (2'') imply the final juxtaposition :

$$\pi^2 R_0 = \pi^2 R_3$$

According to (2') and (2'') :  $e_d$  transforms the radial path  $R_0$  into the tangential path  $\pi R_3$  and  $e_t$  transforms  $\theta_3$  into  $\theta_0^2$ , or  $(8\pi)_3$  into  $(64\pi^2)_0$  during the spinbacks.

It corresponds to the embedding of the seven horizons which are necessary for the doubling and for the respective dilatation of  $\Omega_0$ ,  $\Omega_3$ ,  $\Omega_6$  so that ( $2^0=1$ ,  $2^3=8$  and  $2^6=64$ ).

#### 4 Three Doubling Velocities [1]

Three radial velocities  $C_0$ ,  $C_1$ , and  $C_2$  are necessary between two reconstitution of three embedded horizons. The exchange radial and tangential between  $\Omega_0$  and  $\Omega_3$ , dilated into  $(\Omega_0)_r$ , uses a radial velocity  $C_0$  during the tangential spinback of  $\Omega_0$ . This tangential spinback corresponds to 7 radial spinbacks of  $\Omega_3$  which use a radial velocity  $C_1$ , so that (figure 21a) :

$$C_0 = 7C_1. \quad (3)$$

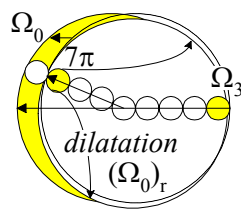


Figure 21a

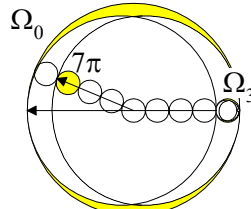


Figure 21b

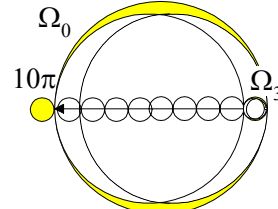


Figure 21c

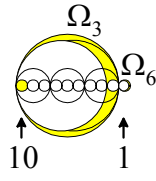


Figure 21d

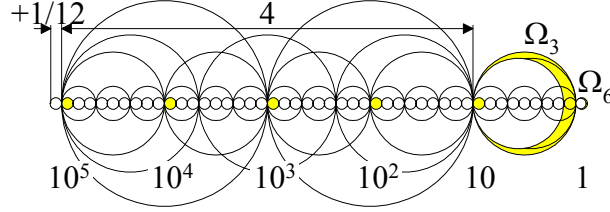


Figure 21e

The radial motion of the horizon  $\Omega_0$  includes 9 radial spinbacks of the internal particle  $\Omega_3$  (figure 21b).

The first spinback of  $\Omega_0$  (or  $\Omega_3$ ) corresponds to the  $10^{\text{th}}$  radial spinback of  $\Omega_3$  (or  $\Omega_6$ ) (figure 21c).

The  $4^{\text{th}}$  spinback of  $\Omega_3$  into  $2\Omega_3$  corresponds to an acceleration of spinbacks of  $\Omega_3$  from 1 to  $10^5$ .

In fact,  $\Omega_3$  makes  $4+1/12=7^2/12$  radial spinbacks into  $\Omega_0$  (figure 21e).

If the radial velocity of  $\Omega_6$  is  $C_2$ , the radial velocity  $C_1$  is so that :

$$C_0 = 7C_1 = (7^3/12)10^5C_2. \quad (4)$$

$C_2$  is the radial maximum velocity of the internal horizon  $\Omega_6$  during the doubling.

During the time  $\tau$  of  $4 \times 54$  spinbacks ( $\pi\rho$ ) of the particle  $\Omega_6$ , the acceleration of the motion of this particle comes from 1 to  $10^6$ . In the same time, the acceleration of the motion of the horizon  $\Omega_0$  comes from 1 to  $10^2$  (figure 22). So :

$$C_2 = (216\pi\rho/\tau)10^4 \quad (5)$$

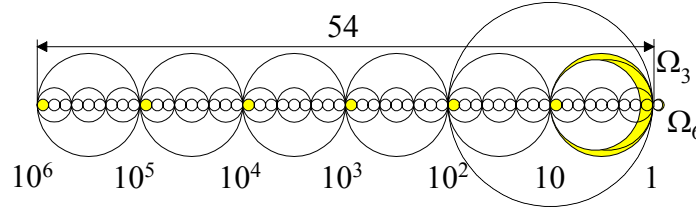


Figure 22

We consider that the radius of the Earth corresponds to the unity of length and one rotation of the Earth around itself corresponds to unity of time. With these unities, the solar system give us this velocity which is in fact the speed of light [1] :

$$C_2 = (216\pi\rho/\tau)10^4 = 54\pi^{5/2}(\pi R_T/4\tau)10^6 = 299\,796 \text{ km./sec.} \quad (5')$$

with :  
 $2\rho = \text{diameter of Sun} = (100/16)(\pi^{5/2})(2R_T)$   
 $2R_T = \text{diameter of Earth} = 12752 \text{ km}$   
 $2\tau = 365,25 \times 24 \times 3600 \text{ sec.} = \text{one year (2 spinbacks)}$

The light speed is the velocity limit of any particle (masse m) observable in the horizon of the observer. Since Einstein's relativity,  $c = C_2$  must to be (and seems to be) the universal constant [6] which connects the energy and the masse, according to the relation :

$$E=mc^2$$

The theory of relativity introduces the constant  $\gamma$  where the time changes, so that :

$$(t/t')^2 = 1 - (v/c)^2$$

$t'$  is the time associated with the moving reference frame (velocity  $v$ ) ,  
 $t$  is the time associated with the inertial reference frame.

$c = C_2$  is the light speed. Measured by many experiments in the solar system, this constant can be deduced in the approximate way from Maxwell's equations [7]:

$$\varepsilon_0\mu_0c^2 = 1 \quad \text{with electric permittivity of vacuum } \varepsilon_0, \\ \text{and magnetic permeability of vacuum } \mu_0 ,$$

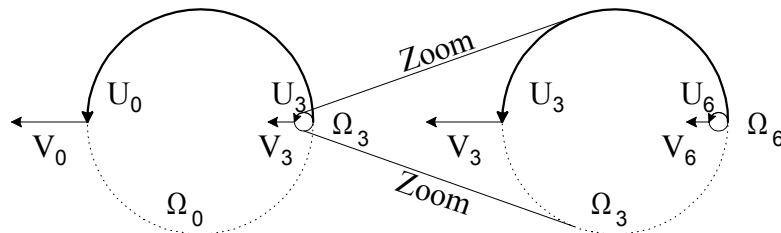
$$\varepsilon_0=10^{-9}/36\pi \quad \mu_0=4\pi 10^{-7} \quad c^2 = 1/\varepsilon_0\mu_0 = 9.10^{16} \quad \text{in MKSA.}$$

Calculated from a doubling motion, the light speed is in fact the doubling velocity of the faster particle observable inside the intermediate horizon. This calculation uses different times. So, it includes the relativistic correction.

## 5 The Relativistic Correction [1]

### 5.1 Tangential and Radial Embedded Velocities.

Each horizon,  $\Omega_0$  (external),  $\Omega_3$  (intermediate) and  $\Omega_6$  (internal), embedded in the same doubling transformation has a radial velocity (respectively  $V_0, V_3, V_6$ ) and a tangential velocity (respectively,  $U_0, U_3, U_6$ ) (figure 23).



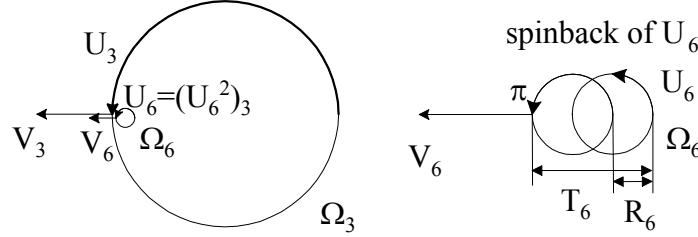
**Figure 23**

The intermediate horizon  $\Omega_3$  ends its spinback when the internal horizon  $\Omega_6$  ends its radial path into  $\Omega_3$ .

The relation (2'') transforms  $\theta_6$  en  $\theta_3^2$ , or  $8\pi$  en  $64\pi^2$  during the spinbacks.

In the particle  $\Omega_3$  (horizon of  $\Omega_6$ ), the radial path  $R_6$  is made during the time  $T_6$  of one internal spinback  $\pi$  of  $\Omega_6$  (figure 24).

This radial path must be equal to the radial path  $(R_6^2)_3$ , observable in  $\Omega_3$ . It is made during the time  $(T_6^2)_3$  of one intermediate spinback  $(\pi^2)_3$  of  $\Omega_6$ . So, the tangential velocity  $U_6=(\pi R/T)_6$ , observable in  $\Omega_6$ , becomes  $(U_6^2)_3$ , observable in  $\Omega_3$ .



**Figure 24**

In the same time, the scaling (2') transforms  $(\pi R)_6$  (tangential path) into  $R_3$  (radial path).

The instantaneous scaling ( $e_t$  and  $e_d$ ) don't modify observations because of  $e_t e_d=1$ .

The tangential velocity  $U_6=(\pi R/T)_6$  becomes the radial velocity  $(R_3/T_6)_3^2$ .

## 5.2 Relativity of time between three embedded horizons $\Omega_0$ , $\Omega_3$ , $\Omega_6$ .

The time  $T_6$  corresponds to the spinback of  $\Omega_6$  during its radial path. According to the above conditions, it will be the time  $T_0$  of spinback of  $\Omega_0$  when :

$$V_0 = 8U_0 = (V_3)_0 = (U_3^2)_0 = (U_3)_3 = (1/8)(V_3)_3 = (1/8)(U_6^2)_3.$$

$$V_0/8 = (1/8^2)(U_6^2)_3 = (U_6/8)_6$$

Because of the possibility to exchange radial and tangential in  $\Omega_3$ , the radial velocity  $V_0$  is equal to the tangential velocity  $U_6$  which becomes  $(U_6^2)_3$  in  $\Omega_6$ .

But the radial velocity  $V_0$  is also  $(U_3^2)_0$ . That implies :

$$(T_6^2)_3(U_6^2)_3 = (T_0^2)_3[(U_6^2)_3 - (U_3^2)_3]. \quad (6)$$

Inside the intermediate particle  $\Omega_3$ , this equation gives us the relativity of time between the external particle  $\Omega_0$  and the internal particle  $\Omega_6$ .

We have the relations :

$$V_3 = 8U_3 \text{ and } V_6 = 8U_6,$$

So, the equation becomes in  $\Omega_3$  :

$$T_6^2 U_6^2 = T_0^2 (U_6^2 - U_3^2) = 64 T_6^2 V_6^2 = 64 T_0^2 (V_6^2 - V_3^2)$$

That gives us the change of time (relativity) :

$$(T_6/T_0)^2 = 1 - (V_3/V_6)^2 \quad (7)$$

In  $\Omega_3$ ,  $(T_6)_3$  is the measure of time  $T$  in  $\Omega_3$  and  $(V_6)_3$  is the maximum velocity  $c=C_2$  observable inside  $\Omega_3$ .

$(V_3)_3$  is the radial velocity  $v$  of the particle which evolves in the time  $t$ .

The relation (7) becomes the well-known relation :

$$t^2/T^2 = 1 - v^2/c^2 = \gamma^{-2} \quad (7')$$

## 6 Conclusion

In 1964, the Danish physicist Lüders was talking about the proprieties of particles and antiparticles through the fundamental symmetry : the symmetry CPT.

We suppose that we film in a mirror the reflection of a world where the particles would be antiparticles. Back to front, the movie shows the similar processes of particles. These very general assumptions imply a theorem where the physical laws must be invariant :

- Invariance of charge  $C$  : the processes are the same when the particles (charge  $C$ ) become the antiparticles (charge  $-C$ ).
- Invariance of parity  $P$  : the symmetry of a physical process is invariant when the space coordinates are inverted.
- Invariance of inversion of the direction of time  $T$  : all the reactions between the elementary particles are also possible with a reversed time.

So, all the physical interactions must be invariant with CPT transformations.

The fundamental motion (figure 3) shows that the particle  $\Omega_n$  ( $\varphi=0$ ) is always connected with another particle  $\Omega_n$  ( $\varphi=\pi$ ) or antiparticle with a similar nature ( mass, spin, life time) into the plane of  $\Omega_1$ . The rotation of this plane (when  $\varphi=0$ ) corresponds to the image of the rotation (when  $\varphi=\pi$ ) in a mirror (inversion = spinback). We must observe the Fresnel's triangle which is connected to the path of  $\Omega_n$  on  $\Omega_1$  into  $\Omega_0$ .

The exchange of radial and tangential gives to a particle the possibility to evolve with an accelerated time (temporal openings). This particle seems to go back in the past. Its accelerated evolution gives only a virtual time of evolution to the particle. A notice of F. Selleri shows us the impossibility of an antiparticle to increase energy through a sheet of plumb (experiment of A. Anderson for the positron). This notice implies the same conclusion : a direction of time is a reality. With the fundamental motion and the temporal openings, the comeback to the past is always a comeback to a virtual past which depends on an acceleration of time.

Without using Lorentz' transformations, it is possible to find the relativistic correction  $\gamma$  with a fundamental doubling motion. This motion is composed of three simultaneous rotations. Periodical reconstitution on a radial axis give an apparent motion of translation. In fact, all translations are discrete circular motions. The fundamental



doubling motion defines imperceptible times called "temporal openings" in which the time flow can be accelerated. Conversely, any time flow can be the consequence of "temporal openings" of a decelerated time flow. The relativity of time is important because of these "temporal openings" in which another time flow exists with another doubling velocity. Because of these different embedded times and spaces, each particle is always in three different times and three different spaces.

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