THE DOUBLING THEORY

By Jean-Pierre Garnier-Malet
Paris - France
E-mail : jpgarma@free.fr

Abstract

This communication is the continuation of two papers (Garnier-Malet, 1998, 1999) which proposed a new model with several essential distinctive features. First, the observations are consequences of the universal principle of horizons and virtual motions of a system of spaces' horizons, which limits observations and interactions. Then, time is stroboscopic with periodical times of observation or interaction and periodical times of non-observation or non-observable interaction.

This theoretical model dispose of basic notions and principles, however it never disposes of the existing laws. It introduces a set of periodical motions of embedded horizons, which would be fundamental for physics, as well for quantum mechanics as for relativistic mechanics.

An application to the solar system (Garnier-Malet J.P., 1998) gave us the understanding of the physical reality of this geometry. It allowed us to explain in another way Kepler's three laws and the motion of planetary libration. It also allowed us to rediscover the condition of the relativity theory in the solar system (the precessional motion of Mercury's orbit).

This new model implies one solar cycle (24 840 years), which is going now to end (2017). Above all, it causes a junction between our solar system and the speed of light, which I could calculate in a theorical way. It gives me now the capability to propound a new theorem, which is already verified by two important astronomic observations.

Keywords

Embedded particles or horizons, stroboscopic time, temporal holes and windows, radial and tangential paths, anticipative doubling, hyperincursion.

1 Introduction

Any space (small dust, atom, star, galaxy or Universe) may be considered as an observable and interactive space in a *horizon* of events. In this model, any horizon, which limits interactions of an observable particle, is also a particle in another horizon. Another important peculiarity of this model is the fact that a horizon (or a particle) is tangentially moving on another horizon (or particle). These relative motions of horizons and particles construct new frames of reference in a dynamic way. We shall see that they forbid all rectilinear propagation. However, it is out of question to abandon the habitual notion of rectilinear propagation. A rectilinear (or curved) trajectory will always be the result of a succession of observations, made in a stroboscopic way on a privileged axis (rectilinear or curve). Actually, we assume that the observable time

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flows in a stroboscopic way : times of perception alternate with times of non-perception. Einstein was already talking about this cutting out of time (see the four conferences about the relativity theory, 1921, at Princeton). The fundamental notions that I bring to this new model, give concrete form to this basic idea of Einstein.
Time, which is measured in a continuous way by the clock, is only a succession of denumerable times, which implies a "before" and an "after" of each state of observation.
The definition of a non-perception state assumes that the observer cannot observe an observable event. This observer does not know the real space but only the observed space by a succession of subjective perception states. The "flow of time" can be differentiated between two particles, which take place into two different horizons.
A particle will be connected to a first frame of reference (into its horizon), to a second frame of reference (where its horizon is a particle) and to a third frame of reference (where it is the horizon of another particle). So, the particle's energy is always the consequence of three embedded energies : the new theorem (matter of this paper) will give us their ratios (1/1000, 333/1000 and 666/1000).
We shall see that observations of supernova, made by scientists (Perlmutter S. in America and Schmidt B. in Australia, January 1998) confirm this basic theorem.
Before this demonstration, I am going to explain the system of periodical motions of particles and horizons again (according to the above principles). Called "fundamental motion", these motions use one particle (connected to its threefold frame of reference) to define and measure the space and the time in its horizon. Three embedded horizons allow us to study three temporal states of one particle (past, present, future) in the same event. Three embedded velocities define this embedding (Garnier-Malet, 1999) :
$C_0 = 7C_1 = (7^3/12)10^5 C_2$ (C_2= speed of light=299 792 km/s.)
To understand the aim of the fundamental motion, which (for the first time) allows us to calculate C_2 in a theorical way, it would be good to see the notions and principles of this new model again.

2 Stroboscopic Time

A real particle o_n (figure 1) is observed in its event's horizon Ω_n where it is interactive. A virtual particle o_0 (non-observable into Ω_n) can be interactive with Ω_n or o_n. It can be observable in Ω_n by its interaction or becomes real when it is observed in the horizon of observation. o_n is an "internal" particle of Ω_n and o_0 is an "external" particle of Ω_n (interactive into Ω_0 which is a particle in another horizon Ω_e). So, o_0 is an "intermediate" particle between an "internal" particle o_n and an "external" particle o_e.

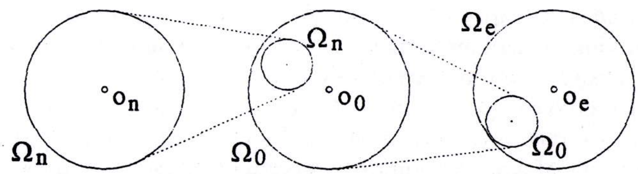


Figure 1 : three embedded horizons (or particles).

For o_n, Ω_n is a boundary of observable events and interactions.
It is a minimum threshold for o_0 which interacts with Ω_n into its horizon Ω_0 and a maximum for o_n which interacts into its horizon Ω_n.
Each horizon has privileged directions of observation (a direction of propagation or interaction) : in a three-dimensional observable space, the association of two virtual particles (internal and external) with each real particle (intermediate), builds a "Threefold Frame of Reference". With this TFR, the distance R, the time T or the rotation Θ, always will be the distance R, the time T or the rotation Θ into the horizon Ω_n of a particle o_n and so noticed : $(R)_n$, $(T)_n$ or $(\Theta)_n$.
So, $(R_0)_n$ will be a distance R into the horizon of o_0, observable into the horizon of o_n.
The time is dotted : its "flow" is stroboscopic (figure 2).

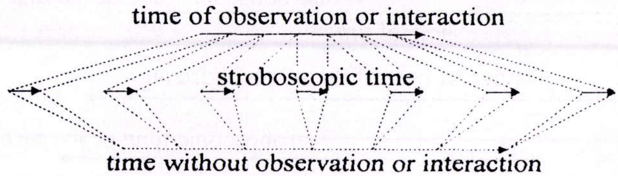


Figure 2 : stroboscopic time.

There are "temporal holes" where the particle is not interactive and seems to be at rest.
There are "temporal windows" where the particle can interact.
The particle is only observable during a temporal window.
The motion of a particle during a temporal hole is non-observable in this horizon. So, the propagation of this particle is only an appearance in its horizon : it could be curved in the temporal holes and rectilinear in the temporal windows or conversely.

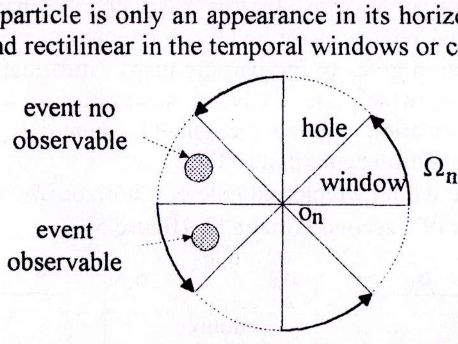


Figure 3 : schema of periodical motion into a horizon.

The "opening's times" of temporal windows and holes into a horizon are defined by a periodical motion of a particle into this horizon which is always a particle in another horizon. Consequently, this motion of particles must also be the motion of horizons.
This periodical and fundamental motion defines and distinguishes the flow of time into any horizon Ω_n of any real or virtual, internal, intermediate or external particle o_n.
So, a particle, which would be able to enter into another horizon during a temporal hole, could obtain the time's flow of this new horizon. By definition of the temporal hole, this

exchange would be non-observable into the initial horizon, but the resulting interactions instantaneously would modify its observable behavior. In fact, an observable interaction is possible in the second horizon where the flow of time is different. But the result of this interaction into the initial horizon appears to be instantaneous.
So, this exchange of horizons can give us an impression of instantaneous acceleration or deceleration of the motion of particles because only a part of this motion is observable into the initial horizon. A real or virtual particle, moving in stroboscopic time, can obtain the instantaneous result of an interaction in a temporal hole of its horizon by exchanging its horizon and the horizon of an internal virtual particle (figure 4).

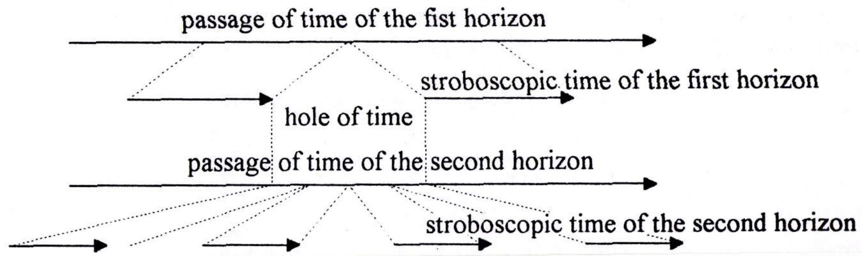


Figure 4 : observation in a temporal hole.

A virtual or real particle interacts with the particles which are in its horizon (condition of space), during its temporal windows (condition of time). So, an exchange of horizons between two particles, during the temporal holes of their respective horizons, is not observable in these horizons. After the exchange, the initial particle can find its initial state again into its initial horizon. In this case, this exchange is not observable. However, the particle has been transformed by an interaction outside its horizon.
This "external" interaction gives to the particle many "information" (distance, rotation, translation velocity,...), which are analyzed according to its Threefold Frame of Reference. These information will be recognized when the particle finds the same spatial and temporal condition again in its TFR.
During a first exchange within a temporal hole of a horizon Ω_0, the particle o_0 of Ω_0 can use a temporal window of a second horizon Ω_1 (figure 5).

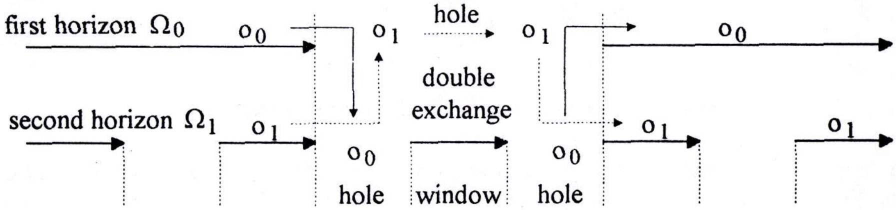


Figure 5 : the double exchange.

This temporal window into Ω_1 gives real information to o_0, but the time of this reality does not exist in the temporal hole in Ω_0. When o_0 finds its initial horizon Ω_0 again in

its next temporal window, these information become instantaneous because, by definition, the interactions, which come from a temporal hole, are not observable in this horizon. In other words, we can say that information, which is coming from a temporal hole of the particle's horizon, is immediately memorized by the particle in the next temporal window of its horizon.
In fact, the interactions of particles depend on the relative position of their respective horizons, which can interact in a common horizon Ω_0 . So, this new model must verify the well-known laws of particles' interactions. When two particles have a common horizon and when their temporal windows coincide, they are interactive according to their known physical proprieties. But we must not forget the interactions during the temporal holes where we find these proprieties again. So, the immobility of a particle is only an appearance into its horizon (figure 6).

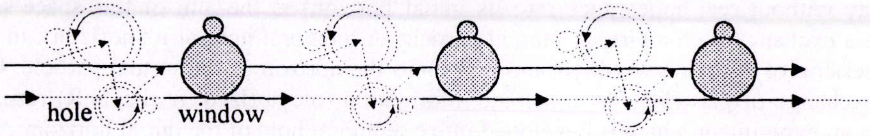


Figure 6 : agitation and dilation into the holes and immobility into the windows.

In this model, the real or virtual particle is never motionless because its horizon is always an interactive particle into another horizon. The impression of immobility comes from a slowing down of the time's flow : there is never absolute rest. The time and the space can be modified in an independent way within the temporal holes.
So, without observation of this modification within the temporal windows, the continuum space-time is a wrong sense. Einstein's Theory of Relativity uses the temporal windows. A change of spaces' and times' scales must be considered in the temporal holes. But it is not enough. So, we must consider a change in the velocity of the stroboscopic flow of time, according to the embedding of the horizons.
The periodic motion of a particle Ω_n, which must define time's flow into a horizon Ω_0 must become the motion of the horizon $\Omega_n=\alpha_0$ of another particle o_n.
So, this motion exchanges the measure of the time of a particle into a horizon and the measure of the dimension of this horizon into another horizon where the time's flow is different. With three embedded horizons (external, intermediate, internal), the external particle (the slow flow of time) measures space and time as well as the internal particle (the fast flow of time). The apparent accelerations of the "motion which defines the different ratios of stroboscopic flows of time", are the consequence of the particles' exchanges.

3 Apparent Dilation of Horizon

To realize the exchange of two particles (by juxtaposition of their horizons), conditions of horizons' dilation are necessary. We shall see how the horizon Ω_1 (so that $\Omega_0=2\Omega_1$) can become $2\Omega_1$ during a temporal hole into the initial horizon Ω_0 in order to coincide with Ω_0 during this temporal hole. In fact, Ω_1 becomes $2\Omega_1$ around the particle o_0. So o_0 have the stroboscopic flow of time of o_1. In other words, o_0 becomes o_1 but into a horizon two times larger than the horizon of o_1. At the same time, o_1 becomes o_0 but during a non-observable temporal hole of o_0. When o_1 comes again into Ω_1, at the end of the temporal hole of Ω_0, it is going into a temporal hole of Ω_1. So, o_1 does not have the time to observe this exchange which is only virtual for it. When o_0 comes into Ω_0 again, at the end of its temporal hole, its exchange is also non-observable in its next temporal window where the resulting observation seems to be instantaneous : however o_0 can use one or several temporal windows of Ω_1.

4 Principle of Anticipation

For the real particle, the spaces 'and times' modification within a temporal hole (that is to say without real appearance into its initial horizon) is the aim of this space's and time's exchange with a virtual internal particle. A temporal hole of its horizon can be a succession of temporal windows and holes into the horizon of the virtual particle. Only an exchange of particles can anticipate information (memorized by the TFR) resulting from an experiment which is developed into a temporal hole of the initial horizon.
After the exchange, the future (coming from temporal windows of the virtual internal particle) is instantaneously coming into the next temporal window of the initial horizon. We can say that this future has become the instantaneous past of the real particle.
All the temporal windows of the horizon of the virtual particle (which are in the future of the last temporal window of the real particle before the exchange), constitute the instantaneous past of this experiment after the exchange. Because of the particles' exchange, one temporal window of the initial horizon is instantaneously transformed by the immediate result of a long experiment coming from the last temporal hole. It is a real anticipation for the real particle. So, it is possible to say that the present of the real particle is the future, which is the experiment in the temporal hole of a virtual internal particle. The real particle o_0 (which is moving into a slow flow of time) can anticipate the consequence of an event by an exchange of information with a virtual internal particle o_1 (which is into a fast flow of time). It could so modify its past by doing exchanges with a virtual external particle o_{-1} (which will be into a slow flow of time).
As this exchange takes place during a temporal hole, the virtual internal particle o_1 becoming o_0, does not modify the horizon of o_0.
So, when o_0 comes back into its horizon by a reverse exchange, it can change its horizon (or not) by introducing (or not) its last interaction into its own next temporal window.

5 Principle of Hyperincursion of the Future into the Past

Two exchange of particles (o_0 and o_1) allow o_0 to anticipate an interaction. Three exchange of particles (external o_{-1}, intermediate o_0, internal o_1) allows o_0 to introduce the future into the past (hyperincursion) and into the horizon of the initial and intermediate particle. With the faster stroboscopic time of o_1, o_0 can do a second exchange and so receive anticipated information from a second virtual particle o_2 during a temporal hole into the dilated horizon of o_1. So, o_0 begins the experiment of o_2, according to the result of the experiment coming from o_1. Two reverse exchanges put the particles again into their respective horizons. Because of the temporal windows of o_2, o_0 knows the future of an experiment of o_1. But these results are not observable beforehand into the initial horizons of o_0 and o_1. When o_0 comes back in its initial horizon, the reverse exchange gives o_1 the future of the experiment. So, the past of o_1 is modified by its future and we can say that the external particle o_0 introduces the future (which is the past of the internal particle o_2) into the past of the intermediate particle o_1. The three particles can begin this exchange again, using another common temporal hole. By considering the virtual internal particle o_1 into a temporal hole of o_0, we can also consider that o_0 is into a temporal hole of a virtual external particle o_{-1}. So, the problem is to transform (by the same motion) the internal particle o_2 into an external particle o_{-1}. The last past event of o_2 which is a future consequence of a present event of o_0, is first a future consequence of a present event of o_{-1}, already memorized by o_0 into its present. By this "hyperincursion" of the future into the past, the fact becomes the cause.

6 Fundamental Doubling Motion

6.1 Principle of Doubling

Because of the exchange of three embedded particles (o_0, o_1, o_2), the intermediate particle o_1 becomes in its horizon the present model of a past, memorized by o_0 and experimented in the future by o_2. In other words, a particle is always doubled by an internal particle into a temporal hole without modifying it into its initial horizon where the time of this doubling is not observable.

This initial particle is also the doubled particle in a temporal hole of an external particle. These two doublings put the future into the past (hyperincursion) and gives an instantaneous potential action to the intermediate particle during its temporal windows. The sequence of these actions forms a present, which, in fact, is a permanent exchange future-past and past-future into temporal holes. So, any particle has the best future information to instantaneously resolve its present problems, which are coming from its past interactions. The system of virtual motions, which are necessary for the periodic exchanges of particles (or horizons), could be called the "fundamental motion of doubling". It is an undulatory and vibratory motion. This motion allows an exchange of three embedded particles into common temporal holes. It defines the stroboscopic flows of time (temporal holes and windows) according to the dimensions of these particles.

6.2 Fundamental Motion or Spinback (recall)

The fundamental motion is composed of three simultaneous rotations (figure 7a) :

1°) A rotation φ (center o_0) of the diameter of $\Omega_1 = \Omega_0/2$ in the plane of Ω_0.

2°) A rotation φ of Ω_1 around this diameter.

3°) A rotation 2φ of Ω_1 around itself.

The particle $\Omega_n=\Omega_0/2^n$ is also a horizon, which is making the same motion into the horizon $2\Omega_n$ during the path of $2\Omega_n$ on Ω_0 (which is called "tangential path").
The rotation $\varphi=\pi$ is called "spinback" of Ω_0 (or $2\Omega_n$). The spinback of Ω_0 corresponds to the spinback of $2\Omega_n$, made during the tangential path of $2\Omega_n$ on Ω_0.
This spinback of $2\Omega_n$ is called "tangential spinback".

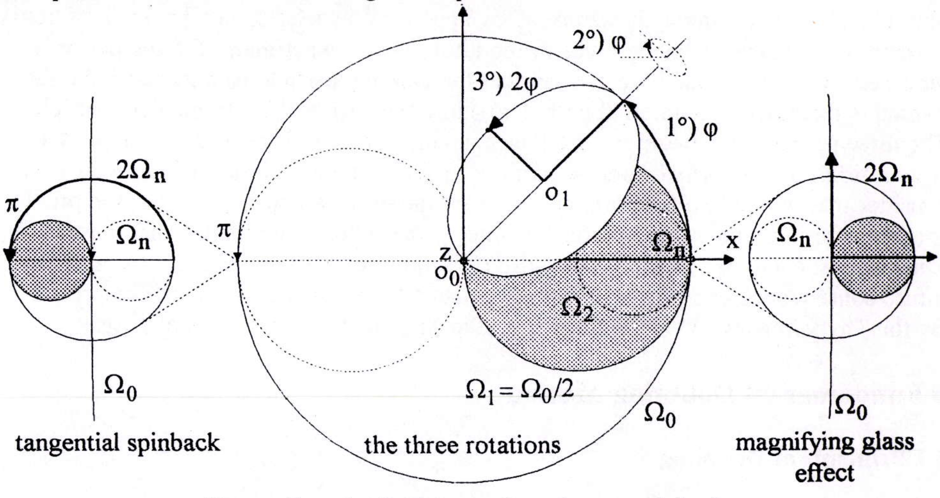


Figure 7a : the fundamental motion or spinback.

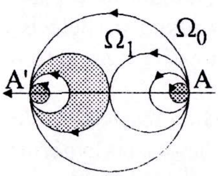


Fig. 7b : spinback of Ω_0

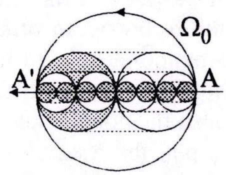
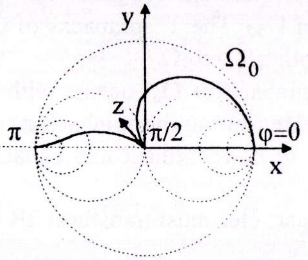


Fig. 7c : radial virtual path

The spinback of Ω_0 corresponds to 2 spinbacks of Ω_1 and to 2^n spinbacks of Ω_n called "radial spinbacks" into Ω_0. It implies a dissociation (or geometrical fission) of horizons Ω_1, Ω_2,..., Ω_n in A, and a reconstitution (or geometrical fusion) in A' (figure 7b.).
It does not give the initial conditions again because it turns back the plane of Ω_1 into the plane Ω_0 and in the same sense replaces the other horizons Ω_2, Ω_3,..., Ω_n.
So the paths of Ω_1, Ω_2,..., Ω_n can be considered as "radial paths" into Ω_0 according to the "radial axis" AA' (figure 7c).
The curve (figure 8a) of the tangential path of a particle on the moving horizon Ω_1 corresponds to the radial path into Ω_0. The parametric equations of this curve are :

$$x = \cos^2\varphi\,(\cos\varphi - \sin^2\varphi)$$
$$y = \cos^2\varphi\,\sin\varphi(1 + \cos\varphi) \qquad (1)$$
$$z = -\cos\varphi\,\sin^2\varphi$$



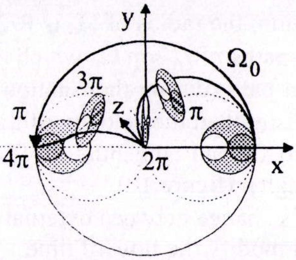


Figure 8a. : curve (1) **Figure 8b :** radial path of embedded horizons

This radial curve is not a locus of particles. It carries off a toroid fog of particles during 2^n periodical fission and fusion of the particle Ω_n ($\forall n>0$) which is doing 2^n radial spinbacks during the spinback of Ω_0 (figure 8b).
According to definitions of the motion which must be the motion of all horizons, the spinback of Ω_0 into $2\Omega_0$ corresponds to the rotation $\pi/2$ of $2\Omega_0$ on an external horizon Ω_e (figure 9).

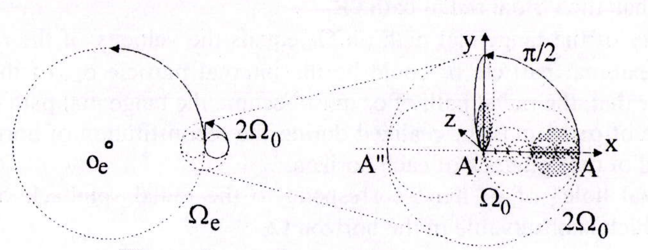


Figure 9 : motion of the horizon Ω_0.

The radial path (beginning in A) ends in A' on the radial axis AA' of $2\Omega_0$. The spinback of $2\Omega_0$ is a tangential spinback on the horizon Ω_e of an external virtual particle o_e.
So, the radial axis is the same for all the internal virtual particles when the horizon of the external virtual particle o_e ends its own spinback. However, during this external spinback, the dimension of this radial axis changes according to the stroboscopic flows of the time of the embedded horizons.

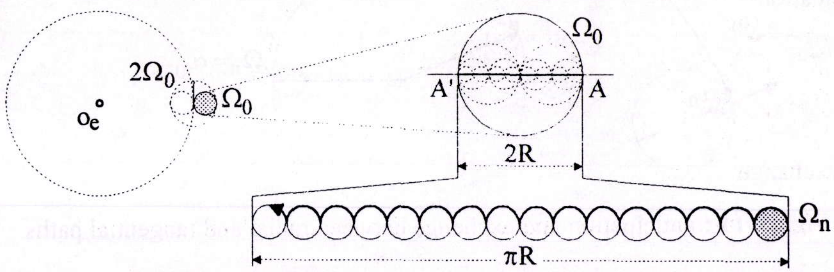


Figure 10 : theoretical radial curved axis πR equals observed rectilinear axis 2R.

The path AA', radial into Ω_0 or tangential on Ω_0, is equal to πR (figure 10).
By definition, the radius of Ω_n is $R/2^n$ (R radius of Ω_0). The 2^n spinbacks of Ω_n form 2^n tangential paths $\pi R/2^n$ on Ω_n which is the radial path πR into Ω_0.
This radial path (during the rotation $2^n\pi$ of the spinback of Ω_n) occurs with a velocity 2^n times faster than the velocity of the tangential path (during the spinback π of Ω_0).
Radial into Ω_0 and tangential on Ω_n, AA' seems to be rectilinear and equals 2R for a large enough n (figure 10).
The scale's change between external and internal particles must transform 2R into πR.
So it must modify the flow of time.
This modification takes place at the end of the spinback of the particles on the axis AA'.
The real initial particle is o_0. By definition, the virtual external particle o_e can only be a virtual internal particle o_n.
This implies that the real tangential path πR, observable into Ω_n (during the 2^n spinbacks of Ω_n) becomes a virtual radial path 2R, observable into Ω_0 with a velocity 2^n times slower.
But the real radial path 2R, observable into Ω_n (during the 2^n spinbacks of Ω_n) is also 2^n times slower than the virtual radial path 2R.
So, the velocity of the tangential path on Ω_0 equals the velocity of the radial path into Ω_n. And the external particle o_e could be the internal particle o_{2n} of the intermediate particle o_n. For that, the radial path of o_n must become the tangential path of o_0.
This exchange of paths must be realized during the reconstitution of horizons on radial axis, at the end of the spinback of each horizon.
So, a "temporal hole" of o_0 must correspond to the radial spinback of the smallest particle Ω_n, which is observable in the horizon Ω_0.

6.3 Anticipation of Motion

Into Ω_e, Ω_0 is a particle (figure 11).
The time of a temporal hole into Ω_e corresponds to the radial spinback of Ω_0 and to a tangential spinback of $2\Omega_n$ on Ω_0.

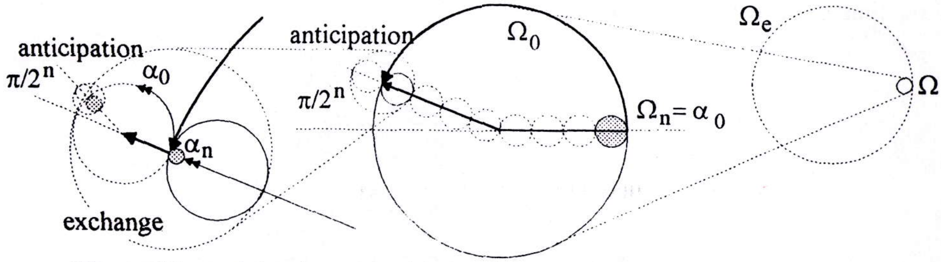


Figure 11 : anticipation and exchange between radial and tangential paths.

An exchange in a common temporal hole between the internal particle α_n and the external particle Ω_0 must be accomplished before the end of this spinback. Within the external particle Ω_0, the intermediate particle $\Omega_n=\alpha_0$ is a horizon for the internal particle α_n. The non-observable time of a temporal hole in Ω_n corresponds to the spinback of α_n.
An exchange in a common temporal hole between the internal and external particles must be done during the spinback of the internal particle.
The spinback of α_0, which defines temporal holes within Ω_0, also defines the flow of time into Ω_0. The fundamental motion allows the internal particle α_n to begin its spinback before the end of the spinback of the external particle Ω_0.
So, the exchange of three particles (external, intermediate, and internal) is possible during a common temporal hole.
In fact, it is the exchange of radial and tangential paths that implies the exchange of the particles. This can be realized before the end of the spinback of Ω_0.
This exchange is possible when the particle Ω_n becomes $2^n\Omega_n=\Omega_0$ by a dilation. The dilation (Garnier-Malet J.P., 1998, 1999) is in fact a succession of expansions of the embedded horizons, which allows particles to exchange their respective horizons.
When the initial horizon Ω_0 ends its tangential spinbacks on Ω_e into $2\Omega_0$ (figure 11), the virtual external horizon Ω_e end its own spinback. The doubling transformation ends.
The application to the solar system (Garnier-Malet J.P., 1998, 1999) shows us that this end uses six periods from 1899 to 2017. The solar modifications and the planetary warming are signs of this six times end.

6.4 Successive Dilation of the Horizon (recall)

To go into a temporal hole of the internal virtual particle o_{-1} (defined by the spinback of Ω_0), the real particle o_0 must leave by using the motion of Ω_1, during the first spinback of Ω_1. So it comes into the center of the $2\Omega_n$ (figure 12a).
This spinback (during the rotation $\pi/2$ of the diameter of Ω_1) exchanges the virtual particle o_1 and the real particle o_0. This motion of o_0 corresponds to the curve (1) with a phase difference $\pi/2$.
This exchange does not change Ω_1. But it transforms o_0 into o_1 into a dilated horizon $2\Omega_1$, with a velocity of rotation two times faster in the plan yz perpendicular to the initial plane xy (figure 12b).
A second spinback of o_0 on Ω_1 (figure 12b), two times faster than the previous (during the rotation $\pi/4$ of Ω_0 in the plane xy), transforms o_0. This particle, which became $(o_0)_1$, becomes o_2 in the center of a dilated horizon $4\Omega_2$, in the plane xz, with a rate of rotation two times faster than the previous.
A third spinback of o_0 on Ω_1 (figure 12c), two times faster than the previous (during the rotation $\pi/8$ of Ω_0 in the plane xy), transforms $(o_0)_1$. This particle which became $((o_0)_1)_2$, becomes o_3 in the center of a dilated horizon $8\Omega_3$, in the plane xy, with a velocity of rotation two times faster than the previous.

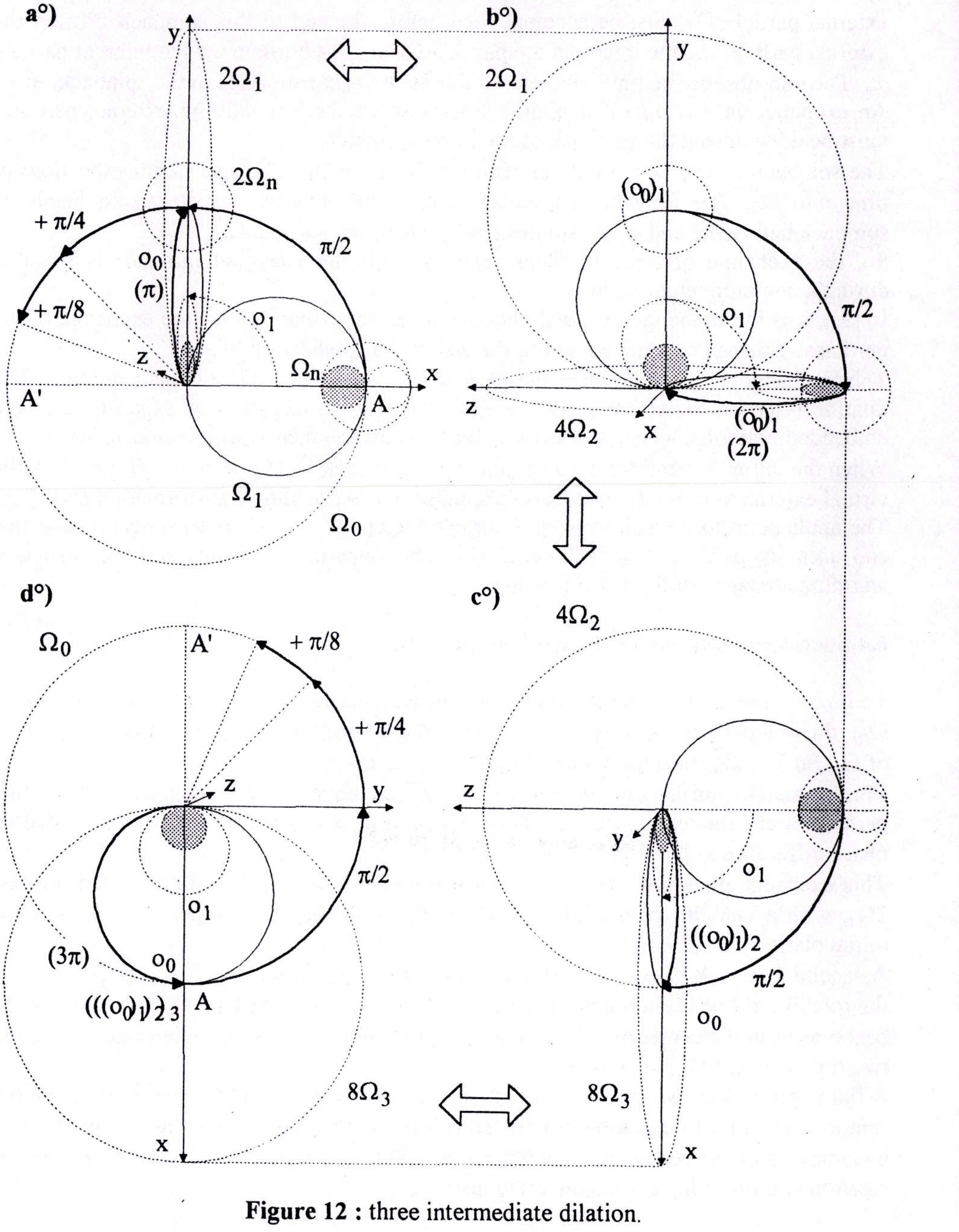
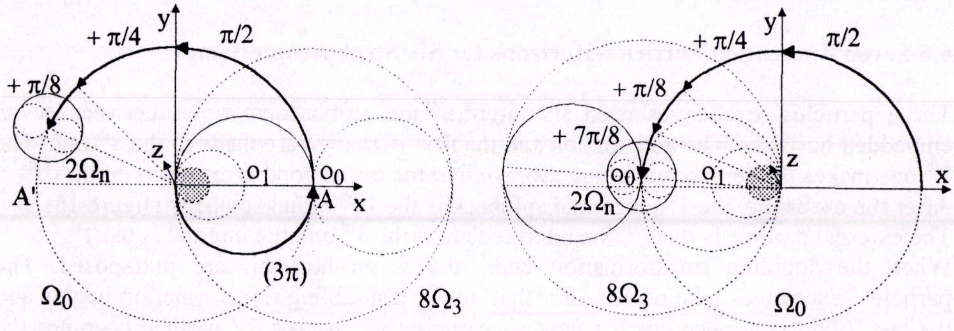


Figure 12 : three intermediate dilation.

6.5 Exchange Radial and Tangential Motion

After the tangential rotation $(\pi-\pi/8)$ of the particle $2\Omega_n$ on Ω_0, the particle o_0, which became $(((o_0)_1)_2)_3 = o_0$, is in A with a rate of rotation 8 times faster than the tangential spinback of Ω_0 (figure 13a). It is into the dilated horizon $8\Omega_3$, which ends its spinback in the center of the radial axis AA'.



a. : Ω_0 and $8\Omega_3$ in the initial plane. **b.** : tangential spinback of $8\Omega_3$ on Ω_0.

Figure 13 : spinback of o_0 on Ω_0.

The horizon $8\Omega_3$ of the particle o_0 can also make a tangential spinback on Ω_0 during the rotation $\pi/8$ of the particle $2\Omega_n$ on Ω_0 which ends its own spinback. So, it is possible to exchange radial and tangential motions after the rotation $7\pi/8$ of $2\Omega_n$ on Ω_0 and the rotation $(\pi-\pi/64)$ of $2\Omega_n$ on Ω_0, that is to say before the end of spinbacks (figure 13b). By considering the horizon $8\Omega_3$ as an initial horizon, the same motion can be realized after the rotation $7\pi/8$ of $2\Omega_n$ on Ω_0 and during the rotation $\pi/16$ of $2\Omega_n$ on Ω_0. The spinbacks of Ω_0, $8\Omega_3$ and $63\Omega_6$ are completed with the exchange of radial and tangential motions when the initial horizon Ω_0 becomes the dilated horizon $2\Omega_0$ (figure 14).

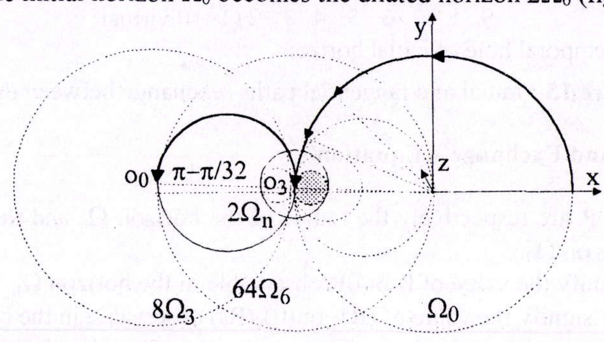


Figure 14 : exchange between radial and tangential paths.

This dilation allows the real particle o_0 to exchange the flow of time and so become the external particle o_{-1} of a horizon $\Omega_{-1}=2\Omega_0$.

So, the intermediate particle o_3 of the dilated horizon $8\Omega_3$ can exchange the measure of the time of its horizon and the measure of the dimension of this horizon between the internal particle o_6 of the dilated horizon $64\Omega_6$ and the external particle o_{-1} of the dilated horizon Ω_{-1}, according to the assumptions. So, the exchange of temporal holes into common horizons can be realized between the external particle o_0 and the internal particle o_6. The intermediate particle o_3 makes the connection. In fact, the external particle o_{-1} becomes o_0 again in the initial plane at the end of this exchange.

6.6 Seven Embedded Particles-Horizons for Six Stroboscopic Times

These particles' exchanges need six intermediate stroboscopic times between seven embedded horizons. The anticipation and the first exchange are made in the 8th one. The 9th one makes the reverse exchange. So, we find the initial conditions again in the 10th.
After the exchange, the 1st tangential spinback is the 10th radial spinback (figure 15).
The external particle is the 7th, the intermediate is the 3rd and the internal is the 1st.
When the doubling transformation ends, the seven horizons are juxtaposed. The particles' exchanges take place. After that, the next doubling transformation begins and the last 7th horizon becomes the next 1st particle. So, the last 7th particle becomes the past of the future 1st particle.

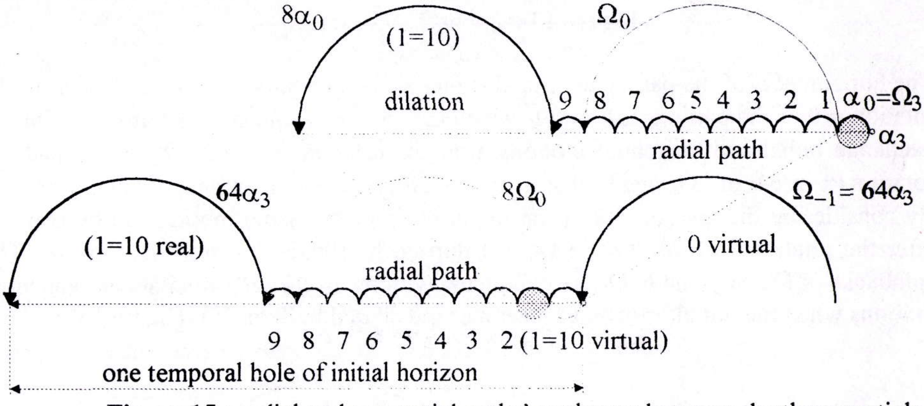


Figure 15 : radial and tangential paths' exchange between the three particles.

6.7 Condition and Exchange's Equation

Recall : R and θR are respectively the radius of the horizon Ω_0 and the tangential path of the particle o_0 on Ω_0.
$(R)_n$ or $(\theta R)_n$ signify the value of R or θR observable in the horizon Ω_n.
$(R_0)_1$ or $(\theta_0 R_0)_1$ signify the value of $(R)_0$ or $(\theta)_0(R_0)$ observable in the horizon Ω_1.
The spinback of a particle o_n is observable in its horizon Ω_n only when :

$(\theta)_n=(k)_n\pi$. with $\theta = k\pi$. and k (whole) ≥ 0.

A spinback of a particle is observable outside any horizon only when the particle begins or ends its radial spinback into this horizon.
According to the above assumptions and conclusions, the exchange's condition between the particles is : $(R/8)_1$ observable into the horizon of the intermediate particle o_1, can become $(R)_2$ observable into the horizon of the internal particle o_2, if $(2\theta R)_1$ observable into Ω_1 corresponds to $(\theta R)_0$ observable into Ω_0. And we can write :

$$(R/8)_1 = (R)_2 \tag{1}$$
$$(2\theta R)_1 = (\theta R)_0 \tag{2}$$

With (1) and (2), the exchange between the particles o_0 and o_2 will be possible when :

$$(R)_2 = ((R)_{-1})_0 = (R_{-1})_0. \tag{3}$$

with $(\theta)_n = (k)_n\pi$, $\forall n$,

the relations (1), (2) and (3) imply the exchange's equation :

$$(\theta R^2)_1 = (4\theta RR_{-1})_0 \tag{4}$$

This equation (Garnier-Malet J.P. 1998) will be possible by using a change of spaces' and times' scales, (e_d) and (e_t), so that :

$$e_t = 1/e_d = 2\pi^{1/2} \tag{5}$$
$$(4R)_0 = e_d\pi(R)_1 \tag{5'}$$
$$(\theta^2)_0 = e_t(\theta)_1 \tag{5''}$$

The relation (5) is so that : $e_t\, e_d = 1$.

Between two successive horizons, the scale's exchange e_d (relation 5') transforms a radial path R into a tangential path πR, and the scale's change e_t (relation 5'') transforms θ into θ^2, or $(k)_1\pi$ into $(k)_0\pi^2$ during their common spinbacks.
When $(k)_1$ equals $(k^2)_0$, the radial path R, during the time of one internal spinback (π) is equal to the radial path R^2 during the time of one spinback (π^2).
In the embedded horizons systems of the doubling transformation :

$(k)_1 = 2^3 = 8$ and $(k^2)_0 = 2^6 = 64$

According to the hypothesis (dilation, acceleration, juxtaposition), that corresponds to the first spinback of the external horizon if :

$(k)_{-1} = 2^0 = 1$

An easy calculation (Garnier-Malet J.P., 1999) gives us the three radial velocities C_0, C_1, and C_2, which are necessary for the initial and final juxtapositions of the three embedded particles or horizons α_0, α_1 and α_2. This embedding uses what are six different stroboscopic times. The final exchange (figure 16), needs a dilated horizon $(\Omega)_{-1}$ with a radial velocity C_0 (so that : $C_0 = 7C_1$).

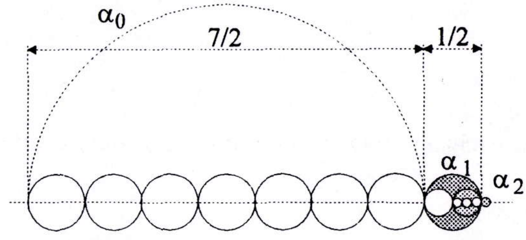


Figure 16 : initial and final juxtapositions

The final juxtaposition corresponds to the different value of $(k)_0\pi$, $(k)_1\pi$ and $(k)_2\pi$ (figure 17). In order to verify the different assumptions, we must find numbers which are multiples of 6, 8, and 10 (six stroboscopic times, eight internal spinbacks, and an acceleration of spinbacks from 1 to 10) for the initial and final juxtapositions.
So, we can write :

$C_0 = 7C_1 = 7(49/12)10^5C_2.$ (6)

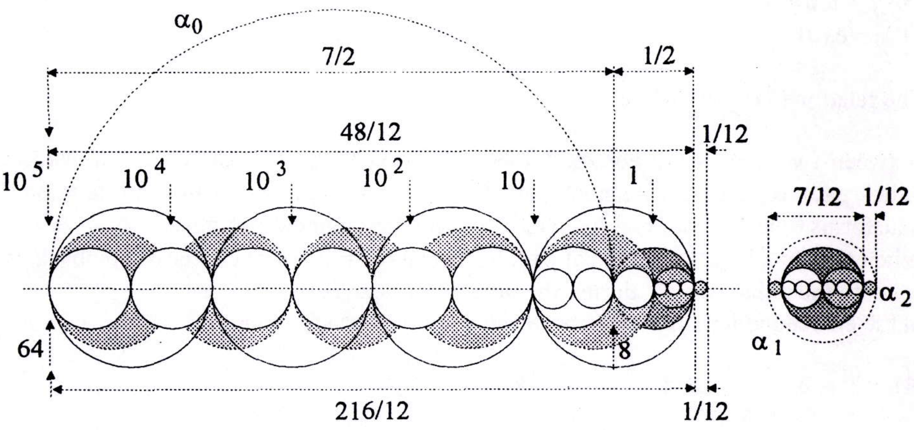


Figure 17 : The three velocities of the horizons' exchanges

C_2 is the maximum radial velocity of the smallest particle, which is observable into the third intermediate horizon α_2, during the time of the doubling transformation.
Because of the exchange scale (5''), when θ becomes θ^2 outside, it becomes $\theta^{1/2}$ inside.

The common multiple values of $(k^2\pi^2)_0$, $(k\pi)_1$ and $(k^{1/2}\pi^{1/2})_2$ and the numbers of spinbacks of the internal, intermediate and external particles or horizons (figure 17) imply the radial velocity C_2 of α_2 so that :

$$C_2 = 54\,\pi^{5/2}(\pi r/\tau)10^6 = (216\pi R_S/\tau)10^4 = 299\ 792 \text{ km./sec.} \qquad (7)$$

R_S is the radius of the Sun and R_T is the radius of the Earth, so that :

$R_S = (100/16)(\pi^{5/2})R_T$ and $R_T = 4r = 6376$ km.

Two spinbacks' time of the Earth = 2τ = 365,25×24×3600 sec. = one year.
πr is the radial spinback of α_2 into α_1. r is the radius of the particle α_2. τ is the time of 4 tangential spinbacks of α_2 on $2\alpha_1$ (figure 27). τ is time of 1 radial spinback of α_1 into $2\alpha_1$ during the tangential spinback of $2\alpha_1$ on α_0 . τ is also the time of 8 radial spinbacks of α_1 into α_0 during the tangential spinback of $2\alpha_1$ on α_0.

7 Theorem of the Three Horizons of Doubling

7.1 Hypothesis

To build the "Threefold Frame of Reference", there are three embedded particles : internal α_2, intermediate α_1, external α_0. Each particle α_n has a radial velocity V_n and a tangential velocity U_n (figure 18). The intermediate particle α_1 ends its spinback when the internal particle α_2 ends its radial path into this intermediate particle.

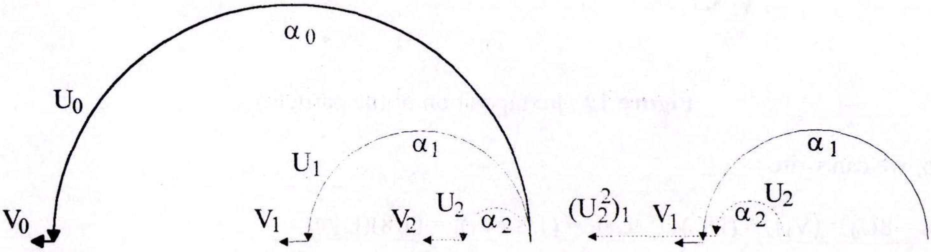


Figure 18 : the three embedded particles.

We saw the relationships (paragraph 6.7) :

$$e_t = 1/e_d = 2\pi^{1/2} \qquad (5)$$
$$(4R)_0 = e_d\pi(R)_1 \qquad (5')$$
$$(\theta^2)_0 = e_t(\theta)_1 \qquad (5'')$$

The relationship (5'') transforms $(\theta)_1$ into $(\theta^2)_0$, or $(k)_1\pi$ into $(k)_0\pi^2$, during their common spinbacks. We saw that the embedded particles α_1 and α_2 are such that :

$(k)_2 = 2^3 = 8$ and $(k^2)_1 = 2^6 = 64$

and, into the particle α_1 (horizon of α_2), the radial path R_2 which is made during the time T_2 of one internal spinback π, must equal the radial path $(R_2^2)_1$ which is made during the time $(T_2^2)_1$ of one spinback π^2.
Consequently, the tangential velocity $(\pi R_2/T_2)$ becomes $(\pi R_2/T_2)_1^2$.
But, at the same time, the scale's exchange (5') transforms πR_2 (the tangential path) into R_1 (the radial path), and the relation (5) allows us to make the simultaneous scale's exchanges (e_t and e_d) without modifying the observations ($e_t\ e_d=1$).
So, the tangential velocity $(\pi R_2/T_2)$ becomes the radial velocity $(R_1/T_2)_1^2$.
In other words, in the same time T_2 or $(T_2^2)_1$, the tangential velocity U_2 (into the particle α_2) becomes the radial velocity $(V_2^2)_1$ into the particle α_0 (figure 30).
The time T_2 (or T_0) corresponds to the spinback of the particle α_2 (or α_0) during its radial path (figure 19)

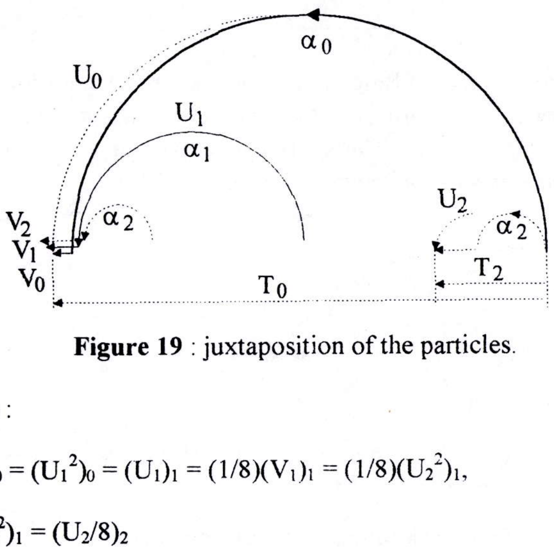


Figure 19 : juxtaposition of the particles.

So, we can write :

$V_0 = 8U_0 = (V_1)_0 = (U_1^2)_0 = (U_1)_1 = (1/8)(V_1)_1 = (1/8)(U_2^2)_1,$

$V_0/8 = (1/8^2)(U_2^2)_1 = (U_2/8)_2$

So in the particle α_1,the radial velocity V_0 equals to the tangential velocity U_2 which becomes $(U_2^2)_1$ into α_2. But the radial velocity V_0 is also $(U_1^2)_0$.
Finally that implies :

$$(T_2^2)_1(U_2^2)_1 = (T_0^2)_1[(U_2^2)_1 - (U_1^2)_1]. \quad (8)$$

7.2 Relativity of Time in the Intermediate Particle or Horizon

This equation gives the relativity of the time in the intermediate particle α_1 between the external particle α_0 and the internal particle α_2. In a particle, the radial velocity V is always equal to the tangential velocity 8U. So, only into α_1, the equations become :

$$[T_2^2U_2^2 = T_0^2(U_2^2 - U_1^2)]_1. \qquad (8)$$
$$[T_2^2V_2^2 = T_0^2(V_2^2 - V_1^2)]_1. \qquad (8')$$

7.3 Theorem

We can state the following and fundamental theorem :
A doubling transformation needs three particles (internal, intermediate and external), embedded into seven stroboscopic times which determine a Threefold Frame of Reference. The internal particle is into the first and fast stroboscopic time. The intermediate particle is into the third and intermediate stroboscopic time. The external particle is into the seventh and slow stroboscopic time.
The initial and final condition must transform the first tangential spinback of the internal particle α_2 into 999 radial spinbacks of its horizon α_1. This horizon α_1 is a particle : it uses 666 spinbacks into its horizon α_0, which, at its turn, uses 333 spinbacks to becomes α_{-1} into the dilated horizon $\Omega_{-1} = 2\Omega_0$.

7.4 Demonstration

We must find now the value of $(k)_0\pi$, $(k)_1\pi$, and $(k)_2\pi$, which verifies the equations (8), (8') and (8") during the initial and final juxtapositions and the particles' exchanges.
The 999[th] spinback of the internal particle α_2 (figure 20) ends the third juxtaposition of the intermediate particle α_1 and the first juxtaposition of the external particle α_0.

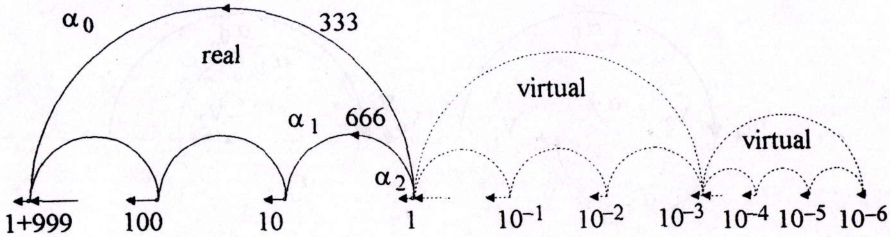


Figure 20 : the two virtual initial particles

So, the real first spinback of α_2 into α_1, must be the 1000[th] of 999 virtual spinbacks.
The third juxtaposition dilates α_1 into $2\alpha_1$. So, these 999 virtual spinbacks must come from intermediate spinbacks (2/3=666) and external spinbacks (1/3=333).
We saw that πR inside the particle corresponds to π^2R^2 outside.

The (333/1000) spinbacks of the two virtual particles, outside α_0, are such that :

$$(333/1000)^2 = (10^{-1}+10^{-2}+10^{-3})(1-10^{-3}) \qquad (9)$$

This condition is to exchange the radial virtual path and the real tangential path.
This initial condition verifies the final condition at the end of the spinback of α_0 :

$$1/1000 + 333/1000 + 666/1000 = 1 \qquad (10)$$

So, 999 real radial spinbacks (internal) come back at the first time and become 666 intermediate spinbacks and 333 external spinbacks just before the end of the spinback of α_0 (figure 21), during a common temporal hole.

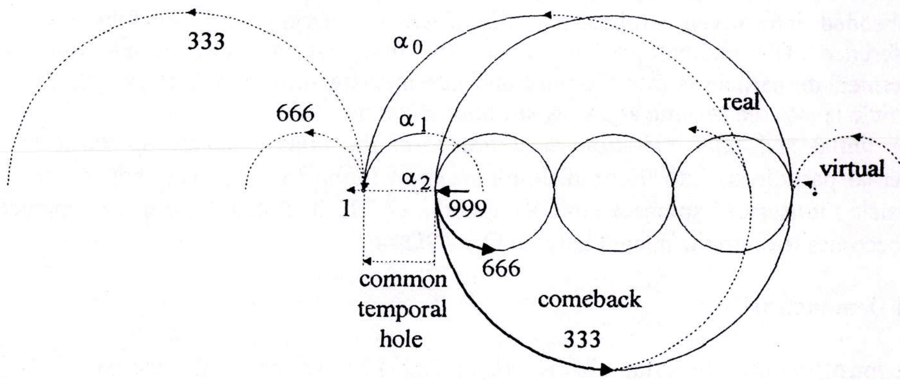


Figure 21 : the comeback during the common temporal hole.

7.5 Verification by Observations in Our Universe (January 1998)

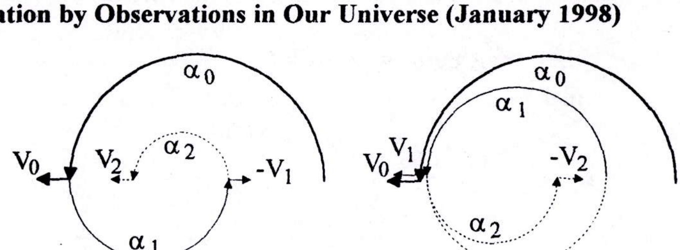


Figure 22 : the embedding.

Before the final juxtaposition of the three particles, the three radial velocities of the three embedded particles are not always in the same direction (figure 22).
We saw that the observable radial velocity V into the intermediate particle, is always the square U^2 of the tangential velocity U of the internal or external particle.

In other words, this observable radial velocity seems to be resulting from an external or internal energy, which is proportional to the square of a velocity.
We can say that the proportion of the initial or final spinbacks between the three embedded particles is also the proportion of the three energies, which are necessary to their doubling motions.
At the end of the doubling transformation, the final juxtaposition again gives the initial conditions with the same proportions :

1/1000 : internal particle,
666/1000 : intermediate particle,
333/1000 : external particle,

which are also the proportions of the three embedded energies.
We will call :
E_R, the energy of "rayonnance 333" (from radius in French) of the internal particle.
E_C, the energy of "coherence 666" of the intermediate particle, because the time of its spinback determines the length of radial axis.
E_R, the "unitary external energy" of the external particle during its spinback. At the end of its spinback, it becomes the new virtual energies of "rayonnance 333" and "coherence 666" of the next spinback, according to the equation (9) :

$$(333/1000)^2 = (10^{-1}+10^{-2}+10^{-3})(1-10^{-3})$$

So, just before the end of the first spinback of the external particle (before the common temporal hole), the energy of "coherence 666" is opposed to the energy of "rayonnance 333" on the radial axis (figure 22).
Recently, by two different observations of supernovae, two scientists (Saul Permutter in America and Brian Schmidt in Australia, January 1998) demonstrated that the expansion of the Universe is accelerated by an unknown energy of repulsion or anti gravitation, which is opposite to the energy of gravitation. This energy would be 70% of the Universe's energy. With the above theorem of the three doubling horizons, I can say that this energy is not 70/100 but 666/1000 of the energy initial E_i of our Universe.
This energy (which is the energy of coherence E_C) is observable at the end of the doubling. It seems to correspond to an acceleration of the dilation (or expansion) of the internal particle.
During the doubling, the energy of "coherence 666" is not observable because the energy of "rayonnance 333" seems to be the energy which gives a cohesion to the intermediate horizon. In the same way, 9/10 of the internal spinbacks (figure 15 and 20) are not observable into the intermediate horizon before the end of the doubling.
That could explain the missing masses (9/10) which would correspond to the virtual (or apparently missing) spinbacks.
This new energy (repulsion or anti gravitation) is not a new energy which would be the result of a negative mass, but the consequence of exchanges of energies by final

juxtaposition of the three embedded horizons : the energy of coherence becomes the energy of rayonnance of the external observer and reversibly in a non-perceivable time. An application of the fundamental motion to the solar system (Garnier-Malet J.P., 1997), allows us to understand that this energy (expansion) becomes perceivable : the six stroboscopic solar horizons are beginning their juxtaposition and the final dilation (expansion) of the Universe is now appearing.
The acceleration of the expansion of the Universe, which is limited by the time of this juxtaposition, proves that we are really at « the end of the times » (that is to say : the six stroboscopic times of doubling). So, the theorem of the three horizons, which is the « theorem of the coherence and of the rayonnance » of any doubling space, can explain many of the observations in the cosmos.

7.6 The Three Velocities of Juxtaposition (Garnier-Malet, 1998)

7.6.1 The speed of light

Into the solar system (which is anticipatory embedded systems) the Earth, (associated with Saturn : Garnier-Malet, 1998), is a particle of the third horizon. I could calculate the speed of light (radial velocity) into this intermediate horizon with the relation (7) :

$C_2 = 10^4.216\pi R_S/\tau = 299\ 792$ km./sec.

R_S is the radius of the Sun and 2τ is one year ($365{,}25\times24\times3600$ sec.).

7.6.2 The Time of the Solar Temporal Hole (24 835 years = 100 years of Pluto)

The time of (12×216) spinbacks of the Earth's particle corresponds to (1/2)×(217) spinbacks of its solar horizon (Garnier-Malet, 1998, 1999) :

$T_{(Earth)} = (12\times216) - (1/2)\times(216+1) = 2\ 483{,}5$ spinbacks of the Earth's particle.

With the acceleration (from 1 to 10), the time of the solar doubling is :
$10T_{(Earth)} = 25\ 920 - 1085 = 24\ 835$ years
That corresponds to 200 spinbacks of the horizon of Sun-Pluto.
The Pluto year (2 spinbacks) corresponds to 248,35 years.
The time of 25 920 years is the time of the rotation of the polar axis of the Earth during the time of 1 085 years which is the time of the rotation of its solar horizon.

7.6.3 The Radial Path of the Universe's Temporal Hole ($14{,}815^9$ light years)

The equation (6) allows us to calculate the time of the Universe's temporal hole which corresponds to the radial path of our light in the time of the solar doubling cycle (Garnier-Malet, 1999). In fact, this equation (6) :

$C_0 = 7C_1 = 7(49/12)10^5C_2$.

defines the flows of time into three successive embedded horizons or particles.

During 2/10 (dilation 2 and radial acceleration 10) of 25920 years (solar cycle of our light or radial path of the mini particle), the Universe light (tangential path of maxi horizon) used only 2×1085 years. So, we can say that the Universe's age is :

$(2/10)\times25920\times(7\times49/12)10^5 = 14{,}818\ 10^9$ light years

minus the final and the virtual initial anticipation (2×1085 years) :

$(2/10)\times(25920 - 2\times1085)\times(7\times49/12)10^5 = 13{,}583\ 10^9$ light years.

1085 light years is the common boundary between the first horizon and the last particle. $13{,}583\ 10^9$ light years correspond to 3 spinbacks of the Universe because the solar system is between $4{,}6.10^9$ and $4{,}5.10^9$ years old, so that :

$4{,}510\times3 = 13{,}583$.

8 Conclusion

The fundamental motion allows any particle to dispose of a new frame of reference (Threefold Frame of Reference or TFR). With it, an external particle can anticipate a future event into the horizon of an internal particle and introduce this future into the horizon of an intermediate particle. Because of this hyperincursion of its future into its past, this intermediate particle obtains an instantaneous past, according to its future. So, its present event is always a reflex time resulting from this hyperincursion.
The horizon of a physical observer could be juxtaposed with the virtual particles' horizons during a temporal hole. So, a physical observer could anticipate the future.
In the next years (may be 2017-2020, before the theorical date 2079), it will be the end of the solar cycle (Garnier-Malet J.P. 1998) : the solar explosion (1989, march the 13th) is the 4th of the seven explosions which are necessary to balance the six stroboscopic times of our six solar particle (Sun-Pluto, Mercury-Neptune, Venus-Uranus, Earth-Saturn, Asteroids' belt and Kuiper's Belt) in their own horizon.
These six embedded solar horizons are the consequences of the fundamental motion of doubling, which implies the above new theorem of three horizons or of three energies.
The acceleration of the expansion of the Universe, observed by Brian Shmidt and Saul Perlmutter (January 1998) and the resulting discovery of a new energy of repulsion (anti-gravitation) confirms this theorem.
At the end of the solar cycle, we will observe the final juxtaposition of the six embedded particles or horizons (solar, galactic and universal) which will correspond to the juxtaposition of the six embedded solar particles-horizons.
During the solar cycle of 24835 years, $13{,}583\ 10^9$ light years is the distance which is made by our light (with the light speed 299 792 km/sec).
This distance is observable by the solar observer but not by the virtual galactic or universal observer.

These two virtual observers – virtual universal observer o_0 (speed C_0), virtual galactic observer o_1 (speed C_1) and real human observer o_2 (speed C_2 = speed of light) – build our Threefold Frame of Reference (TFR), according to the initial hypothesis.
At the end of the doubling transformation of our anticipatory embedded solar system, the juxtaposition of the seven horizons will give us the observation of the Universe outside the universal temporal hole, inside the temporal window of the two virtual observers.
The seven stroboscopic times, which are necessary for the solar doubling transformation of 24835 years, will balance. Then, another solar doubling transformation will begin and the seven stroboscopes of time will start again for 24835 years, according to 12 periods of 2070 years...
Between these two cycles, it is difficult to forecast the future of our planet if we ignore the end of the six solar stroboscopic times and if we don't pay attention to the consequences of this end.

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