Modelling and Computing of Anticipatory Embedded System : Application to the Solar System (Speed of Light).

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Abstract. In this paper, I expose a new idea based on a fundamental movement of doubling in the three-dimensional space. The resulting theory and equation allow us to understand the constitution of any micro or macroscopic system (atomic, molecular, solar, galactic,...) that is always an anticipatory system. An application to the solar system justifies the theory and explains the whys and wherefores of the speed of light.

Keywords : fission, doubling, scaling, anticipation, junction.

1. How to Know the Consequences of an Experience Before Doing it ?

An anticipatory system has a model of itself and (or) of its environment. This model allows the system to anticipate a modification and then to adjust its present behaviour according the model predictions. I establish an embedding by transforming, in a discrete way, the model into an anticipatory system having a model that becomes in its turn an initial system. Thanks to a perception time and a space scaling, a first exchange between the initial system (envelope of the embedded systems) and the n^{th} model (kernel of this envelope) allows me to experiment the different anticipated solutions to resolve a present problem of the initial system. A second transformation between this kernel (envelope of a faster embedded system) and its own kernel allows me to improve the predictions. A second exchange allows this second kernel to envelope the initial system in an imperceptible time for the initial observer o_0 of this system. With the past of the first kernel, improved by the second, o_0 in a brief lapse of time (reflex time), has the best answer to modify the comportment of this system.

I obtain this information exchange between envelope and kernel by a discrete movement of fission and fusion of an initial system that allows me to have a model of this system. Yet, o_0 is a part of the initial system. Therefore, this movement must allows o_0 to have an observer o_1 of this system or to become o_1 without modifying o_0. For o_1, double of o_0, the observed model must be an initial system. That supposes a differentiation of the perception time between o_0 and o_1. So, o_1 can use the same movement to obtain a double o_2. In that way, we obtain a embedded system where o_n is the initial observer of its double o_{n+1}, $\forall n$ (n entire ≥ 0). In an Euclidean three-dimensional space, this movement allows o_{n+3}, $\forall n$, to make 10 transformations during the one of o_n. The multiplication by 10 of the transformation allows o_0 to discover several experiences of o_n, to improve them (by a double exchange) without experimenting them in the initial space where the transformation stays imperceptible.

This movement is fundamental because it allows a first exchange of the doubled systems between o_0 and o_n with n multiple of 3 (three-dimensional space) and a second one with n multiple of 6. Graded in six embedded three-dimensional intermediate spaces, this exchange is defined by an *equation of envelope-kernel exchange*. So, an initial fission transforms an initial space into an anticipatory embedded system in 6 spaces that merge periodically with 7^{th} one. This reconstitution or discrete fusion defines a perception time for the observer of the initial space. The perception time rate between the envelope and the kernel allows me to define an exchange rate envelope-kernel. It is also the rate that allows the doubling particle to be perceived by the observer of the space of this particle.

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An application in the solar system allows me to calculate this perception rate that is the speed of light of a doubling embedded anticipatory system. This exchange rate of the particles α_0 and α_{n+3} in the initial space Ω_0 is an exchange speed linked to a perception threshold of the observers o_0 et o_{n+3}. It is the exchange rate of spaces that are splitting (undulatory aspect) and of particles that are merging (corpusculating aspect). This rate is minima for the observer o_0 of the envelope and maxima for the observer o_{n+3} of the kernel.

2. Fundamental Movement of the Anticipatory Doubling

I define a discrete movement of *fission* and *fusion* of a initial space that allows me to have a model of this system. This movement must allow o_0 (initial observer of the initial system) to have an observer o_1 of the model or to become o_1 without modifying o_0.

At the centre O_0 of a three-dimensional space (x_0, y_0, z_0) *(fig. 2)*, the initial observer o_0 considers a particle α_0 (R_0, 0, 0) that makes a rotation φ_0 with a constant rate on the fixed circle Ω_0 (radius R_0, centre O_0) of a plane (P_0) so that $z_0=0$.

At the centre O_1 (middle of $O_0\alpha_0$) of space (x_1, y_1, z_1), the observer o_1 considers a particle α_1 ($R_1=R_0/2$, 0, 0) that makes a rotation $\varphi_1=2\varphi_0$ on the fixed circle $\Omega_1=\Omega_0/2$ (radius R_1, centre O_1) of a plane (P_1) so that $z_1=0$. Initially ($\varphi_1=2\varphi_0=0$), (P_0) and (P_1) are juxtaposed *(fig.2)*. They are indiscernible for o_0. During the rotation φ_0 of α_0 and φ_1 of α_1, (P_1) makes a rotation φ_0 around the diameter $O_0\alpha_0$ de Ω_1. This movement that turn back (P_1) in (P_0) for $\varphi_0=\pi$ will be called "spinback π" of α_0.

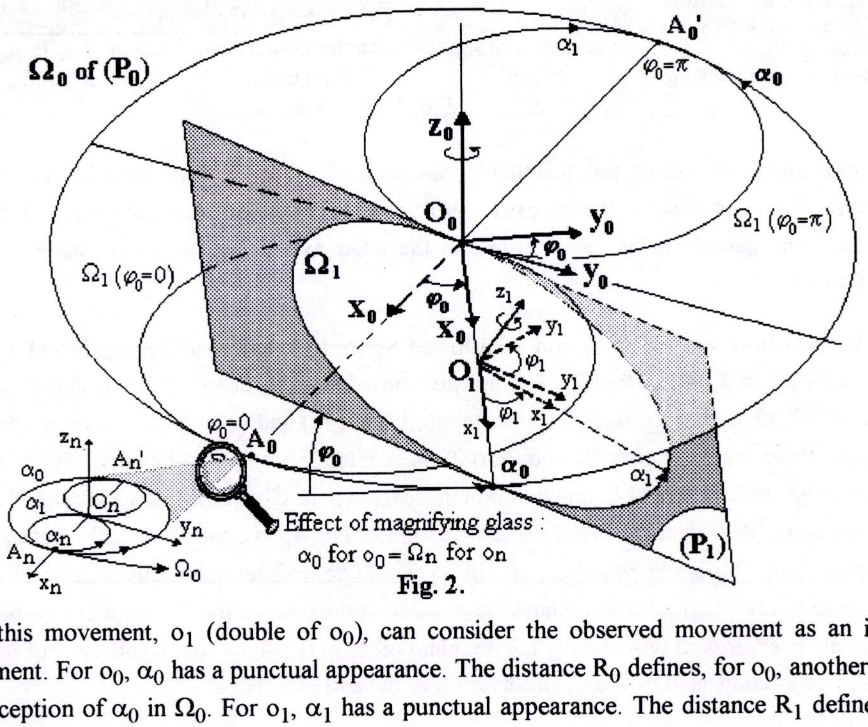


Fig. 2.

With this movement, o_1 (double of o_0), can consider the observed movement as an initial movement. For o_0, α_0 has a punctual appearance. The distance R_0 defines, for o_0, another limit of perception of α_0 in Ω_0. For o_1, α_1 has a punctual appearance. The distance R_1 define, for o_1, another limit of perception in Ω_1.

Initially, α_0, α_1,..., α_n merge into A_0. With a value of n big enough, Ω_n seems to be, for o_0, a punctual particle α_0. This value of de n defines the limit of perception for o_0. With a scaling of space (from R_0 to 2^nR_0) and scaling of time (from π to $\pi/2^n$), the same movements of spinback π (πR_0) take place in the particle α_n (effect of magnifying glass : *fig. 2*). In this way, o_n is the initial observer of α_n in $\Omega_n=2^n\alpha_n$ that is, for this observer, the initial space.
For o_0, when α_0 is on A_0, (P_0), (P_1), ..., (P_n) are juxtaposed *(fig. 3)* and the particle α_0 has its initial constitution in (P_0). The axis z_n, z_{n+1}, ..., z_{2n}, called polar axis of the particles α_0, α_1,..., α_n, have the same orientation (polar axis). Between A_0 and A_0', α_0 undergoes a fission and disintegrates into α_0, α_1,..., α_n. The particles α_0, α_1,..., α_n merge on A_0'. This fission is imperceptible for o_0 because α_0 is the smallest particle that this observer can perceive. The particles α_0, α_1,..., α_n merge on A_0'. This fusion doesn't remake the initial state because (P_1) turns back in (P_0), (P_2) turns back twice in (P_1) and once in (P_0) as (P_1). For o_0, α_0 still has a perceptible envelope identical to its initial envelope. However, by merging, α_1, α_2,..., α_n have reversed their polar axis and their movement compared to the polar axis of α_0.

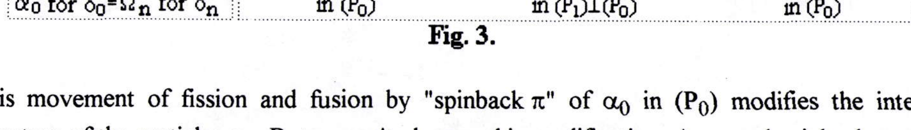


Fig. 3.

This movement of fission and fusion by "spinback π" of α_0 in (P_0) modifies the internal structure of the particles α_0. But o_0 can't observe this modification. A second spinback π of α_0 puts back the particle in its initial state and the polar axis of α_0, α_1,..., α_n have the same orientation.

2.1. Intermediate Fusion of α_1 and Dilation of Space by Change of Perception of o_1

With $\varphi_0=\varphi_1/2=\pi/2$, ($P_1$), ($P_2$) ..., ($P_n$) are juxtaposed. For o_0 et o_1, they are indiscernible in (P_1)⊥(P_0). With $\varphi_1=\pi$, α_1, α_2,..., α_n merge into O_0 in (P_1) and so in (P_0). For o_1, if the space Ω_1 dilate (homothety : centre O_0 and ratio 2), becoming $2\Omega_1$ *(fig. 3)*, the envelopes of α_0 and α_1 would be similar. A double rate in a double space would give back to α_1 the rate of α_0 that was its rate in (P_0) when the initial fusion took place. For o_1, α_1 will be on $2\Omega_1$ and α_0 at the centre of $2\Omega_1$. The envelopes of α_0 and of α_1 would be indiscernible. This dilation of Ω_1 for o_1, is noted $2\Omega_1=(\Omega_0)o_1$. If this dilation is possible at the time of the fusion of α_1, o_1 becomes the initial observer who was making the doubling of α_1 in (P_1) by a first spinback π of α_0. This supposition is confirmed by the o_1 observation of the particles paths.

2.2. Radial and Tangential Paths, Obligatory Points of Passage

For o_n and $\forall n$, the travelled distance of α_n (from $\varphi_n=0$ to $\varphi_n=2^n\pi$) is $2^n\pi R_0/2^n=\pi R_0$. This path of α_n is for o_n a path called tangential on Ω_n. The path $(\pi R_0)o_1$ of α_1, tangential for o_1 on Ω_1, goes through the centre O_0 for $\varphi_0=\pi/2$. So, this path is a radial path in Ω_0 having the same length as the tangential path $(\pi R_0)o_0$ of α_0 on Ω_0.

The 2^n rotations π of α_n on Ω_n correspond, for o_n, to 2^n tangential paths πR_n on Ω_n, thus to a tangential path πR_0 on Ω_n considered by o_n as $(\Omega_0)o_n$. This space $(\Omega_0)o_n$ needs a dilation 2^n of the space Ω_n. For o_0, this path of α_n is a radial path $(\pi R_0)o_n$ that is imperceptible in Ω_0, and equal to the tangential path of α_0 on Ω_0. Only the fission and the fusion of α_0 by spinback π allow o_0 to define, by the obligatory points of passage A_0 and A_0', the radial path of α_n. This path is never rectilinear. It is the place of the periodical fissions and fusions of the particle α_n that are made in a discrete way, imperceptible for o_0, on the axis A_0A_0'. The axis is rectilinear for o_0 but curvilinear for o_n who considers the path A_nA_n' as a rectilinear path, whereas o_{2n} considers them as a curvilinear path, and so on.

2.3. Dilation of the Space by Difference of Perception of the Same Phenomenon

By definition, o_0 only perceives the particle α_0 at the limit of its space Ω_0. At the initial time A ($\varphi_0=0$), o_0 only observes half of ω_0 (*fig. 4a)*.

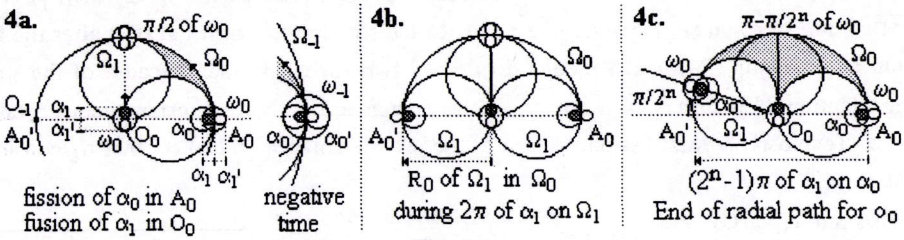


Fig. 4.

The other half of ω_0 that includes α_1' outside of Ω_0 is virtual for o_0. Only a radial path of ω_0 in Ω_0, equal to the radius $R_0/2^n$ of ω_0, can make α_1' observable by o_0. This radial path is obtained by a spinback π of α_1' in ω_0 or of α_1 in α_0 observable by o_1. It is made during the rotation $\varphi_0=\pi/2^n$ of ω_0 on Ω_0.

By supposing a negative time before the zero time, *(fig. 4a)*, o_0 can suppose the existence of a virtual spinback π of α_0' in α_0 into $2\omega_0=\omega_{-1}$ during $\varphi_{-1}=\pi/2^{n-1}$ of ω_{-1} on Ω_{-1}. So, it supposes the existence of an observer o_{-1} of a dilated space $\Omega_{-1}=(2\Omega_0)o_0$ with centre $O_{-1}=A_0'$. For o_0, this space dilation Ω_0 is a supposition that it makes at the moment of the initial fusion of α_0 that would be obtained by a virtual spinback π. This supposition is possible because a real spinback π of α_0 leaves the envelope of α_0 in its initial state for o_0 that doesn't perceive α_1. Therefore, by the movement definition, Ω_1 makes a radial path R_0 in Ω_0 during $\varphi_1=2\pi$ of α_1 on Ω_1 *(fig 4b). N.B. On the figures 4, Ω_1 is represented in* $(P_0)\perp(P_1)$ *for* $\varphi_0=\pi/2$. That implies for o_0 that Ω_0 must make the radial path $R_{-1}=2R_0$ in Ω_{-1} during $\varphi_{-1}=\varphi_0/2=\pi$ of α_0 on Ω_{-1}. This radial path of Ω_0 in Ω_{-1} corresponds to a dilation of Ω_0 into $2\Omega_0$ along the radial axis

A_0A_0' of Ω_0. Likewise, the spinback π of α_1 on Ω_1 allows Ω_1 a radial path R_0 into Ω_0. So it allows o_1 to dilate its space Ω_1 by an homothety (centre O_0 and ratio 2) along the radial axis of Ω_1 *(fig. 2)*. This space dilation corresponds to a perception change.

2.4. Doubling of α_1, Observable by o_1, Imperceptible to o_0

For o_1, the first fusion of α_1 in O_0 (by spinback π in (P_1) with $\varphi_0=\pi/2$) corresponds to an apparent dilation from Ω_1 to $2\Omega_1=(\Omega_0)o_1$. That dilation makes α_1 similar to α_0 in (P_1) on $(\Omega_0)o_1$. For o_1, α_0 is at the centre of $(\Omega_0)o_1$. With $(P_1)\perp(P_0)$, α_1 has, in Ω_0, the same radial rate as Ω_0 in Ω_{-1}.

So, o_1 can suppose that it is the initial observer o_1 of the initial particle α_1 that just doubled α_0 in the initial plane (P_1) after a first fission. But, for o_0, this first fusion of α_1 is as *imperceptible* as α_1 in Ω_0. So, this doubling of α_1 is observable only by o_1. It allows o_1 to suppose that α_1 makes a tangential path on $(\Omega_0)o_1$ in $(P_1)\perp(P_0)$ while α_0, that is at the centre of $(\Omega_0)o_1$, makes its first fusion at the centre of the initial $(\Omega_0)o_1$ by a radial path in $(\Omega_0)o_1$.

2.5. Virtual Instantaneous Fission

So, for o_1, $2\Omega_1=(\Omega_0)o_1$ is the initial space where the first fission of a punctual space $2\alpha_1=(\alpha_0)o_1$ is made. This fission in (P_1) corresponds to a rotation $\pi/2$ of α_1 in (P_1) twice faster than $\pi/2$ of α_0 in (P_0). So it corresponds to the rotation $\pi/4$ of α_0 in (P_0) after the first rotation $\pi/2$ of α_0 in (P_0) which time is divided by two for o_1. In fact, because of the space scaling (dilation 2^n with $n = 1$), o_1 supposes the existence of an virtual instantaneous rotation $\pi/2$ of α_1 (explosive virtual fission : *figure 5*), before the rotation $\pi/2$ of α_1 that o_1 considers as real.

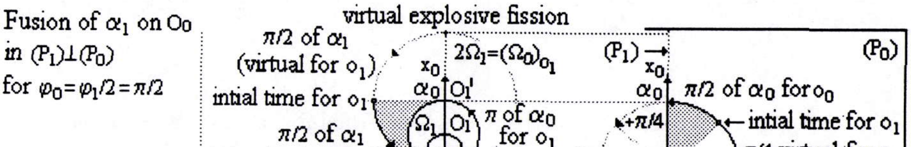
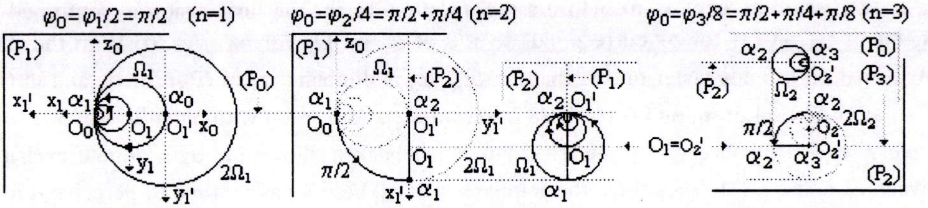


Fig. 5 .

That allows o_1 to suppose the existence of an virtual instantaneous spinback π of α_0 before the spinback π that it considers real in (P_1). So, it justifies its hypotheses by considering that the time of the rotation $\pi/4$ of α_0 in (P_0) is, in (P_1), the time of a spinback π of α_0 and of a rotation $\pi/2$ de α_1.

2.6. Multiplication of the Fissions and of the Doubling by Intermediate Fusion

The first fusion of α_1 out of α_0 *(fig. 6)* and the dilation of Ω_1 transform o_1 into an initial observer that, in its turn, makes a second fission of α_1 on $(\Omega_0)o_1$ in $(P_1)\perp(P_0)$, during $\varphi_1=\pi/2$ of α_1 on Ω_1 (that is $\varphi_0=\pi/4$ of α_0 on Ω_0).



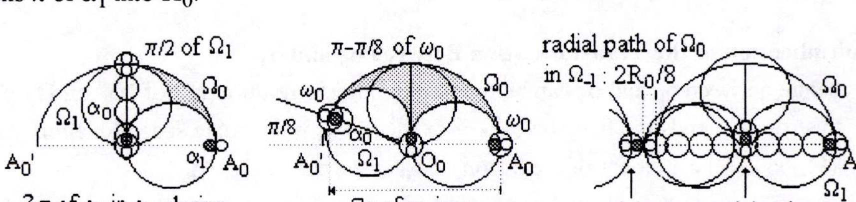
doubling of α_0 by fusion of α_1 on O_0 in $(P_1)\perp(P_0)$ — doubling of α_1 by fusion of α_2 on O_1' in $(P_2)\perp(P_1)$ — doubling of α_2 by fusion of α_3 on O_2' in $(P_3)=(P_0)\perp(P_2)$

Fig. 6.

It results a first fusion of α_2 out of α_1 in $(P_2)\perp(P_1)$ and a dilation of Ω_2 for o_2. So that observer becomes the initial observer in the initial space $(\Omega_0)o_2$ making a fission of α_2 on $(\Omega_1)o_2$ in $(P_2)\perp(P_1)$ during $\varphi_2=\pi/2$ of α_1 on Ω_2 (that is $\varphi_0=\pi/8$ of α_0 on Ω_0).
It also results a first fusion of α_3 out of α_2 in $(P_3)\perp(P_2)$ and a dilation of Ω_3 for o_3. So that observer becomes so the initial observer in the initial space $(\Omega_0)o_3$. By these 3 dilations (2^3), o_3 can consider that α_3 is doubling $\alpha_0=2^3\alpha_3$ in $(P_3)\perp(P_2)$ that is juxtaposing itself to (P_0).

2.7. Anticipatory spinback π

Therefore, a fusion by spinback π separates α_0 and α_3 on $(\Omega_3)o_0$ for o_0 and on $(\Omega_0)o_3$ for o_3. So *(fig. 4c, with* n=3, *and fig. 7)*, after the rotation $\pi/2+\pi/4+\pi/8=7\pi/8$ of α_0 on Ω_0, α_3 doubles α_0 in (P_3) for o_0 and in (P_0) for o_3. For o_0 and o_3, the spinback π of α_0 seems to be finished by that doubling. The 8th rotation $\pi/8$ corresponds to the possibility of a first exchange of o_0 and o_3 by spinback π of α_0 and α_3 on Ω_3 before the spinback π of α_0 on Ω_0. This rotation time allows o_0 to observe a spinback π on $\Omega_0=(\Omega_3)o_0$ before the spinback π on $\Omega_3=(\Omega_0)o_3$. For o_0, that spinback π is an anticipatory movement on Ω_0 *(fig. 7)*. For o_3, it is the continuation of the movement on Ω_3 before the end of the spinback π. A second exchange between o_0 and o_3 gives to o_0 an experience of a spinback π before doing it on Ω_0. In fact, o_0 can anticipate the movement of that spinback π, called anticipatory spinback. That anticipation corresponds to a 9^{th} spinback π of α_1 into fixed Ω_0 or to a radial path $R_0/8$ of Ω_0 during 8 spinbacks π of α_1 into Ω_0.



3π of α_1 in α_0 during the radial path of α_0 in Ω_1 — 7π of α_1 in α_0

Fig. 7.

The exchanges of the doubling observers and the anticipatory spinback allow o_0 to memorize the movement without any perception of it on Ω_0. The time of the anticipatory spinback must be the o_0 reflex time. The appearance of an initial explosive fission of α_0 and of α_3 in the initial plane is so reinforced by the 3 successive dilations. For o_3, the existence of a virtual rotation

$2^3\pi/2=4\pi$ (fission by explosion) before a real rotation 4π for the final fusion is confirmed. In fact, 8π of α_3 on Ω_3 for o_3 corresponds to $\pi/8$ of α_0 on Ω_0 for o_0 *(fig. 8)*. With the same transformation 8 times faster on Ω_3 than on Ω_0, α_6 is doubling α_3 in (P_6) for o_3 and in (P_3) for o_6, after $63\pi/64$ of α_0 on Ω_0 (or $7\pi/8$ of α_3 on Ω_3). And so on with n multiple of 3...

At every level n of observation, an anticipatory spinback π allows o_n, by a double exchange between o_n and o_{n+3}, to memorize the spinback π of α_n before having time to perceive it in its space Ω_n.

At every level, the anticipatory spinback π decreases as the reflex time of the observer. But the time of the initial spinback π of α_0 on Ω_0 increases between o_0 and o_n. This time so differentiated allows o_n to make multiple experiences. Therefore, this time imposes an unlimited number of exchanges, so an unlimited number of intermediate fusion in this embedded system. Because this system has, at each level, a possibility of memorization by anticipation, it is an anticipatory embedded system.

2.8. Number of Intermediate Spaces of the Anticipatory Embedded system

The fusion of α_1, ..., α_{n+1}, in O_0 into (P_1) *(fig.6)* inverses the polar axis of α_2, ..., α_{n+1} compared to the axis of α_1.

The fusion of α_3, ..., α_{n+2}, in $(O_2)o_2$ into (P_3) juxtaposed to (P_0), inverses the polar axis of α_4, ..., α_{n+2} compared to the polar axis of α_3 that already inverted compared to the polar axis of α_1.

The spinorial geometry allows me to define the different particles according to their polar axis at the moment of their fusion (spin).

The first fusion of α_n on $(\Omega_0)o_n$, with a polar axis having the same direction than the one of α_0, takes place in (P_0) with n=6 (even multiple of 3).

So there must be six fissions years six spaces or six changes of perception of o_0 between the envelope Ω_0 and the kernel Ω_6 of the embedded system that the exchange between the envelope and the kernel makes anticipatory.

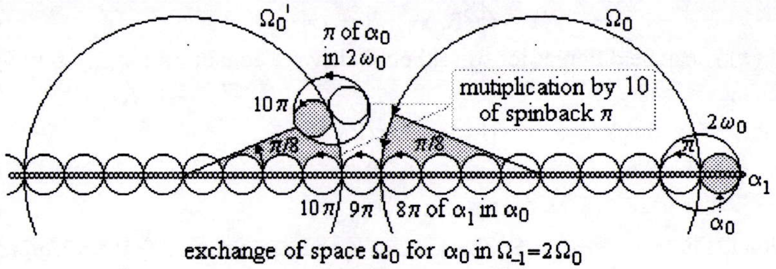
This exchange is possible only if the splitting particles can make a discrete fusion on the radial axis of the initial system. So, it is possible to exchange α_0 and α_3, and then merge α_0 et α_6 before the fusion by spinback π of α_0, α_1,..., α_n in (P_0).

2.9 Multiplication of the Transformation Between o_0 and o_3

The exchange between o_0 and o_3 can be realised during the rotation $\pi/8$ of $2\omega_0$ on Ω_0 *(fig. 7)*. For o_0, this rotation ends the first spinback π of α_0 on Ω_0 in a double space (dilation from Ω_0 to $2\Omega_0=(\Omega_{-1})o_0$ at the moment of the fusion of α_0 at the centre $O_{-1}=A_0'$).

For o_3, it corresponds *(fig. 8)* to the 9th spinback π of $\alpha_3=(\alpha_0)o_3$ on $\Omega_3=(\Omega_0)o_3$ during the radial path made by $(\Omega_0)o_3$ in $(\Omega_{-1})o_0$. So, for o_0, the exchange needs a radial path of α_0 in $2\omega_0=(\omega_{-1})o_0$.

With $2\omega_0=(\omega_{-1})o_0=(\alpha_0)o_3$, an exchange is possible between o_0 and o_3. It can be made 8 time faster between o_0 (became o_3) and o_6 after the rotation $\pi/8$ - $\pi/64$ of $2\omega_0$ on Ω_0 during the rotation $\pi/64$ of $2\omega_0$ on Ω_0 that corresponds to a 9th spinback π of α_0 in $2\omega_0$. It ends by a fusion of α_6 on $(\Omega_0)o_6$ (n=6, even) that allows o_6 to be o_{-1} outside of Ω_0, because α_3 (that became α_0) has not already finished its spinback π on $(\Omega_0)o_3$.



exchange of space Ω_0 for α_0 in $\Omega_{-1}=2\Omega_0$

Fig. 8 .

Therefore o_{-1} is o_0 for the second space Ω_0 on which α_0 makes a first fission. So, the initial particle α_0 owns the movements of the first space as an internal way by α_3 and as an external way by $\alpha_{-1}=2\omega_0$. So it owns a potential of movements. Each movement, realised by internal fission and fusion, is an information from the past. So $\alpha_0$owns a memory of the past because of a multiplication of its past fission in the space of its future fusion..

2.10. Acceleration of the Radial Path Between Ω_0 and Ω_6 for o_3

For o_0 (became o_3), the space Ω_0' of $\Omega_{-1}=(2\Omega_0)o_3$ is the virtual initial space of a future doubling while the space Ω_0 is the 6th dissociated space $\alpha_6=(\Omega_0)o_6$ of the past doubling. Because of the scaling (apparent dilation of the space) and the multiplication by 10 of the resulting spinbacks, the radial path must be, for o_3, 10 times faster in $(\Omega_6)o_3$ than in $(\Omega_0)o_3$. The exchange is possible between o_0 and o_3 if the radial rate for o_3 is 10 times faster in $(\Omega_6)o_3$ than in $(\Omega_0)o_3$. With that rate difference between the radial paths of the splitting particles α_0 et α_6, the condition of the junction of paths for the doubling particles at the moment of their fusion must be found. It is the condition of scaling of the space and time between two successive observers in an embedded system with six levels. So the resulting equation is the equation of exchange between the envelope and the kernel of this system that becomes anticipatory only by this exchange.

3. Equation of Envelope-Kernel Exchange

3.1. Scaling of Times and Distances of Spinback π

For o_0, the radial path $2\rho=(\pi R_0)o_0$ in Ω_0 in a spinback π time of α_0 on Ω_0 (with $(\pi)o_0=\pi$) corresponds *(cf. 2.2.)* to the tangential path $\pi\rho=(\pi^2R_0/2)o_0$.

For o_1, that dilate Ω_1 into $2\Omega_1=(\Omega_1)o_0$, the radial path $(\pi R_0)o_1$ in Ω_1 in the spinback π time of α_1 on Ω_1, corresponds to the tangential path $\pi(\pi R_0/4)o_1$ in the rotation $\pi/4$ time of α_0 on Ω_0. In the following equations, the number π will systematically involve a rotation π and the time of the spinback π. For o_n, this time is noted $(\pi)o_n$. When dilating Ω_1, o_1 must use a scaling of times of spinback π because the spinback $(\pi)o_1$ is different from the time of spinback $(\pi)o_0$. Therefore, in order not to modify the observation of o_0, this scaling must be so that

$((\pi)o_1)o_0=(\pi)o_0$. It allows o_1 to suppose that a tangential double path $2\pi\rho=(\pi^2R_0)o_0$ of α_0 is equal to the tangential path $\pi(\pi R_0/4)o_1$ of α_1 :

$$(\pi^2R_0)o_0=\pi(\pi R_1/4)o_1 \qquad (1)$$

$(\pi)o_0$ and $(\pi)o_1$ can be different for o_1,(although they are equal to π for o_0) if, to verify (1), o_1 use the scalings e_r and e_t :

- of distances of spinback π : $(R_0)o_0=e_d\pi(R_0/4)o_1$ (1')
- of times of spinback π : $(\pi^2)o_0=e_t(\pi)o_1$ (1")
- so that : $e_t=1/e_d=2\sqrt{\pi}$. (2)

The relation (2) involves $e_te_d=1$. So the scalings e_t and e_d don't modify the relation (1).

With e_d, the radial path $(R_0)o_0$ corresponds to the tangential path $\pi(R_0/4)o_1$.

With $e_t=2\sqrt{\pi}$, I obtain : $(\pi^2)o_0=(4\pi)o_1$ if $(\pi)o_1=(2\sqrt{\pi})o_0$ (2')

that allows o_1 to consider itself as the initial observer,

while verifying the hypotheses : $((\pi)o_1)o_0=(\pi)o_0=\pi$. (2")

(2) involves for (1') : $(R_0)o_0=2\sqrt{\pi}(R_0)o_1$, (3)

and for (1") : $(\pi\sqrt{\pi})o_0=(2\pi)o_1$. (3')

3.2. Unitary Radius Common to all Observers

(3) and (3') are verified if : $(R_0)o_0=(\pi\sqrt{\pi})o_0$ $(R_0)o_1=(\sqrt{\pi})o_1$. (4)

In fact, (3) and (4), also give (2') : $(\pi)o_0=(2\sqrt{\pi})o_1$

and according to (3') and (4), I have : $(R_0)o_0=(2R^2{}_0)o_1$. (4')

Therefore *(cf. 2.6.)*, $(2R_1)o_1=(4R_0)o_1$ must correspond to $((8R_3)o_3)o_1=((R_0)o_3)o_1$, the space $(\Omega_0)o_3$ being the dilated space $(8\Omega_3)o_3$.

This exchange takes place if $((R_0)o_3)o_1=((R_3)o_0)o_1=(4R_0)o_1$.

The relation (4') is verified if : $(R_0)o_0=((R_3{}^2/8)o_0)o_1$. (5)

3.3. Equation of Exchange Between the Envelope $(\Omega_0)o_3$ and the Kernel $(\Omega_3)o_0$

In order that o_0 and o_3 can exchange themselves at the moment of the juxtaposition of (P_0) and (P_3), we need to have: $(R_3)o_0=(R_0)o_3$.

That involves according to (5) : $(R_0)o_0=((R_0{}^2/8)o_3)o_1$. (5')

The time $(\pi)o_1$ of spinback π of α_1 on Ω_0 corresponds for o_0 at the moment of an exchange possibility *(fig. 4c et 7)*.

That involves, according to (1") : $(\pi^2)o_0=e_t(\pi)o_1$,

If at this moment, I have : $(R_{-1})o_0=e_d(2\pi)o_0=(\sqrt{\pi})o_0$ (6)

that involves according to (2) : $(\pi R_{-1}/2)o_0=e_te_d(\pi)o_1=(\pi)o_1$. (6')

In other words :

the tangential path $(\pi R_{-1}/2)o_0$of a still virtual space $(\Omega_{-1})o_0$ becomes a possibility for o_0 that, with the scalings e_t et e_d, can dilate its space $(\Omega_0)o_0$ into $(2\Omega_0)o_0=(\Omega_{-1})o_0$. The word virtual is to be taken in the potential direction, that is not already observable by o_0.

The observer o_0 can become o_3 if $(R_{-1})o_0$ becomes $((R_0^2/8)o_3)o_1$ at the same moment. Therefore, at the moment of the exchange, o_1 and o_3 must observe the same space $(\Omega_0)o_1=(\Omega_0)o_3$.

That involves according to (5') : $(R_0)o_0=((R_0^2/8)o_3)o_1=e_d(R_0^2/8)o_1$, (6")

(6') is a time relation $(\pi R_{-1}/2)o_0=(\pi)o_1$,

and (6") a distance relation : $(R_0)o_0=(R_0^2/8)o_1$,

that give the condition on the paths : $(\pi R_{-1}R_0/2)o_0=(R_0^2/8)o_1$.

3.4. Fundamental Equation of a Anticipatory Embedded System

So, I obtain :

the exchange equation : $(4\pi R_{-1}R_0)o_0=(\pi R_0^2)o_1$ (7)

with a unitary radius : $(R_{-1})o_0=\sqrt{\pi}$ (8)

So the space $(\Omega_{-1})o_0$ with the radial path $(\pi R_{-1})o_0 = \pi\sqrt{\pi}$ is the reference space where the envelope $(\Omega_0)o_0$ and the kernel $(\Omega_0)o_3$ of the anticipatory embedded system are juxtaposed. The triple perception scalings of time e_t and space e_d allow o_0 and o_3 an exchange.

4.Rate of Perception of the Exchange Between the Envelope and the Kernel

In order that the exchange between o_0 and o_3 can take place, the radial path of α_3 in the space $2\Omega_0=(\Omega_{-1})o_0$ must be made during the time $(8\pi)o_0$ of 8 spinbacks π of $(\alpha_0)o_3$ in the space $(2\Omega_0)o_0=(\Omega_{-1})o_0=(16\Omega_0)o_3$.

Exchanging with o_0, o_3 becomes the observer o_{-1} of the dilated space Ω_{-1}.

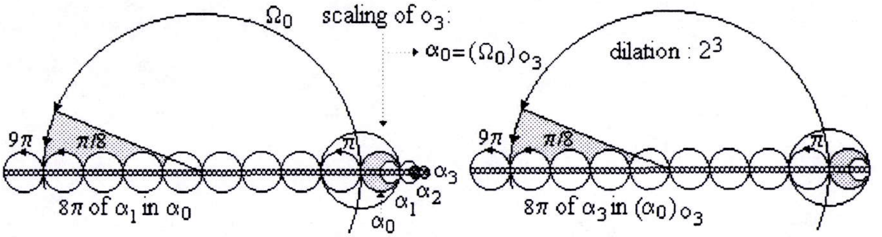


Fig. 9.

During a spinback $(\pi)o_{-1}$, o_{-1} observes a multiple of 9 spinbacks $(\pi)o_0$ of α_3 *(cf. 2.8.)* in each of the 6 intermediate spaces of juxtaposition :

$$(\pi)o_{-1}=(6\times 9k\pi)o_0=54k(\pi)o_0 \quad \text{with k entire>0.}$$

Each of these six intermediate spaces gives a multiplication *(cf. 2.9.)* of the radial path from 1 to 10π (that is $k=10^6$) that involves a radial path :

$$(\pi)o_{-1}=54.10^6(\pi)o_0. \quad (9)$$

In fact, this relation between o_{-1} and o_0 corresponds to three times scalings e_t between o_0 and o_3. The relation (1') allows me to apply three times the scaling of distances e_d *(cf. 3.1.)* to the radial distance $(8R_3)o_3$:

$$(8R_3)o_0=(e_d\pi/4)^3(8R_3)o_3=(e_t/8)^3(8R_3)o_3=(\pi\sqrt{\pi})(R_3/64)o_3. \quad (10)$$

So, for o_3 (that became o_{-1}), the rate of the exchange of particles, constant of the transformation, is the ratio between $(\pi R_3)o_{-1}=(\pi)o_{-1}(8R_3)o_0$ and the time $(8\pi)o_0$ of α_3 that is also the time of a rotation $(\pi/8)o_3$ of α_0, that is, according to (9) et (10) :

$$C_0=(\pi)o_{-1}(R_3/\pi)o_0=(54.10^6\pi)o_0(\pi\sqrt{\pi})(R_3)o_3/(\pi/64)o_0=54.10^6\pi^2\sqrt{\pi}(R_3)o_3/(\pi)o_3.$$

The rate of the exchange of the particles α_0 (envelope) and α_3 (kernel) is so :

$$C_0=[54.10^6(\pi^2\sqrt{\pi}R_3)o_3 \text{ in the spinback } (\pi)o_3 \text{ time of } \Omega_3]$$

5. The Speed of Light

The application to the solar system shows that the human observer is o_3 *(cf. 6)*.

It also shows that the spinback $(\pi)o_3$ of α_3 in $8\Omega_3=\Omega_0$ corresponds to a half year of 365,25 days of rotation in the solar space Ω_0 of the observer o_0.

The radial path $(8R_3)o_3$ corresponds to 2 spinbacks π of the Earth for o_{-1}.

In other words, we have : $(8R_3)o_3=\pi(r_t)o_{-1}$

with $(2r_t)o_{-1}=$ diameter of the Earth that is perceptibly o_{-1} and o_3 =12752 km.

and : $(2\pi)o_3=365{,}25\times24\times3600$ seconds,

I deduce that : $C_0 = 54.10^6\pi^2\sqrt{\pi}(R_3/\pi)o_3 =$ 299 792 km/s.

This rate is the perception of the exchange threshold for the human observer o_3 that perceives the solar kernel (Sun). This rate of the exchange that is maximum for o_3 is the minimum rate for o_0. The solar envelope that o_0 perceive, is unobservable by o_3.

So it is essential to understand the solar anticipatory embedded system.

6 Application to the Solar Anticipatory Embedded system

Considering the Sun and the planets as a particles α of their space Ω, we must associate the 6 following spaces : Sun-Pluto (0), Mercury-Neptune (1), Venus-Uranus (2), Earth-Saturn (3), Mars-Jupiter (4) and the Asteroids with the Comets (5).

Man is an intermediate observer o_3 of the Earth's space Ω_3 which radius R_3 is common to the observers of the six intermediate double spaces participating in the transformation by spinback π. By demonstrating it in the solar system, I verify the expressed results in the theoretical part.

6.1. Constitution of the Solar Anticipatory Embedded System

The initial fission of a particle α_0 is made on the initial solar space Ω_0. A spinback π of α_0 tangential on Ω_0 allows α_3 a fusion by anticipatory spinback in α_0. The particle α_3 undergoes a scaling : $\alpha_3=(\Omega_0)o_3=(8\alpha_0)o_0$.

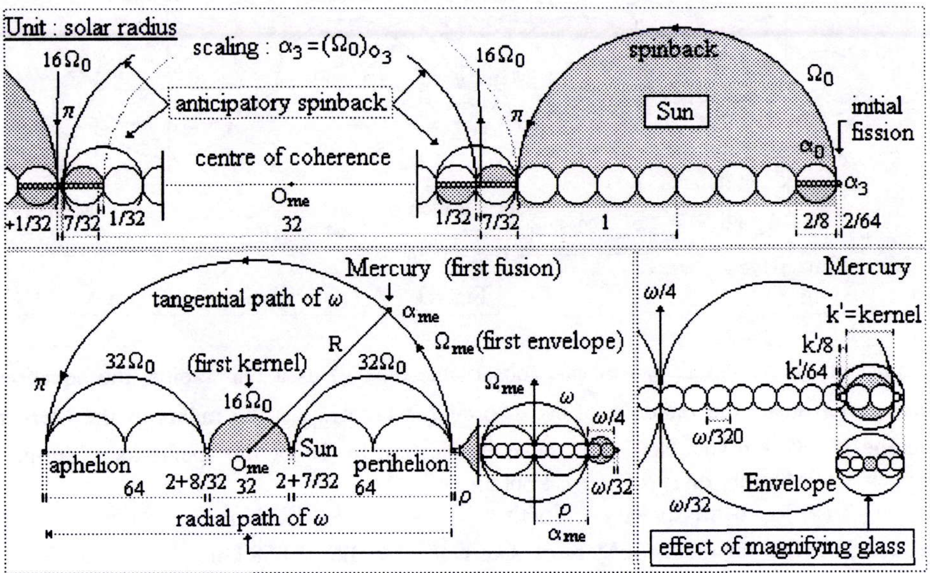


Fig. 10.

A spinback π of Ω_0 around $16\Omega_0$ involves another fusion in a intermediate space $(16\Omega_0)o_1=(32\Omega_0)o_0$, dilated par o_1. So the tangential path of $\omega=2\alpha_{me}$ is situated on Ω_{me}, first "solar envelope" of Mercury, around the first "solar kernel" with centre O_{me}, called centre of Mercury's coherence.

The Sun radius R_0 is taken as the unit in the figures. During the spinback π of ω_{me} on Ω_{me}, this first envelope, with radius $R=(82+1/8-1/64)R_0$, makes a radial path $R_0/32$ corresponding to an anticipatory spinback π of $\omega/32$. This spinback along the radial path of Ω_{me} explains the variation of the eccentricity of the keplerian ellipse between the perihelion (minima) and the aphelion (maxima).

Ω_{me} is the place of the first fusion of a particle α_1 perceptible by o_1 double of o_0. The radial path of the Mercury's kernel $2\omega/320$ in ω during the tangential path of ω on Ω_{me} is the Mercury's path that undulates in $\omega/32$.

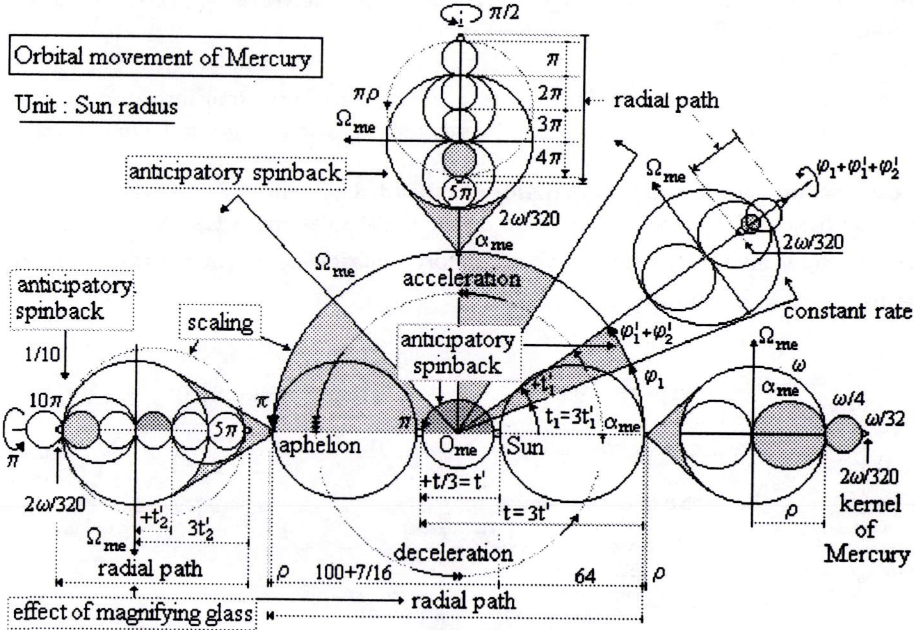


Fig. 11.

By considering the radius $\rho/4$ of $\omega/4$ (observable by o_{-1}) as a unit radius, the equation of exchange (7) gives the radius ρ of ω : $10\rho=r^2_{me}$ where r_{me} is the radius of the Mercury's envelope (2 439 km.) In fact, with the multiplication by 10 of the spinbacks π during the spinback π of Mercury on ω *(cf. 2.9.)*, I obtain :

$(\pi\rho)o_1=(4\pi r_{me}\rho/4)o_0$ with : ρ=594 872 km.

I deduce from that the radius of Mercury's kernel : $\rho/320$=1 858 km.

The spinback π of $32\Omega_0$ around the kernel $16\Omega_0$ takes place with a constant angular rate φ_1 during a time t_1. It involves a anticipatory spinback π of $16\Omega_0$ *(fig.11)*. So a supplementary rotation φ_1' of ω on the envelope Ω_{me} is made during the time $t_1'=t_1/3$.

Likewise, the anticipatory spinbacks π of $\omega/4$, $\omega/32$, $2\omega/320$ in ω involve a supplementary radial path of Mercury in ω. So it results a rotation φ_2' of ω on Ω_{me} in the same time t_1' that speeds up the movement again. The spinback π of ω on Ω_{me} inverses the movement of ω in the plane of the envelope (orbital plane). That involves a symmetric speeding down compared to the solar radial axis (aphelion-perihelion of Mercury).

The anticipation of the time t' of the spinback π of ω compared to the time t=3t' of the spinback π of $32\Omega_0$ involves a movement of spinback π of Mercury in ω (Mercury day=58,646days) equal to 2/3 of the movement of spinback π of ω around the Sun (Mercury year=87,969 days). This anticipation corresponds to a multiplication by 10 of the transformation : during the spinback π of ω, π of $\omega/320$ on $\omega/8$ corresponds to 10π of $\omega/8$ in ω .

6.2. Centres of coherence, Distribution of Masses, Double Spaces

The first centre of planetary coherence in the solar system is the centre of Mercury. It is the centre O_{me} of the space 16α that is dilated by o_0 from the solar space $(2\alpha)o_0=(\alpha)o_{-1}$, after the spinback π of the space $\alpha/8$ corresponding to 8 spinbacks π of the space $\alpha/64$ *(cf. theory and fig. 12&12a)*. The centres of coherence are the points of obligatory passage for the particles. The movements described above for Mercury continue by spinbacks π until the 6th space of the Asteroids. This last space is the place of scalings (space and time). It results from these scalings many junctions. Each junction depends on the centres of planetary coherence *(fig. 12)*.

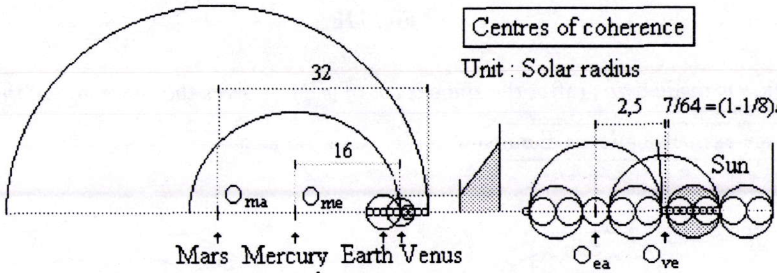


Fig. 12.

The constitution of our solar system is the result of the spinbacks π of six solar spaces.
A space dilation is made by the observer of each space. The dilation from 16α (solar space) to 32α is made by o_1. It gives the first solar envelope of the Mercury space ω_{me}.

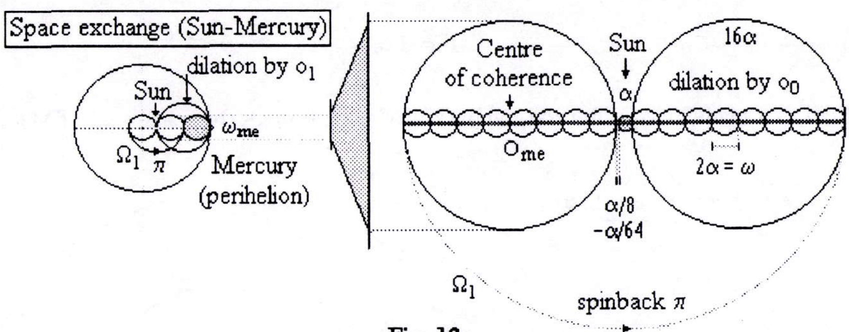


Fig. 12a.

The distances and times of doubling are the reason and not the result of the masses distribution. Without modifying the Newton law, the fundamental movement restores the reason : The masses distribution depends on the presence of an initial movement. The distribution of particles in a solar system that involves the distribution of masses, depends on the space opening around the radial path of the embedded systems. An infinitesimal change of the particle path modifies all the solar system but this modification is making during the spinbacks π that are necessary to the doubling. The anticipatory spinbacks π open and close the radial path for the different splitting particles when the spaces are juxtaposing. So, the gravitation is not a instantaneous phenomenon. It depends on the openings and closings of the radial paths that depend on scalings of the time and space.

Therefore, with the fundamental movement of spinback π, the gravitation is not only a function of the space of doubling (Newton's laws and instantaneous gravitation) but also a function of the time of doubling (Einstein's laws and relativity of gravitation).

A 2^{nd} dilation is made by o_2 (after the spinback π of ω_{me}) It gives the space ω_{ve} of Venus.

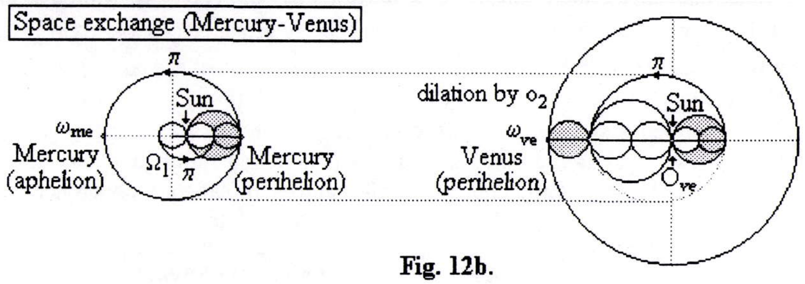


Fig. 12b.

A 3^{rd} dilation is made by o_3 (after the spinback π of ω_{ve}). It gives the space ω_{ea} of the Earth.

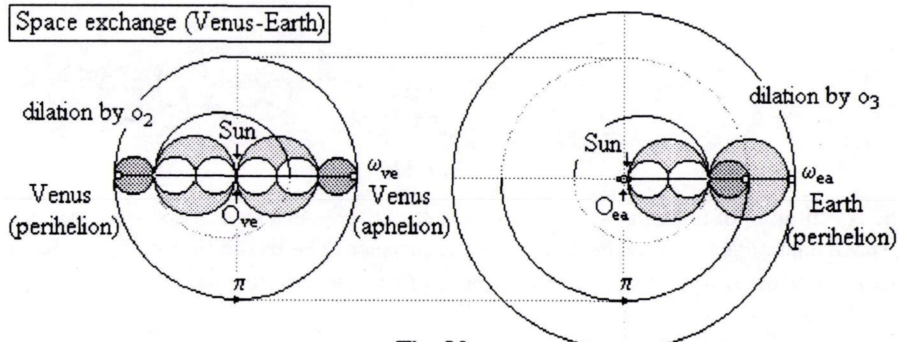


Fig. 12c.

A 4^{th} dilation is made by o_4 (after the spinback π of ω_{ve}). It gives the space ω_{ma} of Mars.

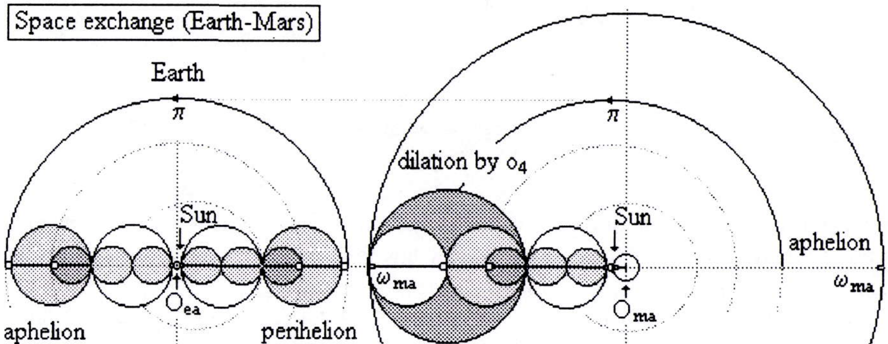


Fig. 12d.

By continuing the spinbacks π movements, I obtain in the same way the centre of Neptune's coherence O_e that forms with Mercury the first of the six intermediate spaces needed by the transformation *(fig. 13)*.

Because of the scaling, the centre O_{me} of Mercury coherence is observable by the human observer o_3, but no by o_{-1}, observer outside the solar system. The space α_{me}, observable by o_3, becomes for o_{-1} the corpuscle α_{me} on the envelope Ω_{me}.

With a punctual appearance, Ω_{me} become the first kernel of the space Ω_{ne}, that is the place of the Neptune's space α_{ne}.

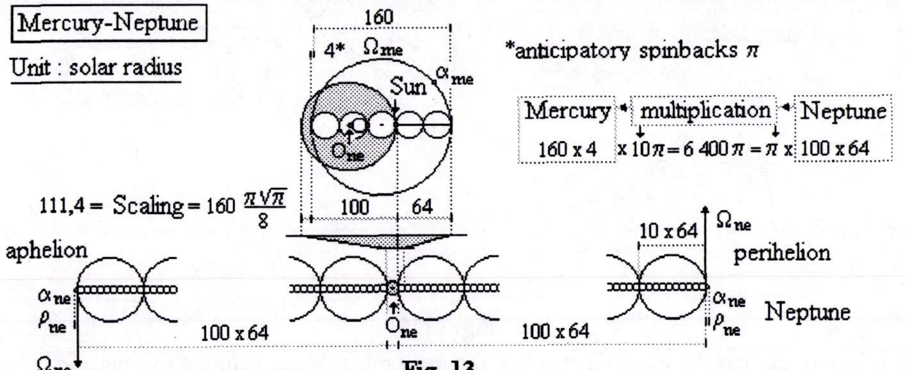


Fig. 13.

The multiplication by 10 of the spinbacks π between Mercury and Neptune, is verified and that involves a radial movement acceleration at the moment of the spinbacks π of the associated different spaces.
After the respective associations Sun-Pluto and Mercury-Neptune, I can verify the associations of Venus-Uranus (backward movement), Earth-Saturn *(Fig 14)*, Mars-Jupiter, Asteroids' belt-Kuiper's belt.

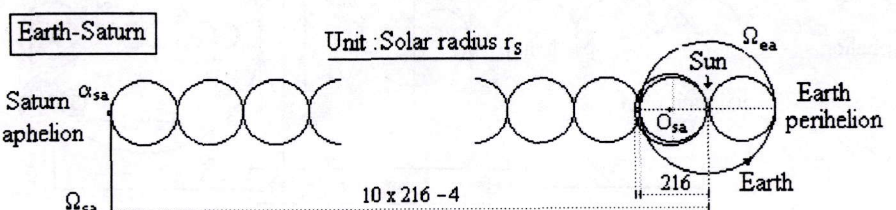


Fig. 14.

The planetary movements associated in that way don't contradict the laws of the classical mechanics, they complete them by explaining the anomalies of the keplerian movement.

6.3. The link with the Kepler's and Newton's laws

The fundamental movement is perfectly identical to the almost elliptic movement of the planets that is defined by the first Kepler's law *(The planetary orbits are ellipses. The center S of the Sun is a focus)*. A next paper will allow me to show that it can be considered as the nearest movement as the one observed. But it is already important to understand that the fundamental movement (in the space and in the time) gives us not only the movement laws but also the cause of the laws. To define a more rigorous movement in the time, Kepler takes into account an average anomaly. With the definition of the fundamental movement, this anomaly become useless. The anticipatory spinbacks in the different spaces Ω, ω, ω/64, ω/64, 2ω/640 *(fig. 11)*, give us immediately the acceleration (or deceleration) of the movement.
In the same way, I can say that the second Kepler's law *(The surface swept by the distance from the center* S *of the Sun to the center* P *of the planets is proportional to the time needed to describe it)* is not the cause of the movement but the effect that is resulting from the anticipatory spinbacks *(fig. 11.2.)*.

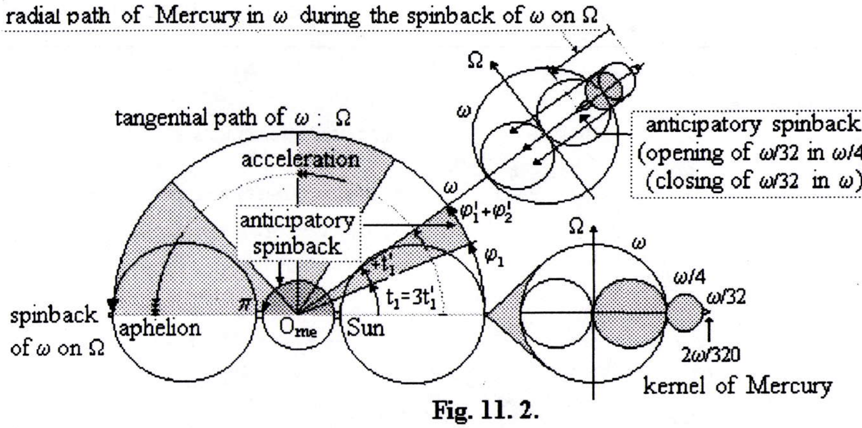


Fig. 11. 2.

We must notice that the movement is not the movement of the planet on Ω but the movement (radial path) of the planet kernel ω/320 in the space ω making its spinback on Ω (tangential path).

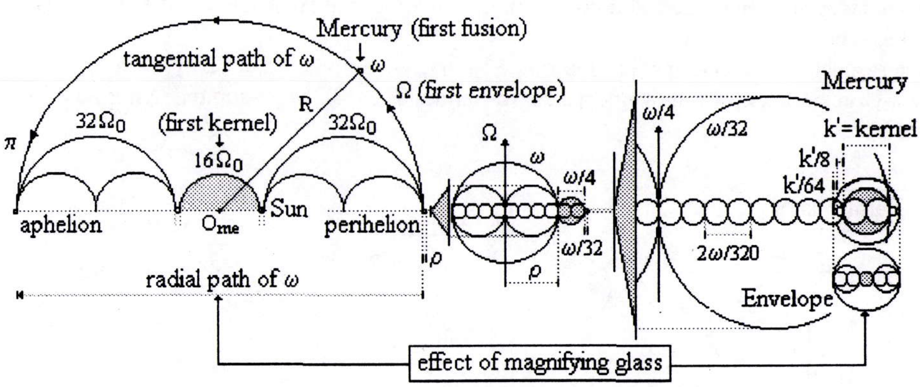


Fig. 11.3.

With the scaling of time and space (effect of magnifying glass), the same transformation is made inside the planet that is the envelop of its kernel *(fig. 11. 3.)*.

Now, with the fundamental movement, we can explain and understand the cause of the third Kepler's law *(The cube of the half big axis of the orbit is proportional to the square of the planet's revolution time.)*. This law that don't have any actual explanation, is a collorary of the fundamental equation of the anticipatory embedded system *(cf. 3.4)* :

$$(4\pi R_{-1}R_0)o_0=(\pi R_0^2)o_1 \qquad (3.4.n°7)$$

with a unitary radius : $$(R_{-1})o_0=\sqrt{\pi} \qquad (3.4.n°8)$$

First of all, we can notice that this third Kepler's law is approximate if we use the half big axis. It becomes rigorous with the radius ρ of ω and R of Ω of the fundamental movement. It is good to say again that the transformation time is given by the distance 2R of a radial path or also by the time π of a spinback corresponding to the tangential path πR. So, the above equation 8 gives the value $\sqrt{\pi}$ of a distance or a value $(R_{-1})o_0$ of a time. The equations 7&8 allow me to say that the time $4\pi\sqrt{\pi}$ of a radial path $(R_0)o_0$ observed by o_0 is the square π of a

time $\sqrt{\pi}$ of the tangential path $(R_0^2)_{o_1}$ observed by o_1. That is to say that the cube $\pi\sqrt{\pi}$ of a distance $\sqrt{\pi}$ is proportional to the square (R_0^2) of a time (R_0) of one spinback. But two spinbacks is one planet revolution. So, we obtain the third Kepler's law with the rigorous proportionality coefficient 4.
If it is important to verify (as I did with the ephemerides of Astronomie Multimedia 1993-1995 RedShift 2.0) the concordance of the fundamental movement with the Kepler's law that define perfectly the planets orbits, the most important is the new and fundamental notion of openings and closings of the spaces, corresponding to the anticipatory spinbacks of the different spaces embedded in the same transformation of doubling.
The Newton's gravitational law doesn't allow us to understand the propagation of the gravitation. But the periodical openings and closings of the spaces allow me to explain and understand this propagation and the different possibilities of tangential or radial paths of the planets. With a scaling of space and time, we could talk about the probability of presence of planets as the probability of presence of electrons in the atom *(fig 11-4)*.

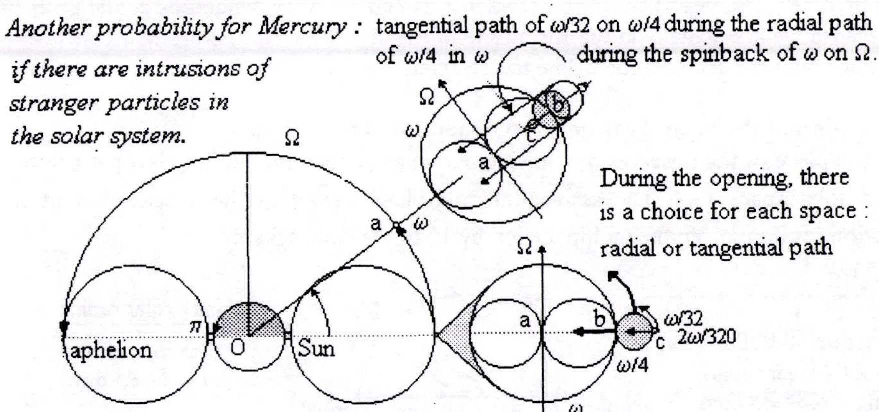


Fig. 11.4.

With an acceleration of the movements (that would change seculars in hours and would correspond to an exchange of observer), the spaces of planets would be clouds of planetary presence. So, it would be impossible to have in the same time the speed and the position of a planet, but only the speed of the envelop (cloud) and the position of the planet (kernel) in the cloud, or the position of the envelop and the speed of the planet in the cloud.
This well-known Principe of Heisenberg in quantical mechanics is contained in the above fundamental equation 8 that exchange time and space of two successive observers.
In order to follow the orbits of each planet, the possibilities of junctions and the junctions probability in the time of the openings, we can use the vector analysis that gives us the rotation movements of 0a, ab, bc, ... in their respective plane for each planet, during the movement of the sun in its solar envelop : This envelop is a physical surface where the scaling of time and space takes place. The different spinbacks of the different spaces define the different times of openings and closings and different accelerations (or decelerations) for each of six double solar spaces. This analysis allows me to define the year (two spinbacks of ω) and the day (two spinback of 2ω/320) of the planet. It will lead us to the Laplace-Runge-Lenz vector.
That will be also the subject of the next paper. This next publication (1998) will show us how a planet can modify its orbit if a comet or a meteorite comes in its spaces in the time of the closing. After the intrusion of a stranger particle (that could be the outcome of the exchange between two spaces in doubling) in the embedded solar system, the next opening of the planet

space embedded in the same transformation, changes the planet orbit without discontinuity *(an example : fig 11.4)*.
In the Earth's space, the moon adds its own openings and so protects the Earth from the most important meteorite crashes. We can say that the moon is the Earth's shield.
By applying the gravitational force in the plane of the planet orbit, we forget the gravitational forces of the spaces (or envelops) whose planet is the kernel. The effects (implosive and explosive) of this double force (fusion and fission) are only observable at the time of the periodical openings and closings.
In short, we can see now the fundamental importance of the solar cycles and above all, the necessity of the calculation of the date of the end of the transformation of the six double solar spaces. This end, that is divided in six times (6×30 years), is the end of the solar cycle of doubling. It opens the spaces and gives all the openings that are necessary to choice the best junctions for each planet, satellite, meteorite or comet. All the six double spaces balance themselves in six times. We will see that the time of this cycle (25 000 years) is divided in six double times (6×2×2160 years). We will notice that its end is a very dangerous actual problem *(n° 6.8)* because we are actually in the forth time of the six times. But before that conclusion, we must understand the acceleration of the transformation in our solar system.

6.4. Acceleration of the Solar Transformation and the Radial Path

If we take the place of the observer o_{-1} outside our solar system, the Sun Ω_0 is a particle α_{-1}, kernel of a solar space Ω_{-1}. The association Sun-Pluto shows us the acceleration of the transformation resulting from the multiplication by 10 of the spinbacks π.

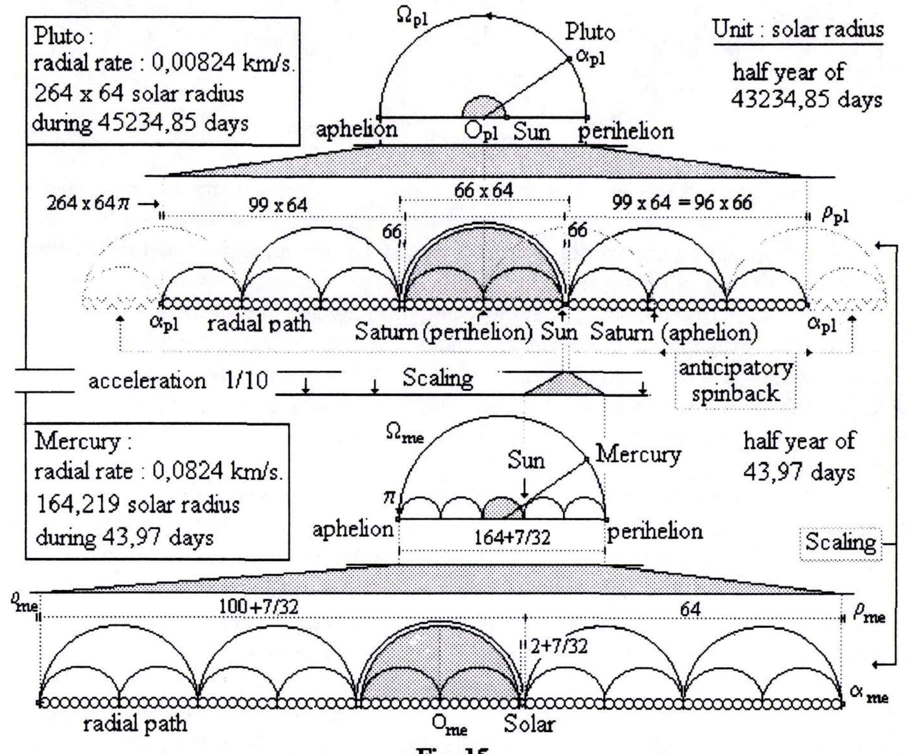


Fig. 15.

During the opening of the radial space, the particles can be speeded up or down by that multiplication by 10. The anticipatory spinbacks serve as space openings and closings that are juxtaposed. The brutal accelerations of the solar wind are a consequence of that phenomenon.

6.5. Privileged Position of the Earth

With a scaling ($\rho_s = r_s^2/10$) and an acceleration of the movement from 1 to 10π *(cf. theory)*, the external observer o_{-1} regains ω_s on the solar envelope Ω_s *(fig. 16)* at the place of ω_{me} on the Mercury envelope Ω_{me} *(fig. 10)*.

The space $\omega_s/320$ with radius $217{,}5r_s$ is the solar kernel for o_{-1}. That space is also the place Ω_{te} of the space of coherence ω_{te} of the Earth, associated to the Saturn's space ω_{sa}. The radial path of Saturn is multiplied by 10 compared to the Earth's one *(fig. 14)*.

The first scaling takes place in the space $64w_s$ that is the Oort's cloud with a radius $32r_s$=1 550 131 10^6 km. The second scaling takes place in the space $w_s/8$ that is the Kuiper's belt *(Fig 14)*. The first one must take place in the space $w_s/64$ where the same movement in the space $2w_s/640$ is regained with an acceleration from 1 to 10 spinbacks π. This last space, with a radius $217{,}5r_s$=151,38 10^6 km, is the place of the solar space a_s with a radius r_s. Therefore that space must be the intermediate space Ω_3 of the human observer o_3. I verify that the radius of $2\omega_s/640$ *(fig. 14)* is equal to $217{,}5r_s$ as the Earth's aphelion *(fig. 13)*.

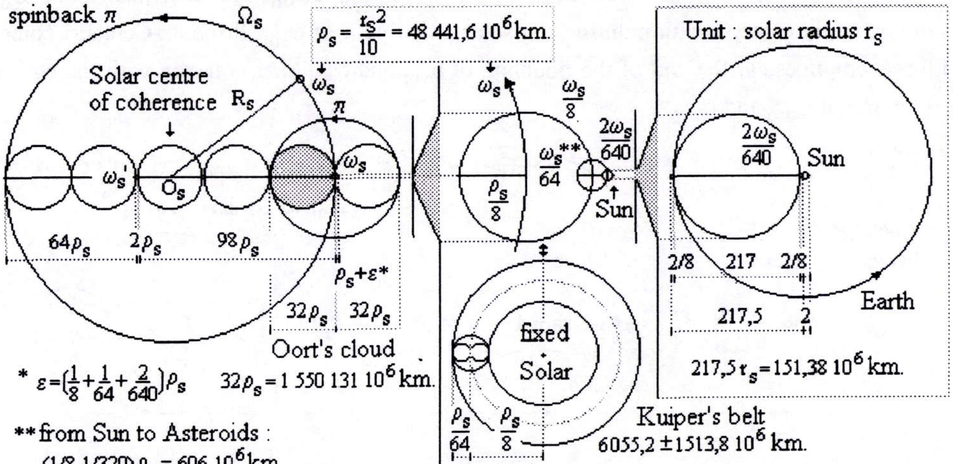


Fig. 16.

With a space of coherence ω_{te} (radius ρ_{te}=4,07 10^6 km.) making a tangential path on Ω_{te} the maximum radial path (aphelion) almost reaches that distance. As the radius ρ_s of ω_s, the radius ρ_{te} of ω_{te} is obtained from the equation of exchange (7) : $\rho_{te} = r_{te}^2/10$ where r_{te} is the radius of the Earth (6 378 km).

The spinback π of the Moon around the Earth adds again a link of $r_s/4$ that involves an aphelion of $217{,}5r_s$.

So 8 spinbacks π of the Earth (4 years) correspond to the time needed by a particle exchange between close spaces. In fact, the Earth is the particle α_3 of Ω_3 that makes the first anticipatory spinback π in the solar embedded system Ω_0. It exchanges itself with the particle α_{-1} of Ω_{-1} *(cf. theory)*. So it is imperative that an anticipatory embedded system should be in the neighbourhood of the solar system at a radial distance. This distance is necessary so that a particle, with a rate of exchange C_0=299 792 km/s, can reach it in 4 years.

6.6. Exchange of Particles Between Doubling Anticipatory Embedded Systems

The radial path d_{ra} of 4 years is made in the solar space. That space must make itself the $1/16^{th}$ of that radial path in the same time and the same direction. So, it allows particles to reach a fixed and external space Ω_x, that is at a radial distance $(1-1/16)d_x$ (or $(1-1/16-1/128)d_x$ if the anticipatory spinback of $\omega_x/64$ takes place before the one of $\omega_x/4$).

So, 4,267 years or 4,303 years are needed to make the reverse path at the same rate :

4,267(1−1/16) years=4 years or 4,267(1−1/16−1/128) years=4,303 years.

It is the time that separate the initial fission of two neighbouring stars and their final fusion. The radial particles must reconstitute themselves with the tangential particles after a path time of 4,267 years. The star that is the nearest to our Sun is Proxima-Centauri at 4,267 light years. It is only an apparent distance resulting from the scaling of our solar space from $(\Omega_0)o_3$ to $8(\Omega_0)o_3$ made by the human observer o_3

By applying the fundamental movements to the solar anticipatory embedded system, I regain that distance *(fig. 17)*. The Oort's cloud is $\alpha_{cl}=\alpha_{sol}/5$ in $\Omega_{sol}=5\alpha_{sol}$. The tangential space α_{sol}' is a momentarily empty location during the solar radial path of α_{sol}. Proxima-Centauri comes to fill this emptiness at the end of the doubling of α_{sol} and α_{sol}' that coincide with the end of the doubling of α_{pro} and α_{pro}'.

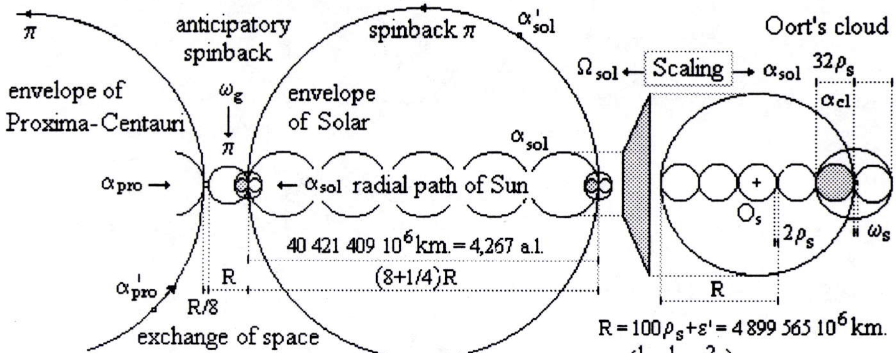


Fig. 17.

The spaces exchange the particles making the same movements at the same rate. So that rate is the constant of the radial doubling. The negative radial rate of Proxima-Centauri is a proof of connection. At the end of the doubling, the radial path opens. The particles can to exchange. The solar system and the system of Proxima-Centauri exchange energy.

The space Ω_0 (Sun-Pluto) is the first one to collect it. The second space Ω_1 (Mercury-Neptune) collects it during a second time. That time is already past because Neptune gives out more energy than it collects (2,7). The particles that are exchanging have all the information about their own space. But only the particles that, by doubling, reach their radial and tangential rate of exchange (C_0), can exchange themselves.

6.7. Tangential Rate of Doubling (Tifft rate) - Exchange of Tangential and Radial

With an acceleration from 1 to 10π between the radial and the tangential at each scaling, the spinback π of ω_s on Ω_s corresponds to the radial path $10\rho_s$ of the Sun for the observer outside the solar system. That path must be increased with the radial path $10\times10(164+2)r_s$ of the solar space of coherence ω_s and decreased with the radial path $10\times10\times10r_s$ of the space of Earth's coherence Ω_{te}, that is 15 $600r_s$ made in the same time.

So it corresponds to the radial path of $10(\rho_s+1560r_s)$. This path corresponds to the $64r_s$ of ω_s needed by the transformation, that is :

990 592,24 10^6 km. during $2\times217{,}5$ spinback π of 1/2 year each.

It involves a rate of 144,322 km/s *(cf. Tifft rate)*.

During $10\times217{,}5$ spinback π in ω_s, ω_s makes 98 spinbacks π on Ω_s when Ω_{sol} makes a radial path of 64 spinbacks π of ω_s *(fig. 16)*. That time allows α_s the fission and the fusion. So, by anticipatory spinbacks π, α_s adds a radial path of 2/8 spinback π of ω_s. So the particle α_s of the solar system must be made in the same time :

2175-98 + 2/8 = 2077,25 radial paths with the tangential rate of 144,322 km/s.

that is : 144,322 x 2077,25 = 299 792,87 km/s.

6.8. Solar Cycle Separating the Initial Fission initial from Final Fusion

A solar doubling needs 2×100spinbacks π of the space of Sun-Pluto that is the first of the six double solar spaces. Two spinback of Pluto correspond to a Pluto year of 248,325 years.

So there must be 24832,5 years for a doubling cycle. I can verify that result by many ways. For example : There must be 12 x 216 = 2 5920 spinbacks π of the Earth's space Ω_{te} to obtain the final fusion. During the same time, the solar space makes a radial path of :

5 x 217,5 = 1 087,5 spinbacks π of Ω_{te}.

So, the doubling cycle is 25 920–1 087,5=24 832,5 years,

that is 100 years of 248,325 days of Pluto.

The opening of the space must be made from the Sun-Pluto space (0) and must end with the space of Asteroids-Comets (5). The six successive openings of the six double solar spaces involve the date of that final fusion that are spaced out (1 087,5)/6=181,25 years into six periods of 30 years. A conjunction of Mercury and Neptune at the beginning of the century has opened the first space and has given to Neptune a new energy superior to the one that this planet receives from the Sun. Another conjunction around the year 2 063 will open the last space by ending a cycle of almost 25 000 years. A new cycle will be beginning when Pluto will be ending its 100^{th} and last spinback π. According to the anticipatory spinbacks of the solar embedded system, that spinback started in 1972 (an anticipatory spinback of 124/8+124/64=17 years before one Pluto spinback of 124 years : aphelion in 1989) will open the radial space in 2079 (an anticipatory spinbacks π of 34 years before two Pluto spinback : perihelion).

The end of solar cycle of 24 832 years will take place during this period. The radial path of the Earth (4^{th} solar space Ω_3), opened to the neighbouring spaces (Ω_0, Ω_1, Ω_3) in 1989, will be opened to the outside 30 years later et 60 years before the end, that is in 2019.

The differentiation of times and spaces between solar neighbouring systems being unknown before the definitive opening, the above dates are only threshold dates. The three last cycles of 30 years *(cf. 6.8.)* can be shortened.

The energy captured by Neptune proves a deficit of our solar system during the exchange of particles. That deficit is compensated by an acceleration of the transformation (scaling of time). That acceleration of the spinback π would bring close the date of the solar cycle end.. A complementary dilation of space (scaling of space) leaves the path unchanged.

N.B. In 1988, I calculated and forecast the solar explosion of the 13th mars 1989, corresponding to that big opening (results deposed in January 1989).

The final anticipatory spinback π of the Mercury's space ω_{me} on Ω_{me} involves a gap of Mercury's *aphelion that is directly proportional to the time of the solar doubling.*

In fact, the transformation needs $\pi/64$ radial rotation of the space of Mercury's coherence while the space of solar coherence makes $(1/100)(\pi/32)$ and that during 8 times 100 spinbacks π of Earth's space (400 years).

So it involves every 100 years a rotation of : $(\pi/4)(1/64+1/3200)$

that corresponds to 43,03' of tangential rotation of the space of Mercury that we can observe by the aphelion gap. In that way, we rejoin the Einstein's relativity theory that gives this gap as a necessary condition.

7. Conclusion

So the application to the solar system allows me to verify the theory without contradicting Kepler, Newton and Einstein laws. But it is not the most important application. With this theory, new notions come to solve many actual problems, to explain several paradoxes, to make a link between the astronomic mechanics and the quantic mechanics. So, the new idea of the exchange of spaces based on the fission and fusion of the spaces and particles allows me to calculate the speed of light and to understand the whys and wherefores of this universal constant. According to the definition of the radial and tangential paths in a anticipatory embedded system, the fundamental movement of spinback makes this speed of the light independent of the observer. This movement, based on the simultaneous fission of spaces and particles, explains the undulatory and corpuscular aspect of the light. Only this simultaneity can generate a force of fission (or fusion) of particles and a force of fusion (or fission) of spaces. It explains also the link and the exchange between this two forces : a kernel force and a envelope force. The envelope (or kernel) force becomes at its turn a kernel (or envelope) force of another anticipatory embedded system. All the forces (weak and strong forces, electromagnetic and gravitation forces) are resulting from the exchange between the kernel and the envelope of an anticipatory embedded system. The scalings of time and space, the anticipatory spinbacks (and the resultant openings and closings of the spaces along a radial path) allow us to understand the propagation of the phenomenon of gravitation and the resulting distribution of masse. The balance of masses can depend on an external reason (meeting with external movements) or on an internal reason (abundance or inadequacy of particles). But above all, it depends on cyclical openings and closings of the doubling spaces that are embedded in the same transformation. The final juxtaposition that involves the fusion of the six doubling spaces, opens all the spaces. Because of the acceleration of the transformation of the doubling inside an embedded system and because of the exchange of the observers resulting from the anticipatory spinbacks, this final opening gives at each particle the information of the six embedded spaces. This end allows the solar particles to exchange with the external particles that own another information. This memorisation of space in an imperceptible time allows the

particles to choose the best junction. The limit of the time of perception is given by the speed of the light perceived by the observer.
I think the best conclusion is that the theory allows me to calculate the speed of the light and the date of the final juxtaposition of the six solar spaces that make an anticipatory embedded system. The end of our six solar times can bring many perturbations (physical, solar and planetary, magnetic and electric, climatic and genetic,...) and many changes of paths (possibilities of crashes of meteorites or comets into the Earth like the crash of a comet into Jupiter in 1996 or into the dinosaur's Earth, millions years ago).
It is evident that the years 2015-2019 (next opening of space after the 1989's) will be interesting in every sphere or despairing if we don't pay attention to the end of the six solar times.

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