4. Discussion on time

4.1 Introduction

This chapter is a reflection on time, on the notion of time as much from a physical as from a philosophical point of view.

4.2 A privileged time exists

Time is certainly the most difficult physical scale to apprehend, I dare say the most mysterious.
If we consider that only the present moment has a physical reality, then perhaps time is nothing more than a very convenient notion invented by man just as money is a practical way to do trade.
Contrary to the relative notion of time that was brought to us by Albert Einstein's Special Relativity, my theory asserts the existence of a Preferred Frame of Reference thus also of a privileged time. I assert, as Einstein does, that every moving system possesses clocks that beat at different rates, but contrary to Einstein, I do not infer that it is time itself that runs differently along different moving systems, but that it is the clocks themselves, made up of atoms of matter which are disturbed, 'distorted' because of their speed with regard to the Preferred Frame of Reference, or because they are plunged into a gravitational field.

4.3 Periodic physical phenomena, measuring apparatus

Since the dawn of time, man has wanted to domesticate and master time by measuring it. At the very beginning he was helped by natural phenomena :

– The rotation of the earth around its axis creates a perpetual sequence of day and night. This is most evidently the very first periodic phenomenon that man has had conscience of and is still important nowadays ;
– the rotation of the moon around the earth and it's relative position with regards to the earth and the sun : this gives rise to the sequencing and increasing and decreasing moon crescents, from full moon, to night without a moon with a synodal period (in relation to the sun, phases of the moon) of 29.53 earth days, a period close to a month ;
– the rotation of the earth around the sun, which, when we move away from the equator gives rise to very distinct seasons (for example four seasons in France) which are repeated every year (about 365.257 days).

The above physical phenomena have the inconvenience of not being very precise and are of relatively long time lapses.
Men who search to continually improve their human condition and their mastery of physical phenomena have invented increasingly precise apparatus with increasingly small time frames.
All the above natural phenomena and the time measuring apparatus invented by men have the following characteristics in common :

– They are periodical physical phenomena (that I call ppp), either natural or artificial ;
– They are material, that is to say made up of atoms.

These two characteristics are essential in understanding the way in which men think about time.

The first characteristic indicates that men do not have access to a direct measure of time. They are simply able to measure lengths of time by counting the number of cycles illustrated by

physical phenomena or by periodic mechanisms. Therefore men only know how to count a number of cycles between two events, in order to determine the length of time which has passed between them (it is possible to have access to part of a cycle by interpolation or extrapolation).

Moreover, the second characteristic underlines the fact that these physical phenomena and periodic mechanisms are ALL material, that is to say, made up of atoms, which means that they are not "infallible" including atomic clocks !

They are not " infallible " because they are made of atoms and these atoms can themselves undergo physical effects, due to their movement with regard to the Preferred Frame of Reference, or to a gravitation field which modifies their behaviour.

Thus, when we compare the measurements of two atomic clocks when one has stayed on earth and the other has travelled by plane, by rocket or by satellite, they will provide two different sets of measured cycles. This difference in the number of measured cycles can be interpreted in two ways :

– Either we can consider the two clocks to be 'infallible' and, in this case, it is Time itself which has been passing more slowly for one of the two clocks;
– Or we may consider that the two clocks are not 'infallible' because they are made up of atoms, which can be disturbed by their movement or by gravity and therefore behave differently according to their speed in relation to the Preferred Frame of Reference or by the gravitational potential energy in which they are plunged. In the latter case, we may consider Time to be Absolute and that the difference in the number of cycles measured is due to the fact that the two clocks have had their rhythm modified by their movement or by gravity.

The latter interpretation is the one selected in the theory I am putting forward.
Albert Einstein changed the way we view time by using clocks in many thought experiments. I venture to say that he did not go far enough in his reflections. There was an extra step, which was to take into consideration the fact that all physical clocks are material and therefore made up of atoms, which can undergo the effects of speed in relation to the Preferred Frame Of Reference and gravity.

4.4 Present time is the only physical reality in the whole universe

Special relativity gives us a vision of time whereby it passes more slowly for a clock in movement, in relation to a given referential. Therefore, for all referentials in movement when compared to each other, time passes differently, making the existence of absolute time impossible.
In the same way, general relativity states, that time passes more slowly for a clock which is in a strong gravitational field and that it passes more quickly for a clock which is in a weak gravitational field, or when there is an absence of gravitational field.

In the theory I am putting forward, these two effects are real. They are the physical effects on clocks (atomic clocks for example) made up of matter, that is to say atoms.
Moreover, a Preferred Frame of Reference exists in relation to which we can measure the actual speed of moving matter.

In the case of a clock moving at speed V_i in relation to the Preferred Frame of Reference, we have :

- the period of the clock is given by the formula $T(V_i) = T_i = T_{rest}.\gamma_i$ with $\gamma_i = \left(1 - \frac{V_i^2}{c^2}\right)^{-1/2}$ where T_{rest} representing the period of the same clock at rest with regard to the Preferred Frame of Reference ;

- the number of pulses or beats or cycles counted from a certain arbitrary t_0 is given by the formula $N_i = N_{rest} / \gamma_i$ where N_{rest} is the number of beats that we could count if the clock was at rest with regard to the Preferred Frame of Reference ;
- whatever the speed V_i is, we obtain $\boxed{N_i.T_i = N_{rest}.T_{rest} = N_{absolute}.T_{absolute} = TIME_{absolute}}$.
  Whatever the speed of the clock is, the number of periods counted, multiplied by the value of the period, is always constant and equal to ABSOLUTE TIME**.**

In the case of a clock placed in a the gravitational field of a body of mass M at the distance r_i in relation to the centre of the body, we have :

- the period of the clock is given by the formula $T(r_i) = T_i = \dfrac{T_\infty}{\sqrt{g_{00}}}$ with $g_{00} \approx 1 - \dfrac{2.G.M}{c^2.r_i}$ where T_∞ representing the period of the same clock situated at an infinite distance from the body of mass M ;
- the number of pulses or beats or cycles counted from a certain arbitrary t_0 is given by the formula $N_i = N_\infty \sqrt{g_{00}}$ where N_∞ is the number of pulses that would be counted if the clock was situated at an infinite distance from the body of mass M ;
- whatever the distance r_i is, we obtain $\boxed{N_i.T_i = N_\infty.T_\infty = N_{absolute}.T_{absolute} = TIME_{absolute}}$.
  Whatever the strength of the gravitational field in which the clock is situated, the number of beats counted, times the value of the beat is always constant and equal to ABSOLUTE TIME.

Whatever their speed, and no matter how strong the gravitational field in which they are to be found, all the clocks of the universe prove :

$$\boxed{N_i.T_i = N_{ABSOLUTE}.T_{ABSOLUTE} = ABSOLUTE\_TIME}$$

The following graphs illustrate preceding comments.

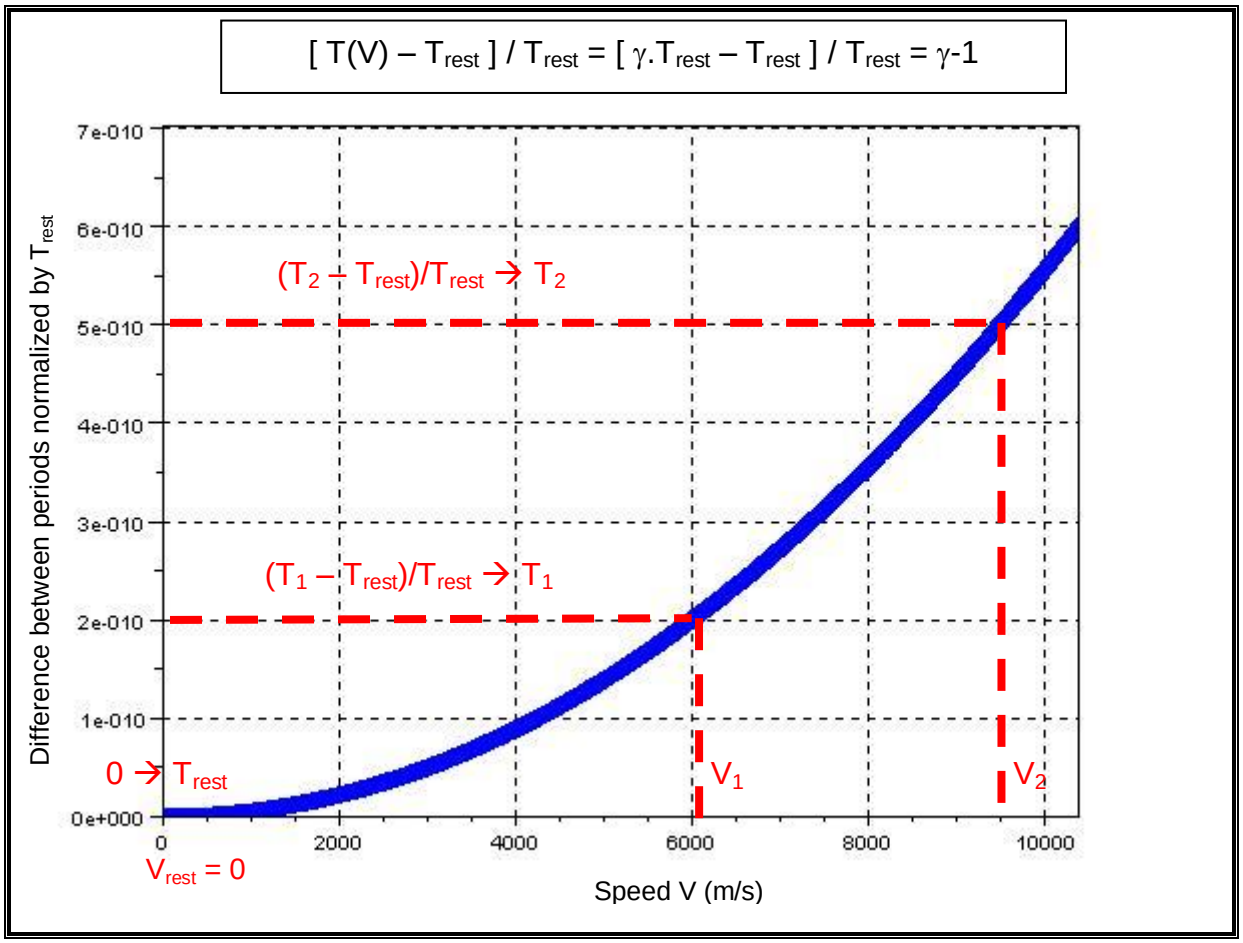

Figure 1 : Difference between the period T(V) of a clock moving at the speed V with regard to the Preferred Frame of Reference and the period T_{rest} of a clock at rest with regard to the Preferred Frame of Reference normalized by T_{rest}

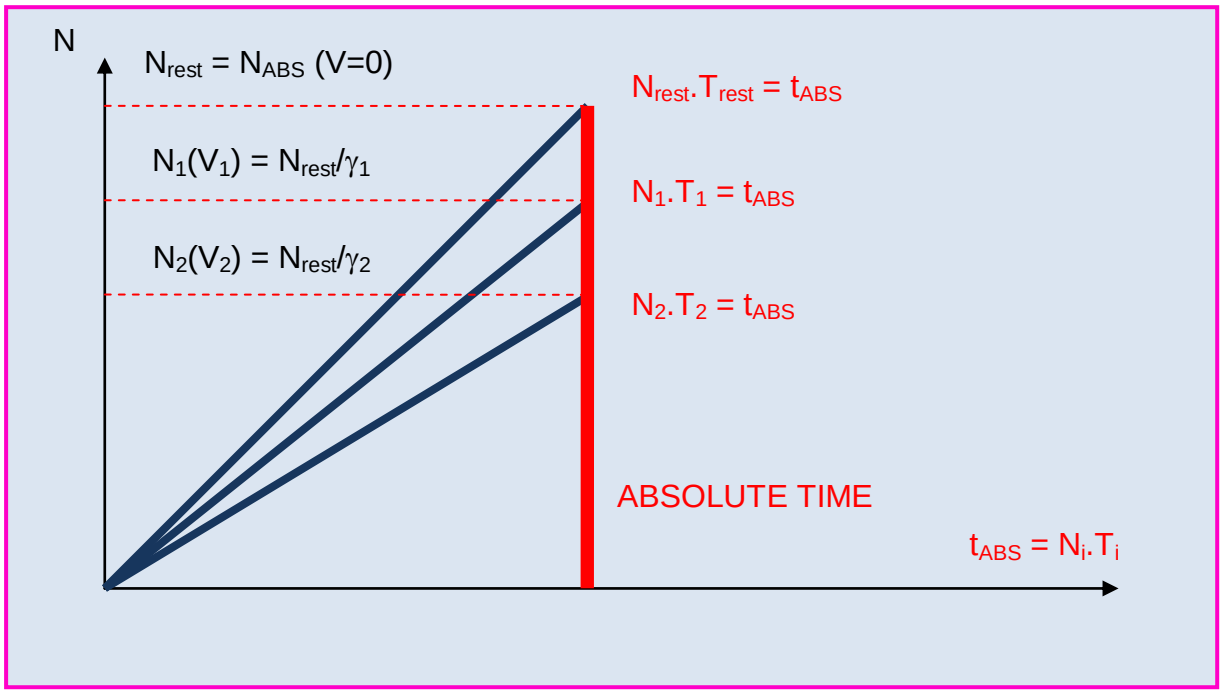

Figure 2 : Number of periods or cycles N_i measured by a clock moving at the speed V_i with regard to the Preferred Frame of Reference

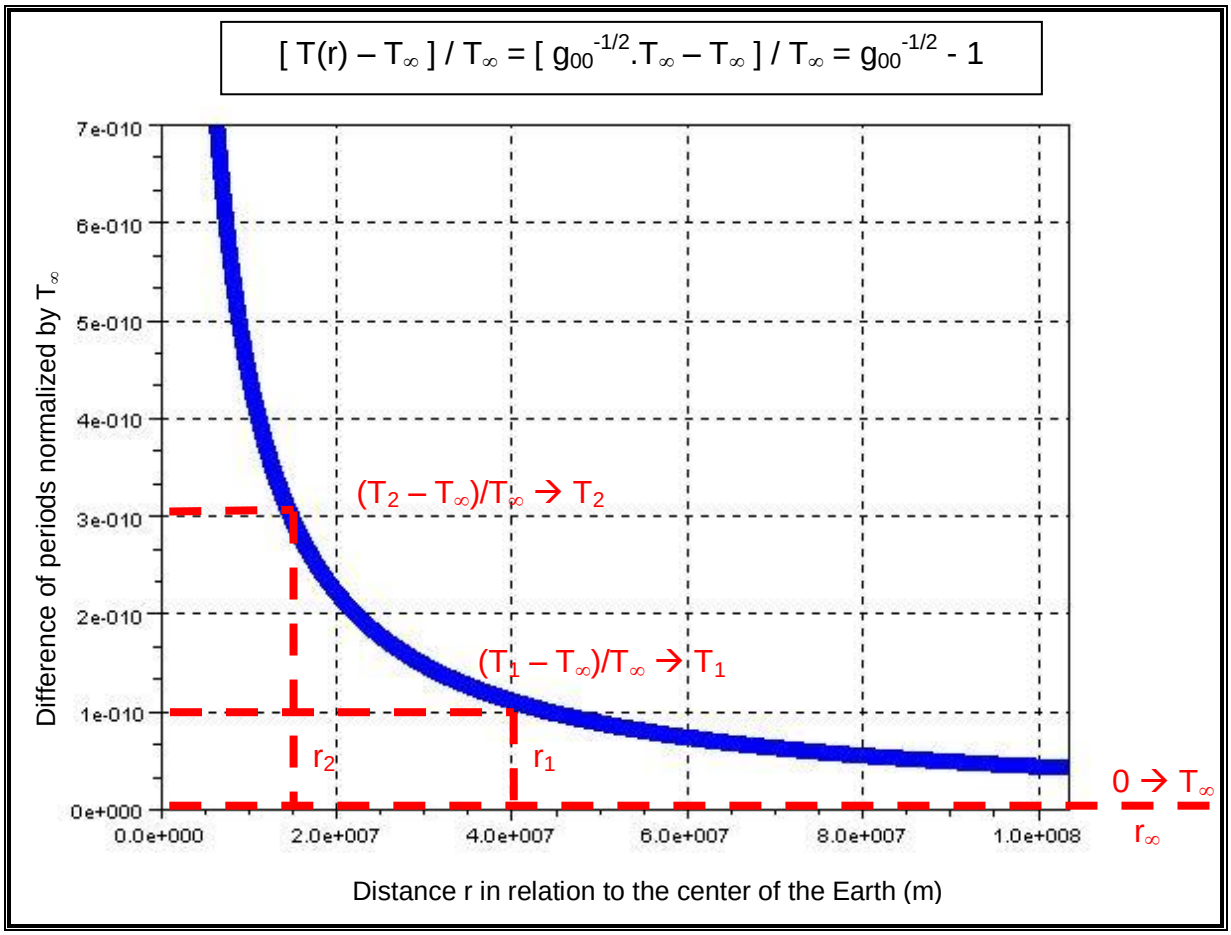

Figure 3 : Difference normalized by T_∞ between the period T(r) of a clock situated at the distance r from the center of the Earth and the period T_∞ of a clock situated at an infinite distance from the Earth de la Terre

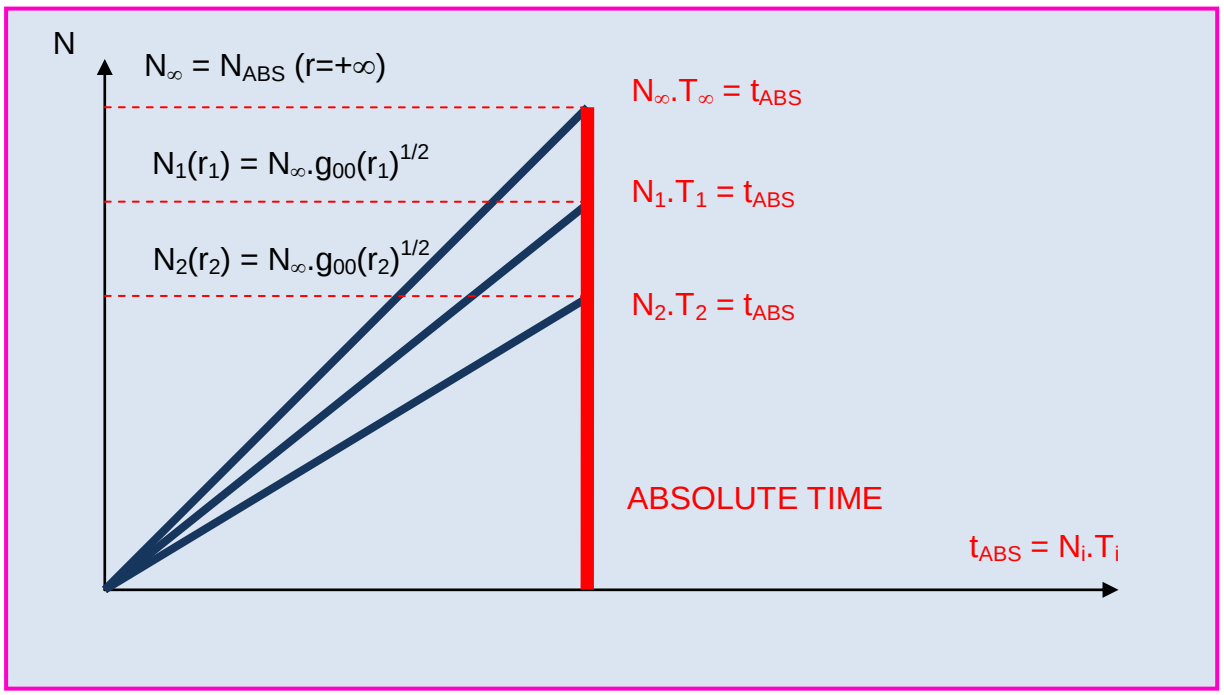

Figure 4 : Number of periods or cycles N_i measured by a clock situated at the distance r from the center of the Earth

Every particle, every cell, every living being, has a musical score to play and to live out, which contains a certain number of bars. For two identical entities (for example two identical particles) the number of bars to play (live) is identical. However, the pace, the rhythm to which these entities play their musical score, depends on their speed with regard to the Preferred Frame of Reference and on the strength of the gravitational field in which they are.
In this way, two particles which do not have the same speed with regard to the Preferred Frame of Reference will have their "metronome" (their internal clock) beating the same rhythm at different tempos. Thus, at the same time in the present, when the first entity moving at a speed of V1 is at the $N1^{th}$ bar, the second entity moving at a speed of V2 is at the $N2^{th}$ bar. The two entities are however at the same present time because the beat of the first metronome is T1 and the beat of the second metronome is T2 with :

$$N1.T1 = N2.T2 = present\_time .$$

On the other hand, if we refer to the total number of bars in a life cycle as N_{tot}, this number is the same for all identical entities whatever their speed and whatever the strength of the gravitational field in which they are to be found, but the tempo is different according to the speed of the entity or the strength of the gravitational field in which it is found. Thus, an entity could be half way through its musical score, while another is almost at its end, but both will at all times be in present time.

In order to illustrate these arguments, I will use the example of muons which have a lifetime of about 2.2 µs at rest in an earth based laboratory.
To my mind, the lifetime of muons can be seen as a musical score that they have to play, a kind of list, a succession of events from the start to the end of their life. For all muons, whatever their position and their speed, the number of events in the list and the number of bars in the musical score is the same. However, muons moving at a speed close to the speed of light, play their musical score at a slower tempo. Thus, they are only a few bars into their score, whilst muons which are immobile in relation to the Earth's surface are already at the end of their score, and by that I mean that they are at the end of their life.

Conclusion :

What I call the number of pulses, or beats, or cycles for which I write $N_i = N_{rest} / \gamma_i$ in the context of a clock in movement, or $N_i = N_\infty \sqrt{g_{00}}$ in the context of a clock in a gravitational field, Einstein calls proper time, notably in special relativity ($\boxed{dt_0 = dt / \gamma}$ where dt_0 is the proper time) and in general relativity ($\boxed{dt_0 = dt\sqrt{g_{00}}}$ where dt_0 is the proper time.)

However, in my theory of Preferred Frame of Reference, the number of beats or cycles which correspond to the time of Relativity tells only half the truth.
In my theory, the other half of the truth is that the clocks themselves, material and made up of atoms, are physically 'disturbed' or distorted, by their speed in relation to the Preferred Frame of Reference, or by the presence of a gravitational field which results in a modification of their PERIOD.
It is this modification in the period of clocks that implies that the number of cycles, multiplied by the period, gives an absolute time, identical for all clocks.

Note 1 : This does not call into question what Wikipedia says about taking into account relativity in the Global Positioning System :
« Special relativity and general relativity intervene in a fundamental way. The former implies that time does not move in the same way in a satellite reference frame because a satellite has great speed in relation to the reference frame of the receiver. The latter, explains that the weaker gravity at satellite level causes a faster flow of time than that of the receiver. The system takes these two relativistic effects into consideration in the synchronization of clocks. »
In point of fact, clocks only provide the number of cycles or beats that have passed between two moments. These numbers must be corrected for two clocks moving at different speeds or placed in different gravitational potentials.

Note 2: It is not possible to measure directly that the beating of a clock in movement or in a gravitational field has changed, because any other clock being used as a reference to measure this

period of time, must be placed in the same conditions of movement or in the same gravitational field and will undergo the same physical effects.

4.5 Similarity with rulers positionned on the circumference of a moving disc

4.5.1 Description of the experiment by Albert Einstein and Jean-Claude Boudenot

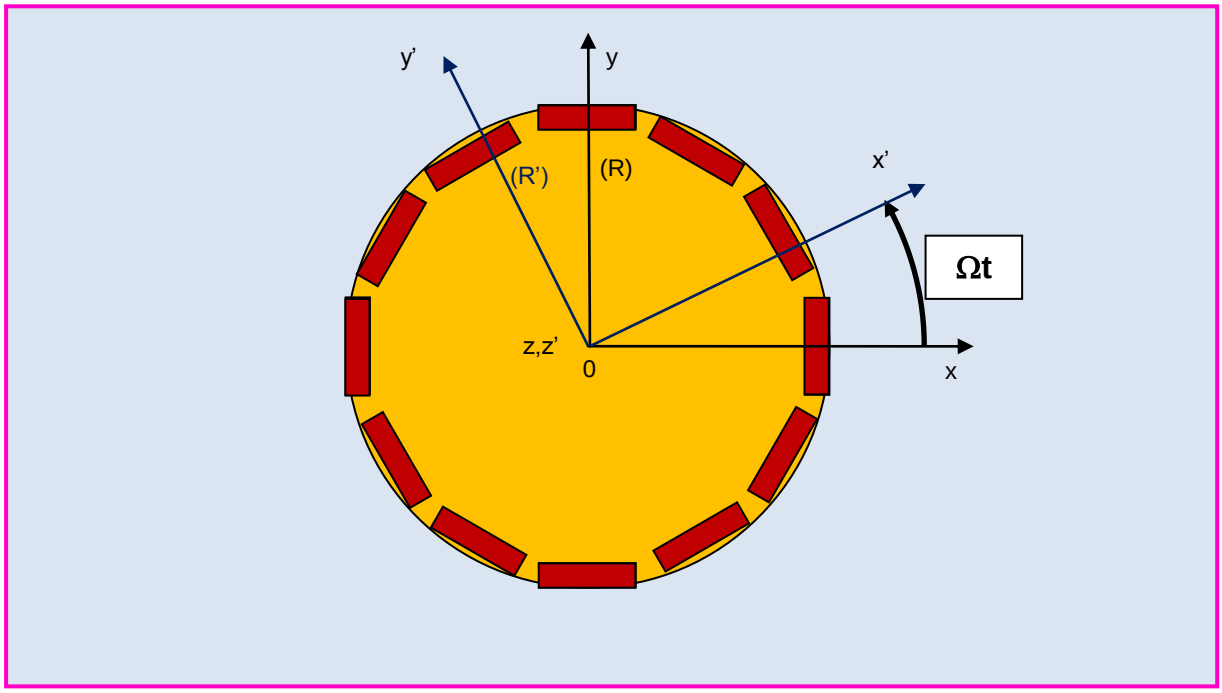

Figure 5 : Rulers placed on the circumference of a disc in rotation

In his book The Theory of general and special relativity, Albert Einstein writes in chapter XXIII « The behaviour of clocks and rulers on a reference body in rotation » :
« … Consider a spatio temporal domain in which there is no gravitational field relative to a reference body K, whose state of movement has been conveniently chosen; in relation to the subject under consideration, K is a Galilean reference body and the results of the Theory of special relativity are valid in relation to K. Let us suppose that the same subject is shifted to a second reference body K' which is animated by a uniform rotating movement in relation to K. To make this clear, let us suppose that K' is represented by a flat circular disc which is making a uniform rotating movement on its surface, around its centre.
If an observer moving with the disc puts his or her ruler (which is small in comparison with the radius of the disc) tangentially on the periphery of the disc, its length will be less than 1 in relation to the Galilean System, since, according to chapter XII, moving bodies undergo curtailment in the direction of their movement. If, in contrast, he or she puts the ruler in the direction of the radius of the disc, it is not subjected to this curtailment in relation to K. Therefore, if the observer starts by measuring the circumference of the disc and then its diameter with the ruler and then divides the result of these two measurements, one by the other, he or she will not find the known number π, as dividing factor, but a superior number, whilst for an immobile disc in relation to K this calculation would obviously give the exact result of the number π. »

To pursue this reasoning further, we will use Jean-Claude Boudenot's notations, in his book Electromagnetism and relativistic gravitation :

« Let R' be a system of coordinates whose axis z' coincides with the axis z of R (presumed Galilean) and which goes around this axis with a constant angular velocity (cf Figure 5). The laws of nature, in particular that which concerns the position of rigid bodies, are not known directly with regard to R' since it is not a Galilean system of reference. We do know them however with regard to the Galilean system of reference R. Let us imagine, in the plane (x', y') of R' a circle traced around the origin of the coordinates, as well as a diameter of this circle. Let us consider also a great number of small rods all of the same height. We assume them to be arranged along the periphery and of the diameter and at rest with regard to R'. If P is the number of rods on the periphery, D their number on the diameter, we obtain, if R' does not make a rotation with regard to R : $\frac{P}{D} = \pi$.

This is not the case when R' is animated by a rotating movement. Let us suppose that at a given moment t of R, the lengths of all the rods are determined with regard to R. In R, the rods on the periphery experience the Lorentz contraction (since moving bodies undergo curtailment in the direction of their movement), but those on the diameter do not experience this, whence the result : $\frac{P}{D} > \pi$.

So, Euclidian geometry proves insufficient for the description of physical space. »

4.5.2 A fuller interpretation of the experiment

The first important element concerning this experiment of rulers on the periphery of a disc in rotation is the fact that these rulers undergo a contraction of their length.
If we suppose that each ruler is locally at the speed V = Ω.R with regard to the system of reference R, it is possible to write that the length of the ruler in the system of reference R' measured by the system of reference R is :

$L_P(\Omega) = L_0 / \gamma$ with $\gamma = \left(1 - \frac{V^2}{c^2}\right)^{-1/2} = \left(1 - \frac{\Omega^2.R^2}{c^2}\right)^{-1/2}$ and where L_0 indicates the length of the ruler at rest in R.

From this, the two authors deduce directly that $\frac{P}{D} > \pi$, that is to say that the measurement of the circumference of the disc is superior to π times the measurement of the diameter of the disc as Einstein says, or as Jean-Claude Boudenot says, that the number of small rigid rods arranged along the periphery is superior to π times the number of small rigid rods arranged along the diameter.

The two authors do not mention an intermediary stage which is nevertheless fundamental and which consists in stating that the mathematical or absolute circumference remains equal to π times the mathematical or absolute diameter :

$$\boxed{PERIPHERY_{math} = PERIPHERY_{absolute} = \pi.DIAMETER_{math} = \pi.DIAMETER_{absolute}}.$$

It is therefore legitimate to write :

- $\boxed{PERIPHERY_{absolute} = N_P(\Omega).L_P(\Omega) = N_{P0}.L_0}$ where N_P indicates the number of rods arranged around the circumference of the disc ;
- $\boxed{DIAMETER_{absolute} = N_D(\Omega).L_D(\Omega) = N_{D0}.L_0}$ (for the diameter the identity is obvious for we obtain $N_D(\Omega) = N_{D0}$ et $L_D(\Omega) = L_0$).

It is only by establishing the three previous framed formulae that we can deduce that the contraction of the rods placed on the circumference and by checking the identity $L_P(\Omega) = L_0 / \gamma$ implies that the number of rods proves the disparity $\boxed{N_P(\Omega) > \pi.N_D(\Omega) = \pi.N_{D0}}$.

It is even possible to know this ratio.
Indeed, the identity $PERIPHERY_{absolute} = \pi.DIAMETER_{absolute}$ can be written :
$N_P(\Omega).L_P(\Omega) = \pi[N_D(\Omega).L_D(\Omega)] = \pi[N_{D0}.L_0]$.
We can ultimately deduce from this that : $\boxed{N_P(\Omega) = \gamma.\pi.N_D(\Omega) = \gamma.\pi.N_{D0}}$.

Important note :
From the identity $PERIPHERY_{absolute} = N_P(\Omega).L_P(\Omega) = N_{P0}.L_0$ and from the contraction of the rulers on the circumference $L_P(\Omega) = L_0 / \gamma$, we can deduce the important identity : $\boxed{N_P(\Omega) = \gamma.N_{P0}}$.

4.5.3 Conclusions

The aim of the entire paragraph on rulers placed on the circumference of a rotating disc is to show comparability between the arguments I made on time and those that I have just made on space.

On the subject of time I wrote :
« In the case of a clock in movement at the speed V with regard to the Preferred Frame of Reference :

- the period of the clock is given by the formula $\boxed{T(V) = T_0.\gamma}$ with $\gamma = \left(1 - \frac{V^2}{c^2}\right)^{-1/2}$ or T_0 representing the beat of the same clock at rest with regard to the Preferred Frame of Reference ;
- the number of pulses or beats or cycles counted from a certain arbitrary t_0 is given by the formula $\boxed{N(V) = N_0 / \gamma}$ where N_0 is the number of pulses that we could count if the clock was at rest with regard to the Preferred Frame of Reference ;
- whatever the speed V is we obtain $\boxed{N(V).T(V) = N_0.T_0 = TIME_{absolute}}$.
  Whatever the speed of the clock is, the number of counted beats times the value of the beat is always constant and equal to **ABSOLUTE TIME. »**

On the subject of space, the paragraph in question has just shown that : « if we study rulers arranged on the periphery of a disc in rotation with regard to the Preferred Frame of Reference we obtain :

- the length of the rulers is given by the formula $\boxed{L_P(\Omega) = L_0 / \gamma}$ with $\gamma = \left(1 - \frac{V^2}{c^2}\right)^{-1/2}$ $V = \Omega.R$ and where L_0 indicates the length of the ruler at rest in the Preferred Frame of Reference ;
- the **number** of rulers arranged on the circumference is given by the formula $\boxed{N_P(\Omega) = \gamma.N_{P0}}$ where N_{P0} the number of rulers whilst the disc is at rest with regard to the Preferred Frame of Reference;
- whatever the speed $V = \Omega.R$ $\boxed{N_P(\Omega).L_P(\Omega) = N_{P0}.L_0 = PERIPHERY_{absolute}}$.
  Whatever the speed of rotation of the disc, the number of counted rulers times the length of the rulers is always constant and equal to the absolute periphery (notion of absolute space).

It is therefore fundamental to make a distinction between space and physical time which proves contraction and expansion (and curvature in General Relativity), and space and absolute time which remain an absolute reference and define an Absolute Frame of Reference.

Moreover, Jean-Claude Boudenot speaks of **physical space** that must be differentiated from absolute space :
« Euclidean geometry proves to be insufficient in describing **physical space**. »

Note 1 : It is appropriate to highlight that the experiment of rulers arranged on the circumference of a rotating disc is of prime importance in the process which allowed Einstein to go from Special Relativity to General Relativity.
It is therefore legitimate to think that if the effects are tangible and physical in General Relativity (slowing down of clocks, change in the frequency of light due to gravitation) then they are equally real and physical in Special Relativity.

Note 2 : here again it is a question of using the experiment of the rotating disc which is one of the fundamental links between Special Relativity and General Relativity.
One of the well-known effects of General Relativity on the subject of light is the shift in frequency due to a difference in the potential of the field of gravitation. The link which exists between Special Relativity and General Relativity is highlighted by a material clock or an atom emitting spectral rays, placed on the periphery of the rotating disc and which possess a speed but also register a centrifugal force and acceleration.
This experiment shows the equivalence between the shift in frequency of a photon due to the difference in potential of the field of gravitation and the shift in frequency due to a change of the system of reference that is called the relativistic Doppler effect.
In this way, as we will see in a very detailed way in the next two chapters, the outcome of **a change in system of reference on light** (which is carried out using the Lorentz transformation and the law of relativistic composition of speeds) is the **relativistic Doppler effect**

4.6 Some arguments in favour of a unique present time

After a long period of reflection, I have found several arguments, examples or experiences “of Intellect” which make it possible to invalidate the **interpretation** of time of Einstein's Relativity and conversely advocate the theory of the Preferred Frame of Reference for which simultaneity is absolute and all the events of the universe take place in a unique present.
In order not to labour the point, I will only give one experiment in the context of Special Relativity and only one experiment in the context of the General Relativity.

Important note : I am not putting into question the validity of the theory of relativity, equations and results obtained which have been proven by numerous experiments. I am simply questioning the **interpretation** of the notion of time which, it seems to me, is not satisfactory.

4.6.1 Experiment in the context of Special Relativity

There already exists the well-known paradox of Paul Langevin's twins. The twins are celebrating their twentieth joint birthday on earth, then one of the twins leaves on board of a high speed rocket for several years, turns round and comes back to Earth, while his brother remains on Earth. What makes this experiment non paradoxical is that the twins did not live or undergo the same physical phenomena. The twin who stayed on Earth remained for the whole duration of the experiment in the same system of reference which can be equated to a Galilean system of reference.
On the other hand, the twin who travelled by rocket, underwent an acceleration at the moment of departure, an acceleration at the moment he turned back and finally, a deceleration on arrival.
Therefore, the situation of the twins is not symmetrical which explains why they meet up at the end of this experiment, not having aged in an identical way.

The experiment that I am presenting consists in arranging two Galilean frames of reference in uniforn rectilinear movement in relation to each other and to arrange a great number of observers who face each other along an extremely long straight line with one row of observers belonging to the first frame of reference and the other row of observers belonging to the second frame of reference.

In order to visualize this, we can take the example of a railway track tracing out a very long straight line in a Galilean reference frame and a train travelling at a very high constant speed along it. We place observers along the railway track at regular intervals and also passengers on the train.
We can suppose that, the railway track being in a Galilean frame of reference, all the clocks (arranged along the track near the observers) and which have been synchronized remain synchronized. Finally the railway track being a long straight line and the train having a constant speed, all the clocks on the train, which have been synchronized, remain so.

The more time passes, the more the time gap increases between the clocks situated on the train and those along the railway track. To my mind, we cannot be prevented from imagining a railway track so long that the time gap reaches one minute, one hour, one day. What is the significance of these gaps, if we imagine that opposite a passenger on the train, there will always be an observer along the railway track? Does a gap of one hour or one day indicate that the observer will no longer be able to see the train which is “elsewhere” on the time axis. If we accept that the clock on the railway track that the train went past at the start of the journey remains synchronized with a clock situated very far from it still along the railway track, then we can consider that it is as legitimate to use the latter in comparison with the clocks on the train when it went past, as the first clock. Therefore, there is no need for the train to turn around like the twin's rocket, in order for us to compare these clocks with the first clock on the railway track.

In spite of this, the train and the observer on the railway track in from of whom it goes past are still in the same present because visual contact is possible and even a slight physical contact can take place with an object along the railway track(a leaf from a tree that touches the train for example).
This is where the paradox lies : how can a clock on the train have a time difference of several hours with the clocks on the railway track and therefore be “in another time” and yet visual and even physical contact at all times be maintained ?

The proposed interpretation from the theory of the Preferred Frame of Reference is the following :
The clocks on the train and those on the railway track show different hours. However, this effect combined to the fact that the real, physical period of the clocks on the train is different from the one of the clocks on the railway track, because they are distorted due to their speed with regard to the Preferred Frame of Reference, has the consequence that the train and the railway track are permanently in the same “present moment” (see paragraph 4.4).

In addition to this experience, it is interesting to mention the case of two “objects” in permanent contact, and however in movement in relation to one to another.

The permanent contact maintained between the two objects shows that they are continually in the same present even if the atoms of the first object vibrate at a different frequency from that of the second object.

As an example of permanent sliding contact with movement, we can quote :

- a bobsleigh, ice-skates in contact and in movement in relation to the ice ;
- Skis, a surfboard, a sled in contact and movement in relation to the snow ;
- Catenaries of a train in contact and movement in relation to electric cables.

4.6.2 Experiment in the context of General Relativity

The experiment that I am going to put forward in the context of General Relativity is perhaps even more disturbing.

General Relativity states that proper time t_0 passes all the more slowly the bigger the gravitational potential in absolute value according to the following relationship :

$$dt_0 = \sqrt{g_{00}}dt \quad \text{with} \quad g_{00} = 1 + \frac{2\phi}{c^2} = 1 - \frac{2.G.M}{c^2.r}$$

where $\phi = -\frac{G.M}{r}$ is the gravitational potential created at the distance r by a punctual body (or extensive but with a spherical symmetry) in Newtonian theory and G is the gravitational constant.

For two clocks situated on the surface of the Earth, but at two different altitudes h_1 and h_2, the difference in time passed between the two clocks is expressed in the following way :

$$dt_{02} - dt_{01} = \left(\sqrt{1 - \frac{2.G.M_T}{c^2(R_T + h_2)}} - \sqrt{1 - \frac{2.G.M_T}{c^2(R_T + h_1)}} \right) dt .$$

As for the Earth, we have $\frac{G.M_T}{c^2.R_T} << 1$ we can make the following estimation :

$$\frac{dt_{02} - dt_{01}}{dt} \approx \left(1 - \frac{G.M_T}{c^2(R_T + h_2)} \right) - \left(1 - \frac{G.M_T}{c^2(R_T + h_1)} \right) = \frac{GM_T}{c^2} \frac{h_2 - h_1}{(R_T + h_1)(R_T + h_2)} .$$

For low altitude with regard to the Earth's radius ($h_1 << R_T$ et $h_2 << R_T$), we can write :

$$\frac{dt_{02} - dt_{01}}{dt} \approx \frac{GM_T}{c^2} \frac{h_2 - h_1}{R_T^2} .$$

Finally, by setting down $g = \frac{GM_T}{R_T^2}$ the acceleration of gravity and, by making the estimation $dt_{01} \approx dt$, we obtain finally the following formula $\boxed{\frac{dt_{02} - dt_{01}}{dt_{01}} \approx g \frac{h_2 - h_1}{c^2}}$ that we can also write : $\boxed{\Delta t = \Delta t_{02} - \Delta t_{01} \approx g \frac{h_2 - h_1}{c^2} \Delta t_{01}}$

Let us now take rocks at the seaside at an altitude h_1 = 0 m and rocks almost at the summit of Everest at an altitude h_2 = 8000 meters.

We suppose that we have at our disposal two clocks with an extremely long life span. One is placed near rocks at sea level, the other is placed near rocks at 8000 meters.
The following grid gives the time difference $\Delta t = \Delta t_{02} - \Delta t_{01}$ which increases between the two clocks, corresponding to very long durations of time Δt_{01} :

Δt_{01}	$\Delta t = \Delta t_{02} - \Delta t_{01}$
1 day	75 ns
1 year	27.5 µs
131 million years	1 hour
1.57 billion years	12 hours

Note : The values of the grid are not very precise. Only the order of magnitude is interesting.
Roughly speaking, the numeric value of the following ratio is :

$$\frac{\Delta t_{02} - \Delta t_{01}}{\Delta t_{01}} \approx g \frac{h_2 - h_1}{c^2} = 9.81 \frac{8000 - 0}{(3.10^8)^2} = 8.72.10^{-13} .$$

Let us now make the final conjecture, which is not the most difficult to obtain, which is that the rocks at sea level are at exactly the same longitude as Everest, for example at about 1000 kilometers to the south of Everest in Bengal in India, looking onto the bay of Bengal.

In around 1.57 billion years, the rocks near to the summit of Everest will have a time difference of twelve hours compared to the rocks at sea level, that is to say that when it will be midday for some, it will be midnight for others. However, all the rocks which are at the same longitude should all see the sun at its zenith at the same time.

Such is the paradox of sea and mountains after a very long period of time!

It is also possible to ask the question about a discrepancy of even one hour between the two points after about 131 million years.
The two points are separated by about 1000 km as the crow flies, which can therefore be easily travelled in less than one second by light (or by electromagnetic waves in a radio transmission between two people).
What is the significance of the two points being separated temporally by one hour ?

Important note : I am not questioning the fact that the clock at the summit of Everest and the one at sea level do indicate different times a long time after having been synchronized.
Many experiments of ever increasing precision have demonstrated that a temporal discrepancy occurs between two atomic clocks undergoing different gravitational potentials.

However, it seems to me that, even if the equations provided by General Relativity are correct and give digital results in agreement with the experiment, the correct physical interpretation of the temporal discrepancy sustained by two clocks has not yet been fully discovered, whether this is in Special Relativity or General Relativity.

The interpretation put forward by the theory of the Preferred Frame of Reference is as follows :
The clock at the summit of Everest and that which is at sea level do indicate different times.
However, this effect combined with the fact that the real physical beat of the clock at the summit of Everest is different from that of the clock at sea level because they are altered in a different way by two different gravitational potentials, leads to the fact that the summit of Everest and the surface of the sea are permanently in the same present.

4.7 Space and movement are fundamental, inversion Time / Movement

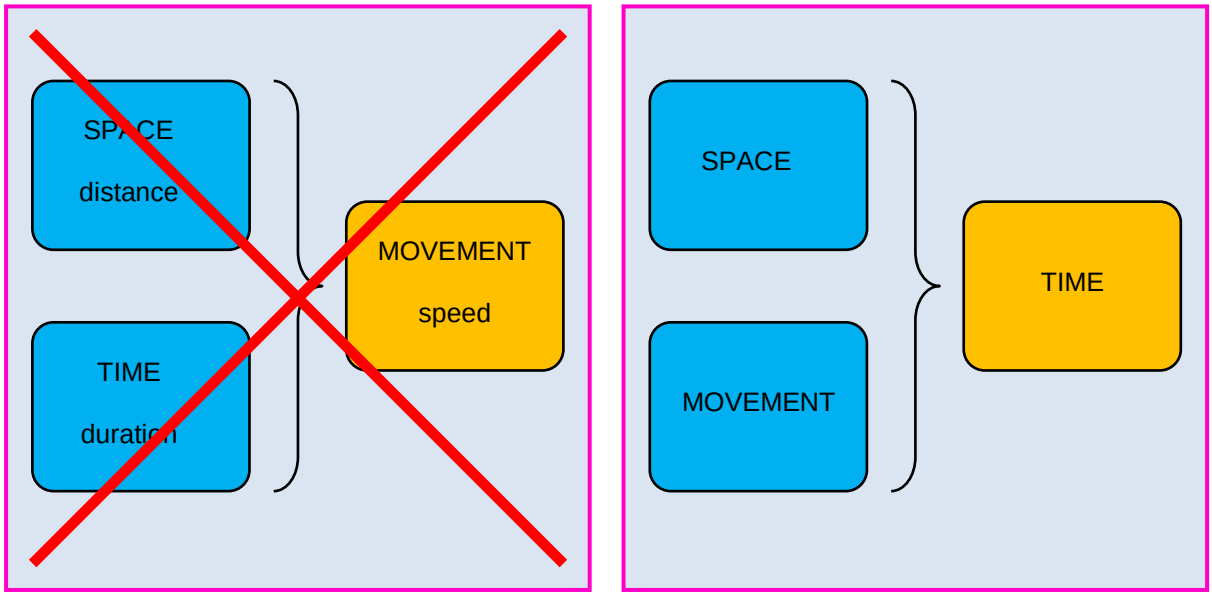

Figure 6 : Space and movement are fundamental, not time

In daily life, we think that the space whose distance we can measure and time whose duration we can measure are “primary”, fundamental.

If an object is at a spatial position M_0 at a time t_0 and then is at another spatial position M_1 at a time t_1, we can deduce that there has been movement with an average speed $V = \frac{M_0M_1}{t_1 - t_0}$.

For example, when we travel from one town to another, we find out the distance between the two towns (for example 100 km) then, we measure the journey time as we are on the journey (for example one hour) and we deduce an average speed of 100 km an hour.
In doing this, what we are not aware of is that we have measured the duration of the journey by means of a clock, a watch, or a chronometer, which are the basis of mechanisms or physical phenomena presenting periodic movement (it is possible to go right down to the level of vibrating atoms). Thus, during the movement of the car, there is at the same time movement of many periodic physical phenomena.

Therefore, in my view of physics, time is neither "primary" nor fundamental. What is primary is the movement of entities in space which give rise to periodic physical phenomena which are also based in movement.
All physical phenomena, with the very important subclass of periodic physical phenomena, are based on movement in space.

In other words, the framework of physics is not the space and time in which physical phenomena arise.
"Physics", our "universe" are more accurately space in which physical phenomena take place and because of movement, evolution of these physical phenomena, Man has deduced a very convenient notion of time, but which has been invented by him.

What the present work provides in addition is the assertion of an absolute simultaneity and consequently that all the physical phenomena of the universe evolve in the same "permanent present".

Thus, there would be no more need to call on, to imagine or to assert the existence of :

- chronons, indivisible units of time. Beyond this time lapse, a photon would not be able to engage in any interaction ("Pour la science", November 2010, issue number 397, page 86) ;
- "particles of time" or "atoms of time" which give a fragmented view of the time of physics ("Pour la Science", November 2010, issue no 397, page 31).

Finally, I have already written that the "field of creatons" would be the equivalent of the space-time of General Relativity, but in fact, the "field of creatons" would more accurately be a "**space-movement**" or equally "**space-energy**", the creaton being the quantum of energy of the Universe.

It is for this reason that in General Relativity, we can link the tensor $S_{ij} = R_{ij} - \frac{1}{2} g_{ij} R$ (bringing in to play the tensor of Ricci R_{ij} which is a contraction of the **curvature tensor** or the Riemann-Christoffel tensor, the Riemannian scalar R, which is a contraction of the Ricci tensor and the metric tensor g_{ij}) with the **momentum-energy tensor T_{ij}**.

Inversion Time/Movement

I will end this paragraph with a final remark. Some authors and scientists write that Time is what makes a river flow, sand run through an egg timer, a pendulum swing, the Sun travel across the sky, the Earth follow its path around the Sun, etc.
In fact, I think that Man has accomplished a mental inversion : it is because the river flows, the pendulum swings, the Earth spins on its axis and around the Sun, the universe is the basis of a myriad of movements, that Man has invented the notion of time which is an induced notion and not fundamental.

The discourse is similar with money : it is not money which gives things their value (car, television, house, …), it is these things which infer a value on money which is their partner.
Money is not primary; it was invented by Man in order to compare the value of different things and to facilitate trade, just as time allows us to compare the length of physical phenomena and the duration of periodic physical phenomena (heart beats, oscillations of a pendulum, …).

4.8 Physical existence of the Sun at the present moment

Richard Feynman goes as far as to write in "*Six not so easy pieces"* page 101 :
« *What we mean by "right now" is a mysterious thing which we cannot define and we cannot affect, but it can affect us later, or we could have affected it if we had done something far enough in the past. When we look at the star Alpha Centauri, we see it as it was four years ago; we might wonder what it is like "now". "Now" means at the same time from our special coordinate system. We can only see Alpha Centauri by the light that has come from our past, up to four years ago, but we do not know what it is doing "now"; it will take four years before what it is doing "now" can affect us.* ***Alpha Centauri "now" is an idea or concept of our mind; it is not something that is really definable physically at the moment, because we have to wait to observe it; we cannot even define it right "now".*** »

I fully understand what Richard Feynman means, but I totally object to the fact that modern physics (Einstein's Relativity to be exact) prevents us from thinking of or studying any of the stars of our universe "right now". It is not because we cannot observe Alpha Centauri as it is at the present moment that it is only an idea or a concept of the mind.
It seems to me that this is all the more striking when we speak of the Sun whose light takes about eight minutes to reach us. In fact, this duration of eight minutes is long enough to have an inspirational thought or an animated discussion and short enough to be able to ascertain eight minutes after the beginning of the thought or of the discussion, the state of the Sun as it was at the start of the thought or discussion.

In fact, after a period of observation of the Sun, lasting about ten hours, in which for each present time it was impossible to ascertain the present state of the Sun, but the state of the Sun as it was eight minutes previously, it is possible to draw up a result and to reconstruct what the state of the Sun was at each terrestrial observer's present moment.
Much more than an assessment drawn up after the event (which is not a contradiction of what Richard Feynman says when he writes that we should wait in order to observe Alpha Centauri and define it physically), it means that **at the very moment of each "present instant"** experienced by the terrestrial observer, **the Sun had a very well defined physical existence**.

The Earth and the Sun were in existence a million years ago and it can be supposed that they will still exist in another million years. Consequently, for an observer on Earth with his own Space-Time frame of reference, at the present instant, in the middle of a temporal span [-1 million years, +1 million years] it is possible to conceptualize that the Sun exists and that it is the centre of physical phenomena, even if it is impossible for us to observe it.

Philosophically and physically speaking I am opposed to the assertion which claims that what is not observable by Man at the present moment is only an idea or a concept of the mind.

Knowledge of reality, even "after the fact", remains nonetheless the unique truth.
It is not because it is impossible for Man to observe and to understand certain physical realities that these realities do not exist.
Finally, the crucial point is not to know if we can observe and describe Alpha Centauri at the present instant, but to know if Alpha Centauri **exists physically at the present instant**.

4.9 Conclusion

This chapter has tried to demonstrate the following points :

- A privileged time exists ;
- Time is an illusion. The sense of the existence of time comes to us mainly from periodic physical phenomena, that I call PPP ;
- The effects due to the movement of a clock with regard to the Preferred Frame of Reference or to the presence of a gravitational field in which it is plunged are real and physical and modify physically its beat ;

- In the context of a clock in movement at the speed V with regard to the Preferred Frame of Reference, we obtain :
  - the number of pulses, cycles or beats counted from an arbitrary instant t_0 is given by the formula $N = N_{rest} / \gamma$ where N_{rest} is the number of pulses we would count if the clock at rest with regard to the Preferred Frame of Reference and $\gamma = \left(1 - \frac{V^2}{c^2}\right)^{-1/2}$. This number of beats N is the information provided by the clock and corresponds with what Einstein calls proper time dt_0 in Special Relativity $dt_0 = dt / \gamma$. This aspect corresponds to Einstein's vision of time ;
  - The beat of the clock undergoing physical dilation in accordance with the formula $T = T_{rest}.\gamma$ where T_{rest} represents the beat of the same clock at rest with regard to the Preferred Frame of Reference. This aspect confirming a real physical change in the beat of clock matches Lorentz's view ;
  - **Whatever the speed of the clock is, the number of counted beats times the value of the period is always constant and equal to the ABSOLUTE TIME** $\boxed{N.T = N_{rest}.T_{rest} = TEMPS_{absolute}}$.
- In the context of a clock placed in a gravitational field of a body of mass M at the distance r in relation to the centre of the body, we obtain :
  - The number of pulses, cycles or beats counted from an arbitrary instant t_0 is given by the formula $N = N_\infty \sqrt{g_{00}}$ where N_∞ is the number of pulses we would count if the clock was situated at an infinite distance from the body and $g_{00} \approx 1 - \frac{2.G.M}{c^2.r}$. This number of periods N is the information provided by the clock and corresponds with what Einstein calls proper time dt_0 in General Relativity $dt_0 = dt\sqrt{g_{00}}$;
  - The period of the clock is given by the formula $T = \frac{T_\infty}{\sqrt{g_{00}}}$ where T_∞ represents the period of the same clock situated at an infinite distance from the body ;
  - **Whatever the strength of the gravitational field in which the clock is situated, the number of counted periods times the value of the beat is always constant and equal to the ABOLUTE TIME** $\boxed{N.T = N_\infty.T_\infty = TEMPS_{absolute}}$.

Whatever their speed is, whatever the strength of the gravitational field in which they are, all the clocks of the Universe prove : $\boxed{N.T = N_{rest}.T_{rest} = N_\infty.T_\infty = TEMPS_{absolute}}$.

An analogy which is made with rulers on the circumference of a rotating disc allows us to believe in the existence of an absolute space even if the physical space is indeed that of the theory of relativity and that defined by the field of creatons. It must however be highlighted that absolute space is a concept of the mind and does not exist physically.

Arguments given in the form of an experiment in Special Relativity, as well as an experiment in General Relativity attempt to emphasize the fact that all the clocks of the Universe, despite the fact that they all beat at different rhythms, are all beating at the present moment and that therefore all the

events of the Universe simultaneous in the Preferred Frame of Reference, take place in a unique present.

An argument attempts to show that time is not a fundamental notion but deduced from the notion of movement and that therefore we should use the term “space movement” rather than that of “space time”.

Finally, starting with a text by Richard Feynman which attests that the physical state of a star at the present instant is just an idea or a concept of the mind, I use the case of the Sun to demonstrate that the essential element is the **very existence** of the Sun at **the present instant**.
And if the Sun exists at the present instant, then it possesses a well defined physical state.

Philosophically and physically, I am against the assertion which claims that which is not observable by Man at the present moment is only an idea or a concept of the mind.
Even that which is impossible for Man to observe can have a physical existence that is very real.