

## 1. Introduction

The main objective of this work is to try to bring a detailed description of the following physical phenomenons :

- the gravitation ;
- the light and more generally the electromagnetic waves (nature, propagation, polarization, energy, ...);
- the electromagnetism ;
- atomic forces.

The second objective of this work is to give a general outline of the deep nature of :

- the matter and therefore its mass and energy ;
- the electron and therefore its charge ;
- the atom, the nucleus, the nucleons.

Finally, the third objective of this work is to propose subtle mechanisms which take place at another scale, "infinitely" smaller than the atomic scale, which would be the physical support of the two main theories of the XX<sup>th</sup> century :

- Einstein's relativity ;
- quantum mechanics that Louis de Broglie called more willingly and surely more rightly "wave mechanics".

In the frame of this work, these two theories are seen as very powerful theories, predictive but ,they don't provide the subtle mechanisms at a thin scale and the fundamental causes of the physical phenomenon. It is the reason why these two theories will be seen in this work as :

- the Geometric Mathematical Model (GMM) for General Relativity which mainly deals with gravitation ;
- the Probabilistic Mathematical Model (PMM) or Statistic Mathematical Model (SMM) for quantum mechanics.

I consider that mathematics have improved so much that Man manages to describe and modelize mathematically the physical phenomenon without knowing and thus understanding the fundamental physical mechanisms.

About quantum mechanics, there was this famous debate between Bohr and Einstein that goes on nowadays and that Alain Aspect sums up in the following manner :

« For Bohr, quantum mechanics gives, under a probabilistic form, the most complete physical description of world that can be conceived. On the contrary, for Einstein, the probabilistic predictions of the quantum theory implies the existence of an underlying level which allows a more detailed description of the physical world, whereas quantum mechanics gives only a statistical description of phenomenon existing at a thinner scale. »

I think that these two great physicists are both right on an essential point of their assertion :

- the present work tries to show that on an ultimate way, Einstein's thought is right ; it completely meets my vision of the Universe and the theory that I propose corresponds to this underlying level ;
- as for Bohr, he is right when he states positively that quantum mechanics is able to predict and explain every physical phenomenon, but only in terms of probability without being able to provide the ultimate mechanism.

For many years, Einstein tried to fight quantum mechanics, in particular because, in his opinion, « thought experiments » could put in the wrong the new mechanics or at least he showed that this new theory was not complete.

Among these “thought experiments” the most famous is the EPR experiment (of the name of its three authors : A. Einstein, B. Podolsky and N. Rosen) and we can note that the title of the article was formulated interrogatively : « *Can quantum mechanical description of physical reality be considered complete ?* ».

Thanks to John Bell, with his famous inequalities, and others as Alain Aspect, with his famous experiment of entangled photons, we know that it is possible to achieve intricated states and that the measure of the polarisation of two intricated photons gives right to quantum mechanics on a probabilistic and statistic point of view.

The right approach that is essential to adopt is not to “fight” against quantum mechanics as Einstein tried to do for years, but really to use imagination and develop the right ideas which will allow to find the subtle mechanisms, the underlying level in which Einstein believed.

It is very interesting to notice that Einstein did not think that his own great theory of the General Relativity requires the same necessity of this underlying level in which he believed for quantum mechanics.

The present work tries to show that gravitation itself is fundamentally explained by subtle mechanisms in which entities “infinitely” smaller than nucleons take place.

The two fundamental entities introduced by the theory that I propose :

- **the creaton** : it is the unique entity at the source of the whole creation, of the whole Universe and which explains the totality of the physical phenomena. The creaton owns a translation speed which goes from zero to a speed much greater than the speed of light. It also owns a rotation speed which goes from zero to a maximum value. The total energy of a creaton is the sum of its translation energy and its rotation energy which it keeps all the time. The creatons fill the whole Universe, cross it in all the directions and constitute the field of creatons ;
- **the vortex** : it is a vortex of creatons dimension of which is much smaller than the one of a nucleon. Its formation can be understood by analogy with a vortex or cyclone created by violent and swirling winds. Again, with the same analogy, I will use the term “wind of creatons”. We will see exactly in which case later. The vortex is considered to be the “root brick” of matter, which means the smallest entity with which it is legitimate to use the word “matter”. The vortex could be modeled by a cylinder with an axis around which the creatons form the vortex spin. A direct consequence of the fact that the vortex is the ultimate entity of matter is that its mass is supposed to remain constant on average along the time. This implies that the creatons captured by the vortex are emitted, so that, on average, during very little time, the number of captured creatons are equal to the number of creatons emitted by the vortex. So the vortex are continuously renewed and this lead to what we can call a perpetual regeneration of the matter. If we compare with a wave or a “roller” on the ocean, the wave being by nature constantly renewed by new molecules of water, the vortex can also be seen as a wave and I can see in it the fundamental link with the Louis de Broglie’s wave which he associates with all the particles and the thinner description of quantum mechanics/wave mechanics. In the model of the proposed vortex, the captured creatons are captured by the surface of the cylinder and the emitted creatons are emitted by the two bases of the cylinder. Of course we will give a detailed account of the vortex in the next chapters of this book.

Another essential notion that is at the root of numerous explanations in this book is the ROTATION.

In our world, translation is much more privileged because it corresponds to the action of going from one point to another (when you travel) and this is all the more true in the domain of particles. Einstein’s

Special Relativity allocates to a particle the total energy  $E = \gamma.m.c^2$  with  $\gamma = \left(1 - \frac{V^2}{c^2}\right)^{-1/2}$  (where m

is the mass of the particle, V its speed in a given referential and c the celerity of light).

When the speed is null, the particle owns only an energy called “own energy” and given by the famous formula  $E_0 = m.c^2$ . The kinetic energy of translation is given by the difference between the total

energy and the "own energy"  $E_C = E_{totale} - E_0 = (\gamma - 1).m.c^2$  (by doing a limited development at the first order of this formula when  $V$  is greatly smaller than  $c$ , we find back the classical form of the kinetic energy of translation  $E_C = \frac{1}{2}m.V^2$ ).

**In the proposed theory, a material particle is composed of lines of vortex.**

**When the particle is at rest, the vortex are doing a movement of rotation around the axe of the line at the speed of light. The energy at rest of a particle corresponds to the kinetic energy of the vortex in their movement of rotation.**

The sense of the rotation of the creatons (called creatons-spins when their rotation speed is very high) emitted by the bases of a vortex explains the sign of the charge.

A positive sense of rotation with regard to the direction of emission (axe of the vortex) corresponds to a positive charge.

A negative sense of rotation with regard to the direction of emission (axe of the vortex) corresponds to a negative charge.

In fact, the vortex would be the elementary entity source of an electric field which would be at the basis of electricity, magnetism and electromagnetism.

Finally, the interaction between two creatons transforms a part of the translation energy of the creatons into rotation energy. In the same manner a creaton-spin (creaton with high rotation energy) interacting with another creaton will recover a very high speed of translation.

This transfer of energy explains the fact that all the interactions between creatons do not rise the global temperature of the Universe of a huge factor as Henri Poincaré thought in his book *Science et Méthode*.

A celestial body placed alone in the field of creatons is going to undergo forces in all the directions equivalent to a pressure distributed on all the body. Thus it will be in equilibrium, which means maintained at a constant speed in the creatons field.

Every change of the speed vector of the body with regard to the average speed vector of the creatons field is going to require the application of a force which will have to be against the force due to the creatons which is called **inertial force (modification of the module of the speed vector) or centrifugal force (modification of the direction of the speed vector)** according to the case.

The presence of a second body will create a screen (not very opaque to the creatons in the case of the bodies of the solar system) sufficient to unbalance the field of creatons at the level of the first body in such a way that there will be more creatons arriving from the opposed side of the second body than creatons arriving from the side of this second body. The net force gives birth to the force of gravitation.

The inertial force and the gravitational force being both caused by the field of creatons, it is already possible to make out that :

- the inertial force can be considered as a fundamental and real force in the same manner as the gravitation force ;
- the inertial mass is absolutely equal to the gravitational mass because both are the result of the interaction between matter and the creatons ;
- the movement of the Earth around the Sun is due to one only cause, the creatons, and to a constant rebalancing of the creatons which allows it to remain on its orbit.

It is also interesting to note that :

- the presence of an only body distorts the field of creatons which creates the gravitation field ;
- the presence of matter distorts the field of creatons and the field of creatons determines the trajectories of the material bodies ;
- there is a fundamental reciprocal action between the field of creatons and matter.

This point meets up what Einstein said in the University of Leyden the 5<sup>th</sup> of May 1920 quoting the great Austrian physicist Mach :

« ... It is true that Mach tried to avoid having to accept as real something which is not observable by endeavouring to substitute in mechanics a mean acceleration with reference to the totality of the

masses in the universe in place of an acceleration with reference to absolute space. But inertial resistance opposed to relative acceleration of distant masses presupposes action at a distance; and as the modern physicist does not believe that he may accept this action at a distance, he comes back once more, if he follows Mach, to the ether, which has to serve as medium for the effects of inertia. But this conception of the ether to which we are led by Mach's way of thinking differs essentially from the ether as conceived by Newton, by Fresnel, and by Lorentz. Mach's ether not only conditions the behaviour of inert masses, but it also conditioned in its state by them.

Mach's idea finds its full development in the ether of the general theory of relativity. According to this theory the metrical qualities of the continuum of space-time differ in the environment of different points of space-time, and are partly conditioned by the matter existing outside of the territory under consideration. »

The ether Einstein is talking about is the field of creatons in the theory I propose.

Accurately, Space-Time of the General Relativity corresponds to the field of creatons.

The same manner Space-Time is distorted by matter, the field of creatons is distorted by matter.

The same way the curvature of Space-Time has an influence on the trajectory of a particle or a ray of light, the field of creatons has an influence on the trajectory of a particle or a ray of light.

My theory stipulates that the field of creatons is also the medium of propagation of the light and of the electromagnetic waves.

Far from the ether imagined at the end of the XIX<sup>th</sup> century, the field of creatons is a medium constantly distorted, constituted of a huge number of entities (the creatons) moving at incredible speed.

Light is fundamentally conceived as a wave requiring a medium of propagation.

This assertion is based on the fact that all the known waves need a medium to propagate. It would be surprising that light would be the only exception to this rule.

In a more fundamental manner, I consider that light requires a medium of propagation because the essence of a wave is the deformation of a medium and the propagation of that deformation. This point is fundamental. It explains that, in a given medium, the speed of propagation of the wave is constant in all the directions with regard to the medium.

The theory that I propose considers light and electromagnetic waves as lines of light-vortex which axes, perpendicular to the direction of propagation, give the polarization (we will see that it is possible to obtain all the possible polarization : rectilinear, circular, elliptic). A very important consequence is that the energy of one photon is not uniformly distributed in space but is condensed in certain zones of space, the light-vortex.

A photon is thus constituted of lines of vortex which can be seen as pearl necklaces, the pearls representing the vortex and being permanently renewed in the same manner a wave is renewed by new molecules of water.

Louis de Broglie writes in *La Physique Nouvelle et les Quanta* :

« Numerous attempts had been naturally done to try to conciliate the negative result of the Michelson experiment with existing theories. In particular Fitzgerald and Lorentz proposed to admit the existence of a contraction of material bodies caused by their movement in the ether : this contraction would have decreased the length of the bodies in the direction of their movement respecting their transverse dimensions and had to have the result to compensate exactly the effects of the movement on the propagation of light. But, this ingenious hypothesis had obviously a quite artificial character and seemed imagined only to mask a failure. »

Fitzgerald's and Lorentz's hypothesis which had an artificial character in those days ,conveys its whole meaning with the theory of the creatons. Indeed, the ether of Lorentz would be the field of creatons that Man would not have the technical means to detect and which would constitute the Privileged Referential in which light propagates. In the theory of creatons that I propose, the contraction of material bodies provoked by their movement in the field of creatons would be real.

By duality (that we will explain later in this book), there would be a dilatation of time, that I prefer to call contraction of frequencies because it would only apply on material entities.

Thus, it is not the TIME itself which would be subjected to dilatation, it is, for example, an atomic clock which would see its frequency decrease when it moves with regard to the field of creatons. Only matter would be subjected to the contraction of lengths and frequencies and so only the **measures** carried out by instruments would show variations.

Louis de Broglie writes a little further in the same book :

« Going on in this direction the physical interpretation of Lorentz's transformation, Einstein has shown that everything happens as if a material object moving with regard to an observer would seem to him shorter in the direction of the movement that it seems to an observer carried along by its movement. (...) This contraction, in practice always minor, is precisely equal to the contraction imagined by Fitzgerald and Lorentz and is enough to a rigorous account for the negative result of the Michelson experiment. There is nevertheless an essential difference between the Lorentz-Fitzgerald contraction and the one which results, according to Einstein, of Lorentz's transformation. Indeed, he first was supposed to be a real contraction caused by the absolute movement of the body in the ether, whereas the second is an apparent contraction relative to the second observer : it only derives from the manner the various observers realize their measures of distances and durations and of Lorentz's transformation which mathematically expresses the relation between the measures carried out by the two observers. »

Once again, the theory of the creatons that I propose would fully justify the Lorentz-Fitzgerald vision validating the principle of a real contraction caused by the movement of a body in the field of creatons.

In *Électromagnétisme et gravitation relativistes*, Jean-Claude Boudenot writes :

« In his memoir of 1895 about his theory of the electrons, Lorentz introduced the contraction of lengths, the increase of the mass with the speed, and the Lorentz transformation. Taking into account the negative result of the Michelson-Morley experiment, Lorentz added in his second memoir of 1904 the dilatation of the durations. These ad hoc hypothesis were necessary to "save" the classical mechanic while interpreting the available experimental results. (...) The Michelson-Morley experiment is often brought up, wrongly, as a decisive experiment for the Special Relativity. In fact, the null result of this experiment can be interpreted using other hypothesis than those at the basis of the Special Relativity, in particular by the **Lorentz hypothesis** according to which "**we can imagine a true contraction of the lengths and a true dilatation of the durations with regard to the privileged system ether**". (...) The notion of contraction of lengths has been introduced at the same time (1892), and, in an independent way by Fitzgerald and Lorentz, to interpret the negative result of the Morley-Michelson experiment in a classical frame. They introduced the hypothesis of a contraction in the direction of the movement of all the bodies with a uniform rectilinear movement; **it was a physical effect**. The hypothesis of dilatation of the durations intervenes, (as to that) in the second Lorentz's memoir (1904) on the theory of electrons. Besides, this new phenomenon is linked to the previous one by the constancy of the speed of light. »

For Fitzgerald and Lorentz, these notions of contraction of lengths and dilatation of durations are a physical effect of the ether, which, in the theory of creatons that I propose, is called **the field of creatons**.

In *Schrödinger's Kittens and the Search for Reality*, John Gribbin writes :

*"The key concept of the special theory of relativity is that the Universe and the laws of physics should look the same for all observers, regardless of how they are moving. This is known as "Lorentz invariance", although Lorentz was not the only person to investigate these phenomena in the years before Einstein made his contribution. Aspect's experiment tells us that we have to abandon local reality, and that either the Universe 'out there' is not real, or there is some form of **faster-than-light communication**, Einstein's 'spooky action at a distance', going on. John Bell suggested that the 'cheapest resolution' of the puzzle is to go back to the kind of relativity theory that existed before Einstein's version, **the theory constructed by people like Lorentz on the assumption that there really was an ether.***

*According to these ideas, **there is really a preferred frame of reference, but our measuring instruments are distorted by motion in just the right way to ensure that we can never detect motion 'through' (or 'relative to' ether).** The value of this way of looking at things is that, because there is a preferred frame of reference, it turns out, although in **this preferred frame, things can go***

**faster than light**, in other frames of reference where influences seem to go both faster than light and backwards in time **this is a kind of optical illusion**. If there is a preferred frame of reference, then **clocks in that preferred frame will tick away at a preferred rate of time – both Newton's absolute space and his absolute time are restored in one fell swoop. It is only in Einstein's version of relativity**, with all Lorentz frames equivalent to one another, **that going faster than light also means 'really' going backwards in time**.

John Bell developed these ideas in an article that became the Chapter Nine of *Speakable and Unspeakable in Quantum Mechanics*. He showed how using the pre-Einsteinian idea of a preferred frame of reference, combined with the experimental fact that we do not detect motion relative to this frame of reference, leads to the usual form of the Lorentz transformation equations so that 'it is not possible experimentally to determine which, if either, of two uniformly moving systems, is really at rest, and which moving'. Einstein's theory differs from Lorentz's version, Bell points out, in terms of its philosophy, and its style. The philosophical difference is that because it is impossible to say which of the two moving systems (if either of them) is really at rest and which is really moving, then the terms 'really resting' and 'really moving' have no meaning, and only relative motion is important. The difference in style is that Einstein starts out from the hypothesis that the laws of physics look the same to all uniformly moving observers, and deduces the Lorentz transformations in a simple and elegant way, instead of starting out from the experimental evidence and following a longer route to the same destination. Just as the Copenhagen Interpretation, say, and the many-worlds interpretation give the same 'answers' to quantum problems, so Lorentz's version of relativity and Einstein's special theory give the same 'answers' in all practical situations. **But they suggest different interpretations of what is going on."**

The theory of the creatons is quite in John Bell's direction.

I would end this introduction by giving the position of eminent scientists concerning the medium of propagation of light that I call OMNIUM in my book.

I will start to quote the physicist John Bell.

« John Bell, interviewed by Paul Davies in "The Ghost in the Atom" has suggested that an aether theory might help to resolve the EPR paradox by allowing a reference frame in which signals go faster than light. He suggests Lorentz contraction is perfectly coherent, not inconsistent with relativity, and could produce an aether theory perfectly consistent with the Michelson-Morley experiment. Bell suggests the aether was wrongly rejected on purely philosophical grounds: "**what is unobservable does not exist**". Einstein found the non-aether theory simpler and more elegant, but Bell suggests that doesn't rule it out.

Besides Lorentz himself has maintained his interpretation :

« However, Lorentz disagreed that it was "ad-hoc" and he argued in 1913 that there is little difference between his theory and the negation of a preferred reference frame, as in Einstein's and Minkowski's theory so that it is a matter of taste which theory one prefers. »

Finally, I can't finish on this point without pointing out that if Einstein has caused the "death" of the ether with his Special Relativity in 1905, afterwards he has often maintained the existence of the ether, in particular during a conference at the University of Leyden in 1920.