The Spacetime Model ®

Part 5/5

Forces, Universe

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In 2006, this theory was addressed to more than 7000 physicists worldwide by e-mail. Several paper copies were sent in October 2006 to the most important Academics of Science and Committees of Foundations for Research.

This theory was also published on November, 30, 2006, on 28 different web sites. It is also referenced on many sites such as Google, Google Books, Yahoo, DMOZ... Since 2006, more than 300,000 Internet Users (about 230,000 Physicists) have read it.

Important note

This paper attempts to explain some enigmas of modern physics. In this regard, some parts are speculations, but Science can only advance through speculative theories.

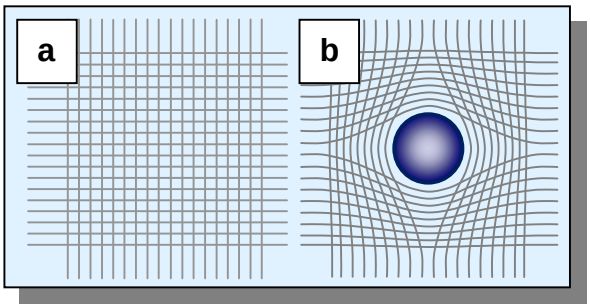
To date, the Spacetime Model, is nothing but a theory. Despite the fact that this theory is logical, coherent, and makes sense, the reader must be careful, bearing in mind that the Spacetime Model has not yet validated by experimentation.

Before reading…

To fully understand this part, the reader must be familiar with the deductions and results developed in previous parts. These results are summarized below:

The curvature of spacetime

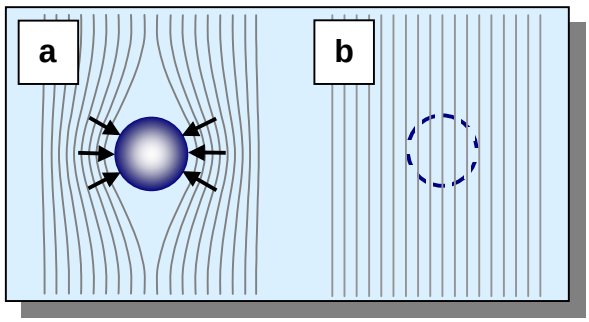
Lets consider a flat spacetime (a). It could be logical to consider that it is the volume, not the mass, that curves spacetime (b).



Einstein Field Equations and experimentations show that it is the mass, not the volume, that deforms spacetime… The solution to this enigma is given below.

Closed and open volumes

All volumes have not the same behaviour regarding spacetime. In reality, we have three classes of volumes:



a/ Volumes with mass, or "Closed volumes" such as elementary particles. Their internal spacetime "pushes" the surrounding spacetime to make room. Thus, "closed volumes" produce a convex curvature of spacetime. Since the latter has properties of elasticity (Einstein), it exerts a pressure on the surface of these volumes. As a result, a "mass effect" appears, i.e. an effect having all the characteristics of mass. The mass component [M] can be extracted from the pressure [M/LT^2] by simple mathematical operations. This conducts to a 4D expression of the mass as M = f(x,y,z,t).

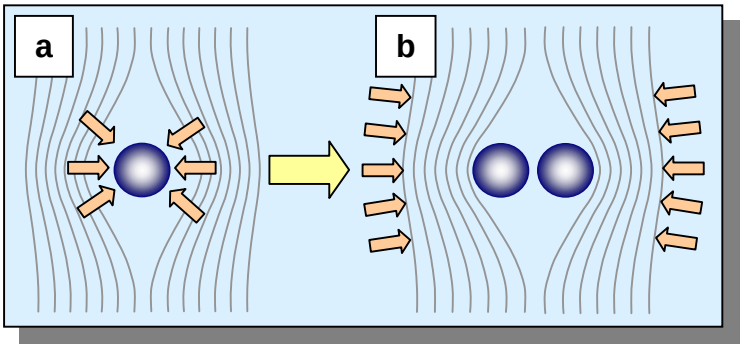
b/ Massless volumes, or "Open volumes". It is a vacuum but sometimes found in various forms such as the volumes of orbitals of atoms. These volumes exist but they are "porous" regarding spacetime. More exactly, they are subject to variations of spacetime but they don't curve spacetime themselves. Therefore, open volumes are massless since no curvature means no mass (Einstein).

c/ Apparent volumes are combinations of closed and open volumes. In atoms for example, the nucleus is a closed volume which has mass, whereas orbitals are massless open volumes. The proportion of closed/open volumes, i.e. volumes with/without mass, varies from one atom to another, from one molecule to another, from one object to another... This is why we feel that mass and volume are two different quantities. This is an illusion. It is the proportion of closed/open volumes that varies from one object to another, which gives us this feeling.

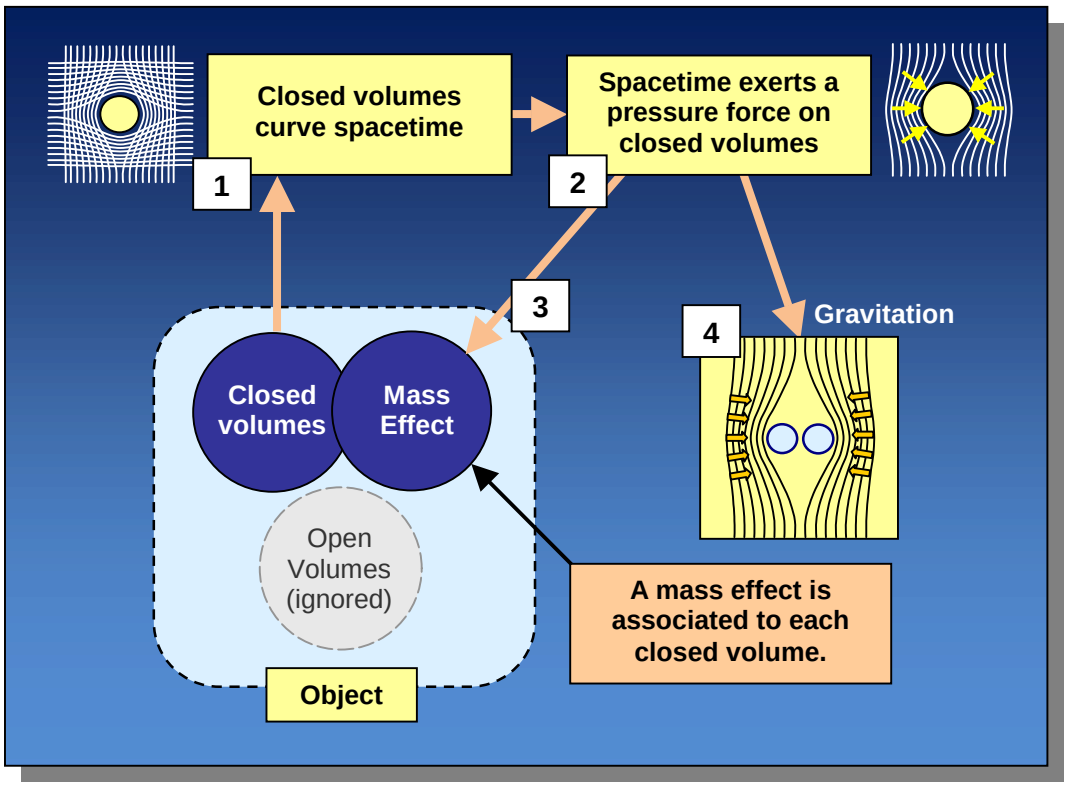
Mass and Gravitation

Two closed volumes inserted into spacetime curve it. Since spacetime is elastic, its curvature produces pressures on these two volumes. So:

Gravitation is not an attractive force between masses but a pressure force exerted by spacetime on closed volumes that tends to bring them closer to each other



As shown in this figure, mass and gravity are the same phenomenon



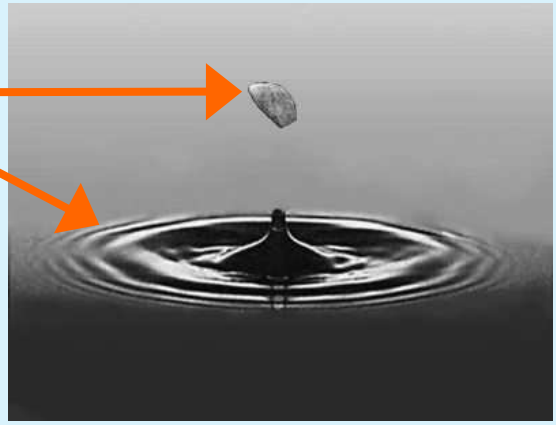
Note: Part 1 also covers the Higgs Field.

The Wave-Particle Duality

The following two figures fully explain the wave-particle duality.

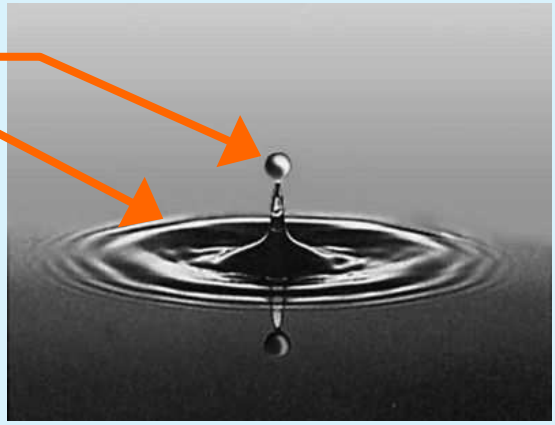
Example 1
A stone
and a water wave
*are of **different matter**.*

In that case, the wave-particle duality can't be explained. It is an enigma.



Example 2
A drop of water (corpuscle)
and a water wave
*are of **identical matter**.*
Water has either a corpuscle behavior or a wave behavior.

In this particular situation, wave-particle duality is explained with logic and consistency.



Particle	wood	stone	metal	**water**	glass	plastic	carbon
Wave	water	water	water	**water**	water	water	water
Medium	air	water	water	**water**	water	water	air
Duality ?	**No**	**No**	**No**	**YES**	**No**	**No**	**No**

Impossibility

Impossibility

Duality is fully explained
in this particular case

Wave – particle duality appears only in the very particular situation where the wave, the particle and the medium are of identical matter

The constitution of particles

Part 1 explains that mass and gravity also come from spacetime. Parts 2 and this part cover explanation of EM waves, which are nothing but spacetime vibrations, different than those due to gravitational waves. Linking this discovery, the wave-particle duality explanation, and experimentations such as the 511 KeV production from e+e- annihilations, we deduce that matter and waves, including De Broglie waves, are made of spacetime. More exactly, what we call "matter" is areas of low (electrons) and high (positrons) densities of spacetime. So:

Waves	=	**Matter**
(Spacetime variations)		*(Spacetime areas)*

The "sCells"

It would seem that the global spacetime of the universe is divided into quanta called "SpacetimeCells" or "sCells", which are nothing but neutral electrons. Therefore, sCells could have a closed volume equivalent to 511 KeV but, like neutrinos, they can't be detected.

In particular, sCells explain with logic and good sense the constitution of quarks and show where is located the antimatter in the Universe.

The "Distributed Charge" Model

The explanation of wave-particle duality leads to an important deduction: electrons are not moving around the nucleus as a punctual particle but as a sort of "cloud of charge". Indeed, the charge of the electron is distributed into the sCells surrounding the nucleus. Schrödinger's probability concept must be replaced by a more realistic concept called "Distributed Charge Model". However, quantum mechanics formulas as Schrödinger Equation are not modified by this new approach. It is only an explanation of the phenomenon.

Spin

Part 4 demonstrates that the rule of addition of spins is correct in 99% of cases. In quarks and some particles, this rule is violated. It seems that the spin could be a dynamic value which disappears when the particle is motionless. This view is confirmed by the Bose-Einstein Condensat. So, the rule of addition of spins can't be considered as a pertinent objection.

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1 Atom

Niels Bohr (Nobel Prize - 1922) thought that electrons were continually moving around the nucleus inside the atom. Around 1930, Schrödinger (Nobel Prize - 1933) created another concept: "probability density". The electron is a particle, as the third postulate of quantum mechanics indicates: "the probability of locating the ***particle*** *is described by the wavefunction…". The word "particle" is not ambiguous and doesn't mean a wave. This new concept was an improvement on Bohr's idea but did not solve the enigma of the quantification of orbitals.*

Here we show that atoms are built according to the "distributed charge model" described in Part 4. We will try to bring logical answers to some questions that are mathematically verified but, so far, remain unanswered.

1.1 Energy levels of orbitals

The Schrödinger Equation gives the mathematical solutions to orbitals with great accuracy but no one can rationally explain the principle of orbits. We can take the example of satellites orbiting around Earth. Of course, many satellites may share the same orbit. Why, in quantum mechanics, would it be different? If the electron is a particle which "is moving in all directions" around the nucleus, why the orbitals must be quantified?

Moreover, if the electron is a punctual particle, the Pauli Principle also can't be explained.

If the charge of the electron is distributed in several sCells around the nucleus, according to the "Distributed Charge Model", the quantification of orbitals becomes clear and obvious. The following example explains this idea.

Let's place five magnets, all oriented in the same direction (fig. 1-1), in a vertical rail. Each magnet is subject to gravity, which attracts it toward Earth, and to a repulsive force due to the adjacent magnets.

The lower magnets carry the total weight of the upper ones. This is why spaces between magnets are not equally drawn. The levels E_1, E_2, E_3… are, thus, dynamically built.

By repeating the same experiment any number of times and under the same conditions, we will always find the same spaces E_1, E_2, E_3… We could think that these magnets are systematically placed on imaginary rails, or "quantum rails", E_1, E_2, E_3… In other words, we could think that the position of each magnet E_1, E_2, E_3…is "quantified".

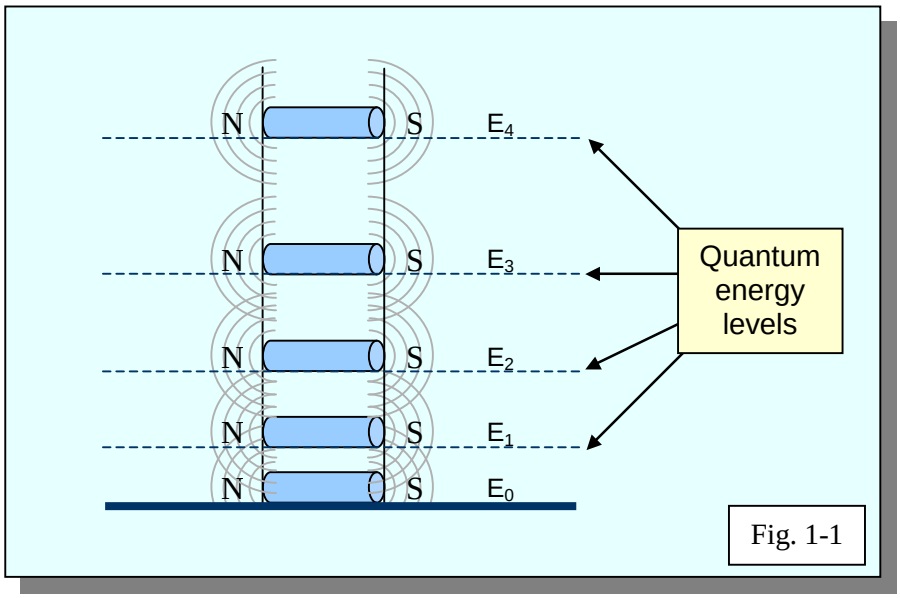


Fig. 1-1

This example explains the origin of the quantification of orbitals in atoms[1].

If the electron is distributed in the sCells surrounding the nucleus, according to the "distributed charges" model, this enigma no longer exists. The above example explains the construction of orbitals inside the atom. In particular, we must note that the orbitals are **dynamically** built. In other words, quantum levels are not "predefined".

In the following example, if the magnet E_1 is removed, the magnet E_2 drops down and takes the empty place of the removed magnet (fig. 1-2). Other magnets also drop down one level. Energy levels in atoms follow the same principle. The only difference is that the Coulomb force replace the magnetic force of magnets. Spin is also omitted.

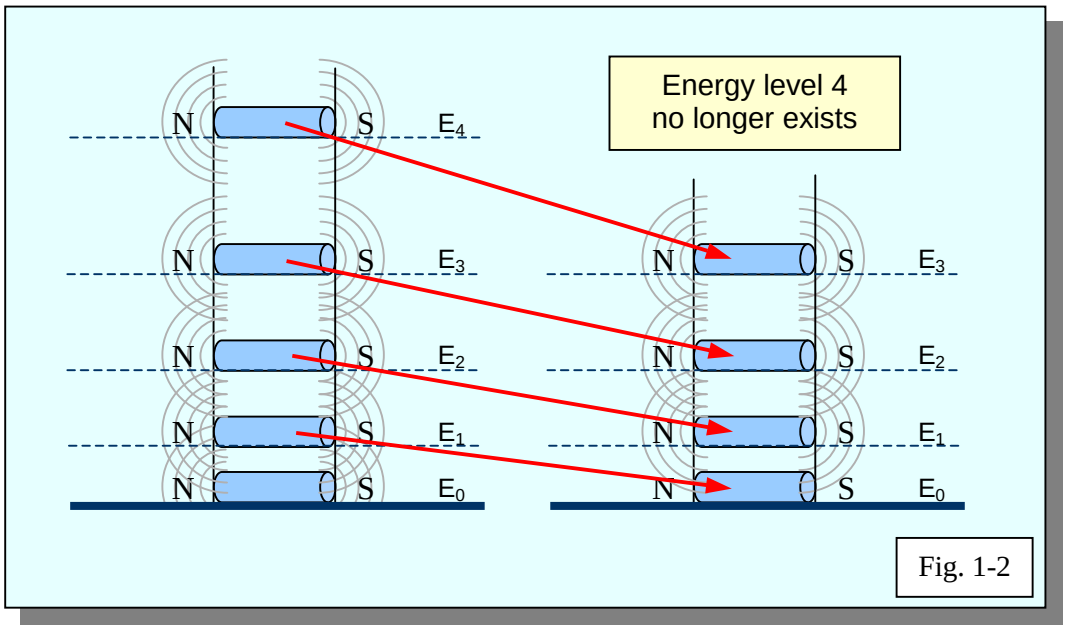
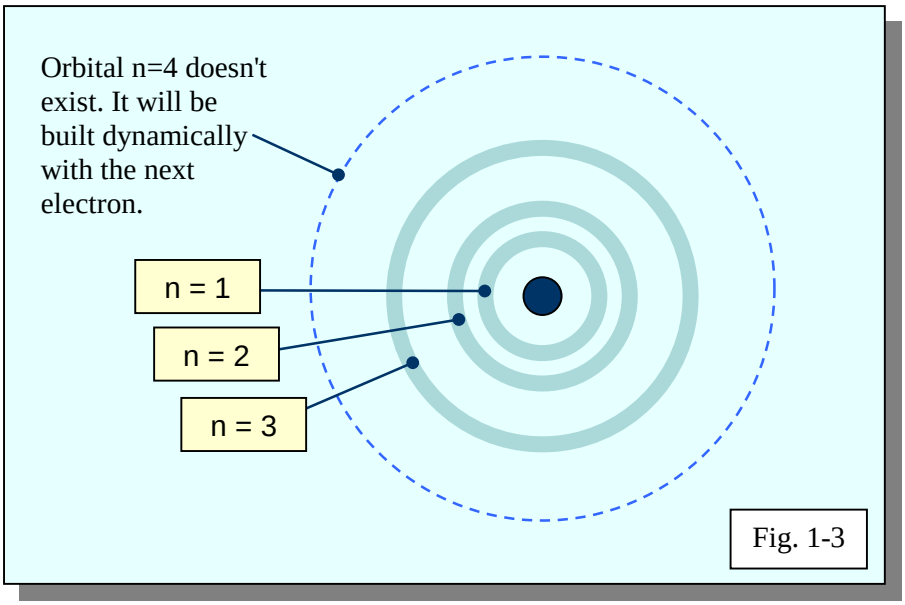


Fig. 1-2

[1] In quantum mechanics, there is often confusion between “discrete” and “quantified”. In the Schrödinger Equation, we have both definitions. On one hand, the Laguerre Polynomials, which are a solution of the Schrödinger Equation, are discrete. On the other hand, the Planck Constant is a quantified quantity. In this document, when the two concepts are simultaneously present, we will use the qualifier of “quantified”, even if this word is not entirely correct.

Fig. 1-3 shows the principle of the “distributed charge” model inside the atom. This diagram is only for illustration since, as we know, orbitals are not spherical.



for teaching purposes, secondary levels (l, p…) have been omitted.

To summarize, we can state:

- Levels are **dynamically built**, one after the other.
- An atom cannot have high-level orbitals if low-level ones do not exist. There are, however, a few exceptions[1].
- Since the levels are dynamically built, electrons always tend to fill empty layers.
- If an external disturbance occurs, it modifies the overall magnetic field. In such a case, all the levels may be displaced (level degeneration).

To sum up, the quantification of orbitals is misunderstanding. The solution of the Schrödinger Equation is a discrete suite of terms[2]. Physicists thought that levels are quantified inside the atom. This is not true. Orbitals are not quantified but are dynamically built taking into account electrons that are still in place. New electrons are distributed in sCells around the nucleus, and take their natural place on orbitals having the most favourable Coulomb Force.

1.2 The E0 energy level

In quantum mechanics, we have another enigma regarding the atom: why doesn't the electron drop on the nucleus yielding its energy? If the electron was a punctual particle moving around the nucleus, this enigma exists and can't be solved.

[1] Sometimes, some orbitals are far from each other. This is the case of the "p" layer orbitals. We can also have coinciding energy levels of layers, like "s" and "p" for example (layers known as "sp").

[2] Similar situations also exist on Earth. For example, the propagation of the waves on the membrane of a drum uses Bessel Functions, which are similar to Laguerre Polynomials (both are solutions to the Hypergeometric Gauss Function). We do not deduct for all that the membrane of a drum is quantified.

The E_0 energy level was imagined to solve such a phenomenon, but this explanation is only a theory, nothing more. Since the charge is distributed in sCells, the overall charge surrounding the nucleus is stable. This problem doesn't exist in the Spacetime Model and the E_0 energy level has no reason to be.

1.3 Schrödinger Equation

The Schrödinger Equation introduces another enigma: the probability of the presence of electrons is maximal at the center of the nucleus. Why does this curiosity exist?

In the Spacetime Model, the Schrödinger Equation doesn't relate to a probability but to a part of the overall charge. Since the nucleus (the main charge) is precisely located in the center of the atom, the maximum charge is obviously focused in the center. This explains the enigma.

1.4 The Pauli Principle

The Pauli Principle is fully demonstrated but no one can explain it. Indeed, if electrons are those punctual particles moving around the nucleus, the Pauli Principle remains a true enigma. For example, would it not be logical to consider that more than two satellites may share the same orbit around Earth. Why would it be different in quantum mechanics?

Fig. 1-4 shows the simplest case: layer n=1 filled with one or two electrons. Electrons are distributed in several sCells in their wave form (not as punctual particles). If two electrons fill the same orbital, the spin locks them up. This is due to the polarization of spin (see Part 4).

The charge of two electrons is different of the charge of only one, and orbitals are necessary different. So, when one electron is ejected from (B), the remaining electron takes another orbital (A) with a different energy level. This is why spin produces multiple lines.

So, this view, which is only a suggestion, solves both the Exclusion Pauli principle and the multiple lines due to spin in atomic spectroscopy.

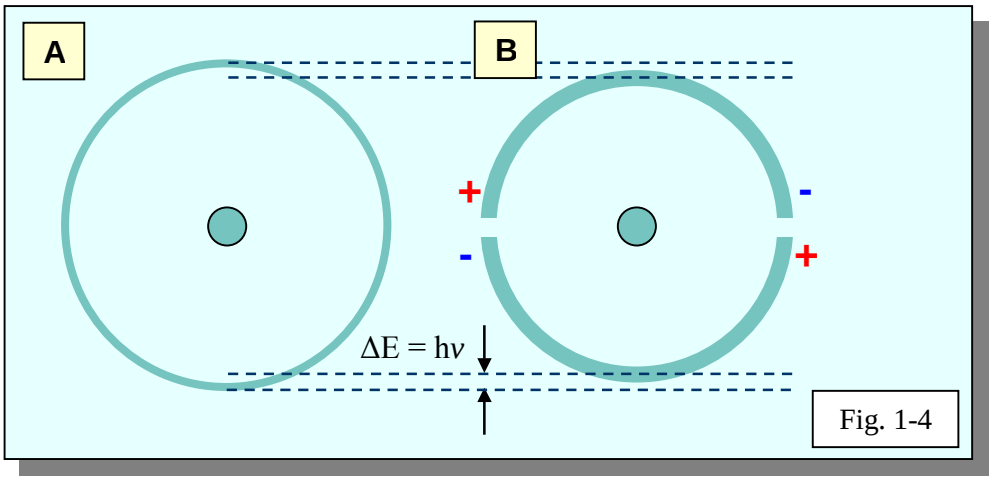


Fig. 1-4

2 Nucleus

We could think that the nucleus is built on the same principle as that of the quarks, leptons, mesons, baryons and atoms, i.e. the "distributed charge" model.

This chapter does not undertake a complete study of the nucleus, this subject being so huge, but proposes suggestions according to the "distributed charge" model.

2.1 Isobars

Usually, nucleus graphs are plotted from the atomic number "A", the neutron number "N" or the proton number "Z". The figure 1-1 was drawn on a u quark basis. The u quarks inside the d quarks were taken into account. That is to say, each proton is made up of three u quarks and one electron, and each neutron is made up of three u quarks and two electrons.

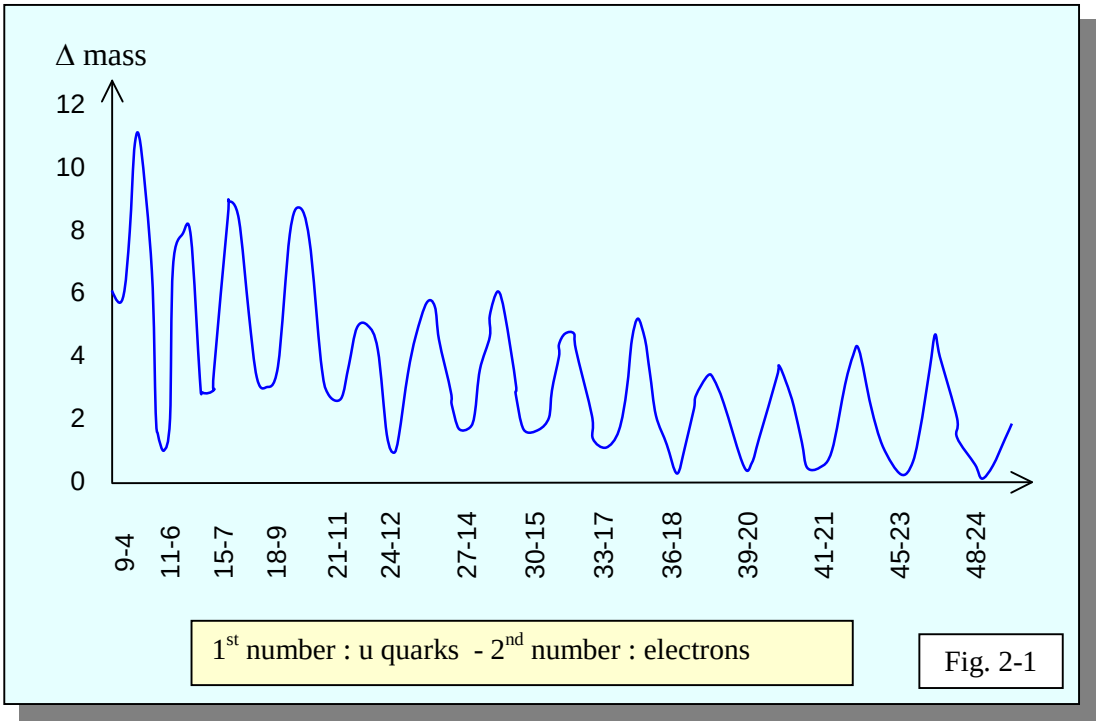


Fig. 2-1

This graph covers the first nuclei, those for which the mass number goes from 3 to 16. The X-coordinates thus go from 9 to 48 since each nucleon, proton or neutron, has three up quarks. The mass of each nucleus was initially divided by the mass number A. An offset of 930,9 MeV was subtracted from each element in order to make the graph more readable[1].

Figure 2-1 shows a simplified graph. A more precise graph emphasizes that the lowest point of each isobar's group is always reached when the number of electrons is equal to half the number of u quarks, including the d quark electrons.

This conclusion is very important since it gives additional proof that the d quark is made up of a u quark and an electron

2.2 Isotopes

The lowest point noted with the isobars is repeated with the isotopes. However, examination of the curves shows that the mass of each isotope oscillates with a period of two elements.

In order to better emphasize this oscillation, the difference between two adjacent isotopes, the derivative, has been plotted. Thus, every other time, we have a negative derivative (fig. 2-2 and 2-3). The object of these graphs is to know **what the electron of the d quarks becomes inside the neutron**. For that, it is necessary that the number of protons doesn't vary.

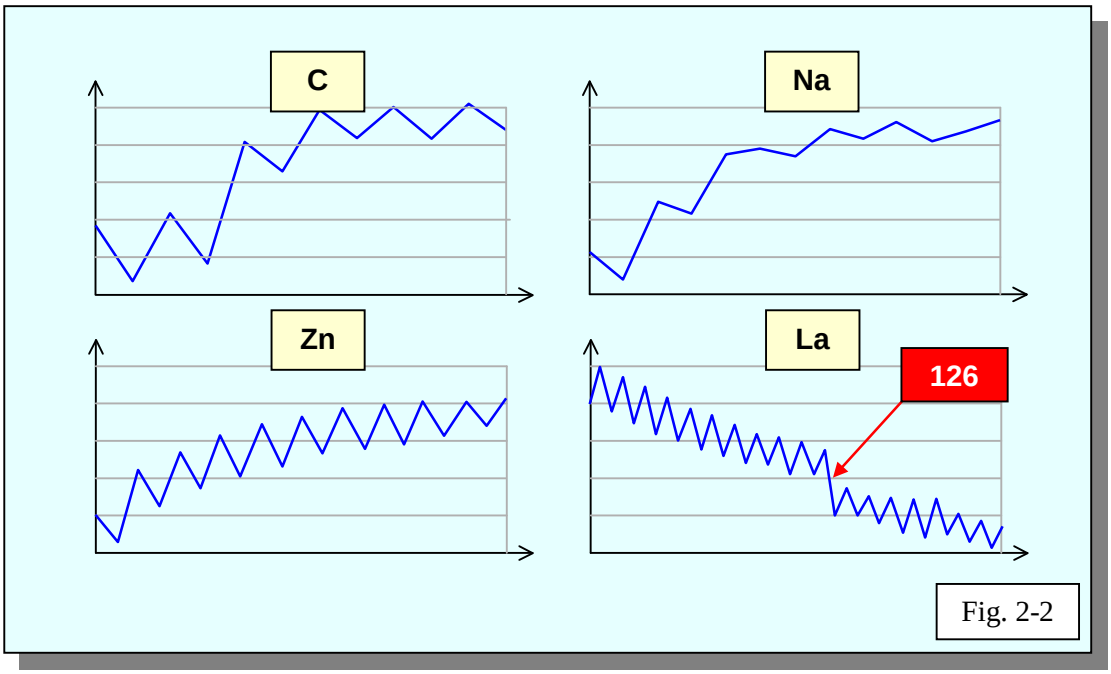


Fig. 2-2

[1] There have been many studies of atoms. However, it is the interpretation that is particularly interesting because this study has a new basis, namely that the d quark is made up of a u quark surrounded by an electron. This appears to highlight a binary structure, in figures 2-2 and 2-3.

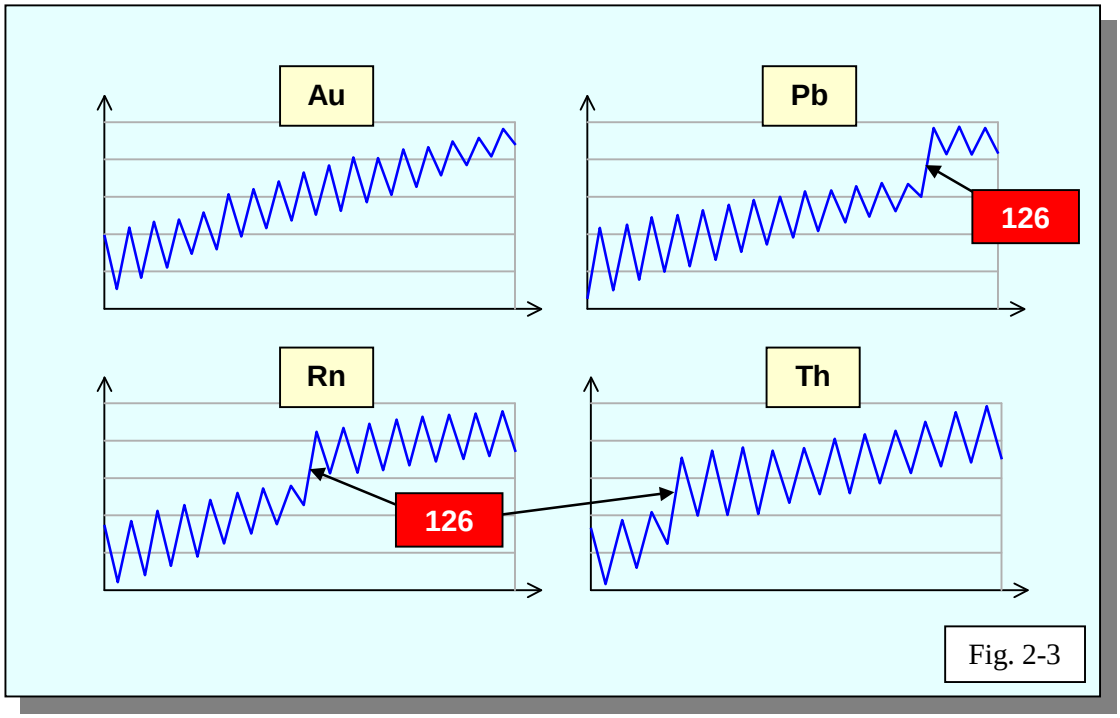


Fig. 2-3

On these graphs, the mass increases and decreases alternately in steps of two neutrons. On the other hand, these graphs show an anomaly at 126, which is a "magic number".

These graphs don't leave any doubt about the binary structure of the nucleus

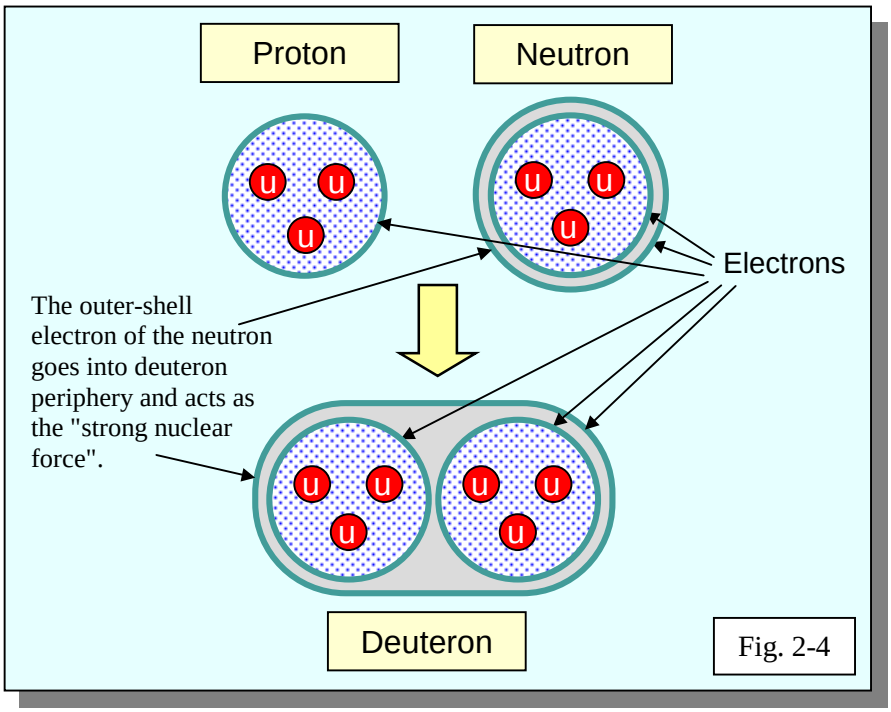
2.3 Deuteron structure of the nucleus

The only possible explanation of this binary structure is to consider that the nucleus has a deuteron (deuterium nucleus) structure (fig. 2-4). It seems to be no other alternative.

It is highly probable, when a neutron meets a proton inside the nucleus, that the outer-shell electron of the neutron “phagocytes” the proton to make a deuteron. Deuterons would not, therefore, be composed entirely of a proton and a neutron, but of two protons and an outer-shell electron, **which act as a strong nuclear force**, keeping the two protons locked inside the deuteron.

This scheme could explain 1/ the binary structure observed, and 2/ the strong nuclear force of the nucleus.

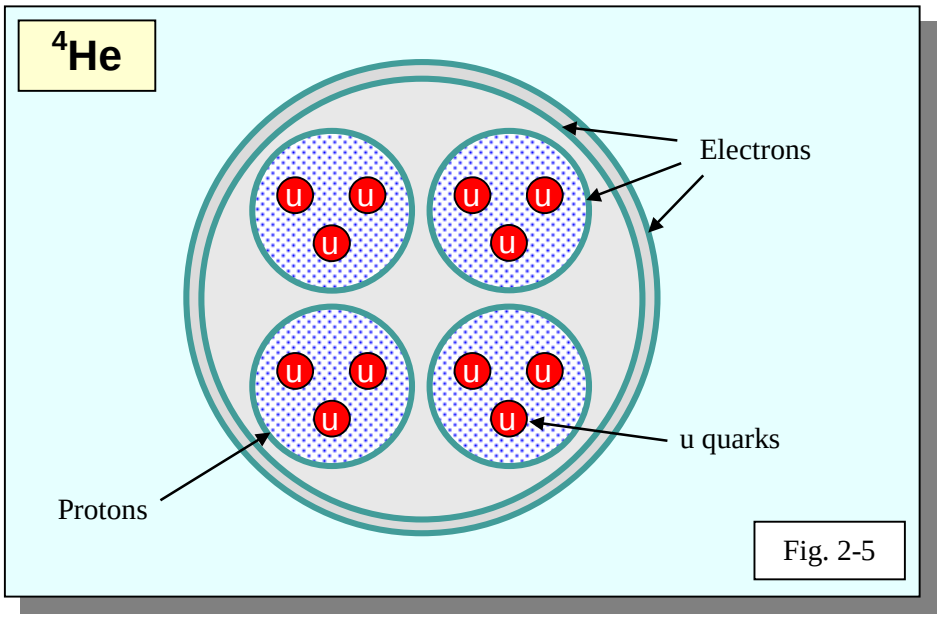
Moreover, the structure in two protons and one electron of the deuteron is more homogeneous and logical than the structure of one proton and one neutron. It should be noted that other structures, like e-(e-(e-(u u u u u u))) or e-(e-(u u u (e-(u u u)))) (see Part 4) are also possible but improbable.



2.4 The He nucleus

Since alpha particles are helium nuclei, physicists suspect the He structure to be one of the basic structures of the nucleus.

Within the "distributed charge" model, many configurations are possible for the He structure. However, taking into account the great stability of this nucleus, it is judicious to think that the following scheme (fig. 2-5) is the most probable. This configuration is very close to the deuteron scheme (fig. 2-4). It has 6 electrons and 8 positrons since 2 positrons makes 3 u quarks. So, the overall charge is –6 +2 = +2, i.e. the charge of the ^{4}He nucleus.

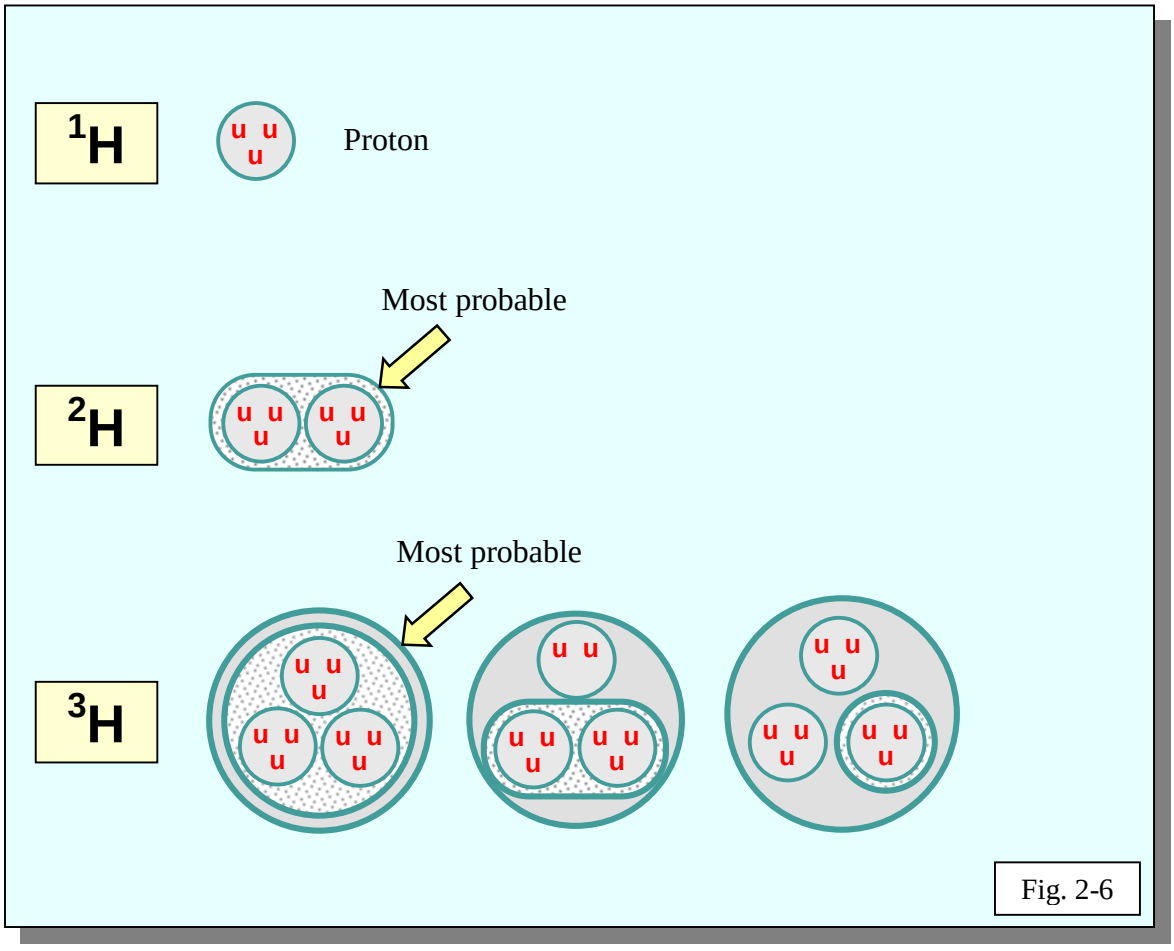


This scheme seems confirmed by the experimentation because the two outer-shell electrons of the ^{4}He nucleus make it particularly strong. Alpha particles are also very strong.

2.5 H isotopes

Figures 2-6 and 2-7 cover the possible configurations of H isotopes where electrons replace the strong nuclear force. There is also a possibility ^{2}H and ^{3}H, here not represented, that u quarks are separated and their electrons goes in the periphery of the nucleus to act as the strong nuclear force. However, the binary structure of the nucleus suggest that this possibility is less probable than the other schemes here shown.

Please note that these diagrams are only for teaching purposes.



2.6 ^{4}H isotope

The ^{4}H isotope (fig. 2-7, next page) may lead to different schemes using protons with one, two and three outer-shell electrons.

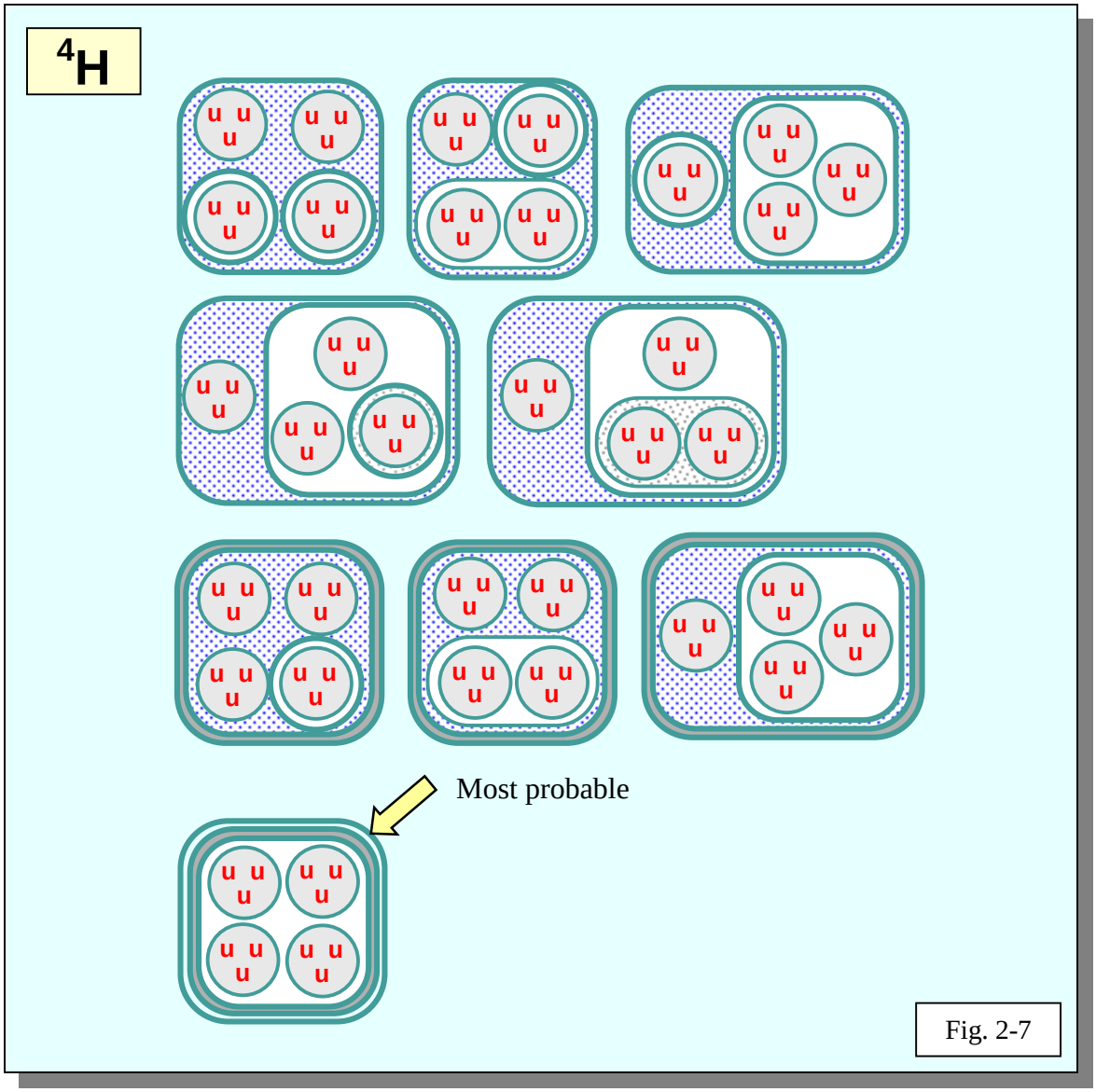


Fig. 2-7

These schemes are only suggestions. Intuitively, the binary structure of the nucleus suggests that, inside the nucleus, protons and deuterons toggle. So, the most probable configurations are when electrons surround protons. The correct configuration would require some investment of time, and must be in accordance with many parameters: decay modes, binding energy, volume differences from one isotope to another, the mass derivative, quadripolar moment etc…

It should be pointed out, once more, that if a decay or radioactivity produces protons and neutrons such as alpha particles, it does not mean that these particles were parts of the nucleus before the interaction per se. Maybe the nucleus contains a "soup" of u quarks with all electrons in its periphery. Protons, neutrons, d quarks are produced during the interaction. On the other hand, since waves and particles are both created from spacetime, it is necessary to bear in mind that ***what we see is not necessarily what really exists***. The only thing we can be sure of is that all these particles and waves come from spacetime (see Part 2).

2.7 Possible explanation of binary steps

The binary oscillations of figures 2-2 and 2-3 suggest that, when a group of isotopes is examined, the nucleus is created in two phases (fig. 2-8).

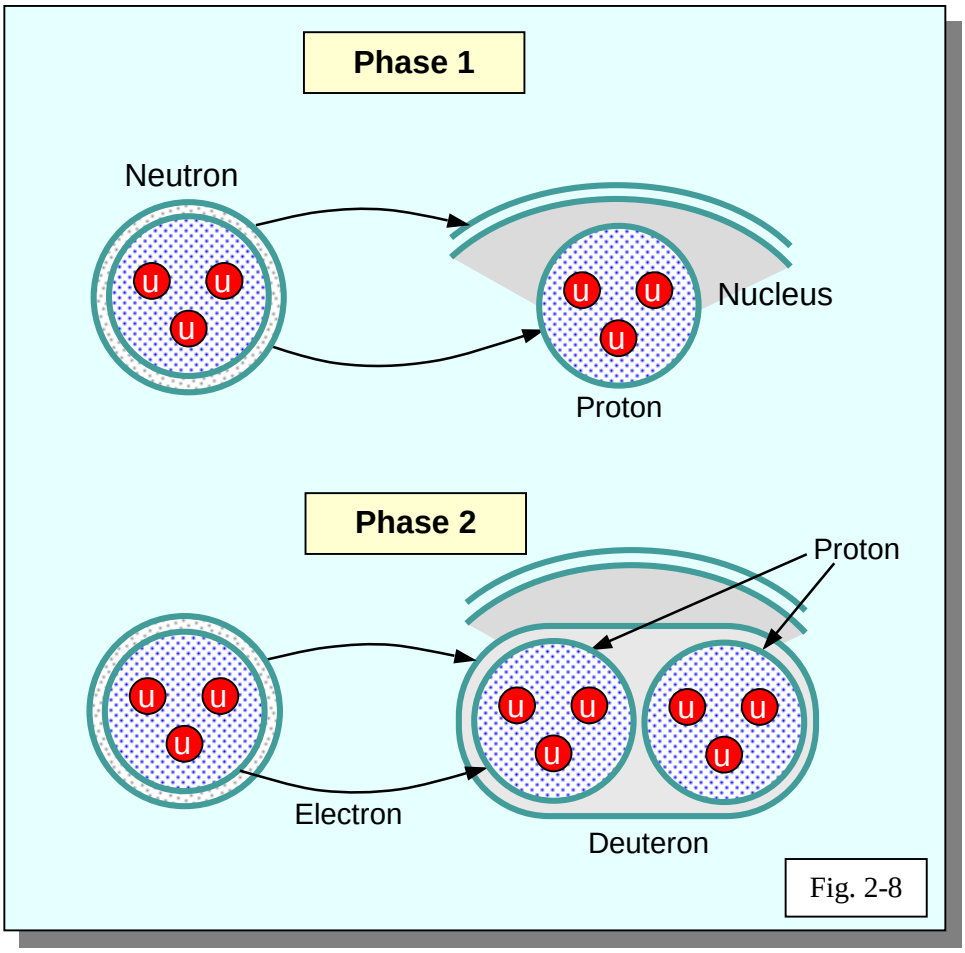


Fig. 2-8

Phase 1: The first neutron takes its place in the nucleus as a proton. It is stripped from its electron. The latter joins the other electrons on the nucleus's periphery

Phase 2: The second neutron takes its place in the nucleus as a proton. Its electron also surrounds the preceding proton, making a deuteron, instead of going on the periphery of the nucleus.

In both cases, the volume of the nucleus increases since it contains one more proton. This volume difference comes from the location of electrons.

When the electron goes on the nucleus's periphery, it produces an increase in volume. When it is used to make a deuteron, the increase in volume is different. This could explain the binary steps[1].

[1] We can suppose that the electron decreases the Coulomb Field inside the nucleus and the repulsion force between protons is decreased too. However, this is only an assumption.

These two phases are repeated in a loop. Thus, we have a succession of increasing and decreasing volumes in a same isotope group.

It is also possible that the electrons go on the periphery, two per outer layer, such as in the orbitals of the atom, as the Pauli Principle states. This process could also explain the periodicity of two.

2.8 The Bethe – Weizsäcker Formula

This formula determines the binding energy of a nucleus of mass $m_{(A, Z)}$:

$$B = a_v A - a_s A^{2/3} - a_c Z^2/A^{1/3} - a_a (N - Z)^2/A + C$$

- The first term is the volume energy (a_v = 15,56 MeV).
- The second term is the surface energy (a_s = 17,23 MeV).
- The third term comes from the Coulomb Force (a_c = 0,7 MeV).
- The fourth term is an asymmetry energy (a_a = 23,6 MeV)
- C is an adjustment constant.

The traditional strong nuclear force is not in accordance with this formula. The problem lies in the two following terms:

1. **Surface energy[1]:** The strong nuclear force supposes linking protons and neutrons inside the nucleus. Under no circumstances is this force a "surface force". In this way, the Bethe-Weizsäcker Formula should not have a surface term.

   Within the Spacetime Model, the surface component term is perfectly logical because it matches exactly our model of outer-shell electrons acting like a rubber band to explain the strong nuclear force.

2. **The Coulomb Force:** A similar problem is met with the Coulomb term. Since the Coulomb Force is far less important than the strong nuclear force, this term is unexplainable in the Bethe-Weizsäcker Formula.

   Within this Spacetime Model, the nucleus volume comes from the repulsion force between protons. The presence of a Coulomb term in this formula is, therefore, perfectly logical. **It is even a necessity.**

Another point must also be considered. The nuclear volume, i.e. the mass, and the binding energy increase both as A, the atomic number. Currently, physicists think that the nuclear forces are saturated since each nucleon interacts only with its neighbours.

If we consider that the neutrons are transformed into protons inside the nucleus, the atomic number A relates the overall number of protons, i.e. addition of the original protons and the protons coming from neutrons.

[1] The explanation of this surface energy usually uses the Van Der Walls Model. The author is not fully convinced by this model, which is a good comparison, but not a reliable explanation of the phenomenon.

In other words, it is highly probable that

The nucleus doesn't have Z protons and N neutrons, but rather A protons and N electrons.

All these protons make a repulsive Coulomb Force between them, which creates the volume (see Part 1). **It is, therefore, normal that the volume increases as the atomic number does.** It is only a simple Coulomb problem, and not a complex and unexplained phenomenon of saturated forces.

To summarize, the Bethe-Weizsäcker Formula doesn't explain the present strong nuclear force of the nucleus, but this formula is in perfect accordance with the Spacetime Model.

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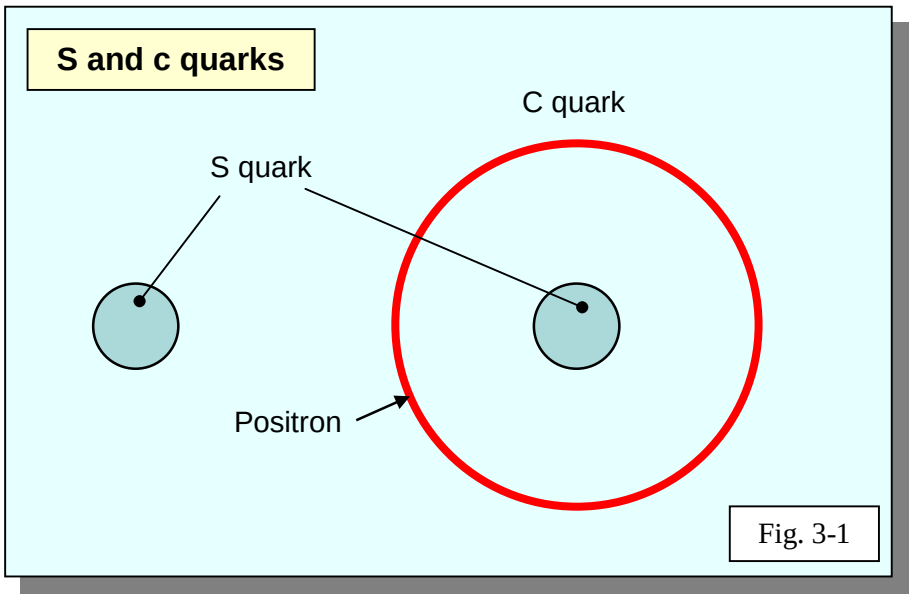
3 Quarks and Mesons

This chapter covers the other quarks and mesons in accordance with the "distributed charge" model. However, this chapter contains only suggestions which, to date, are not verified. Therefore this information must be taken with care.

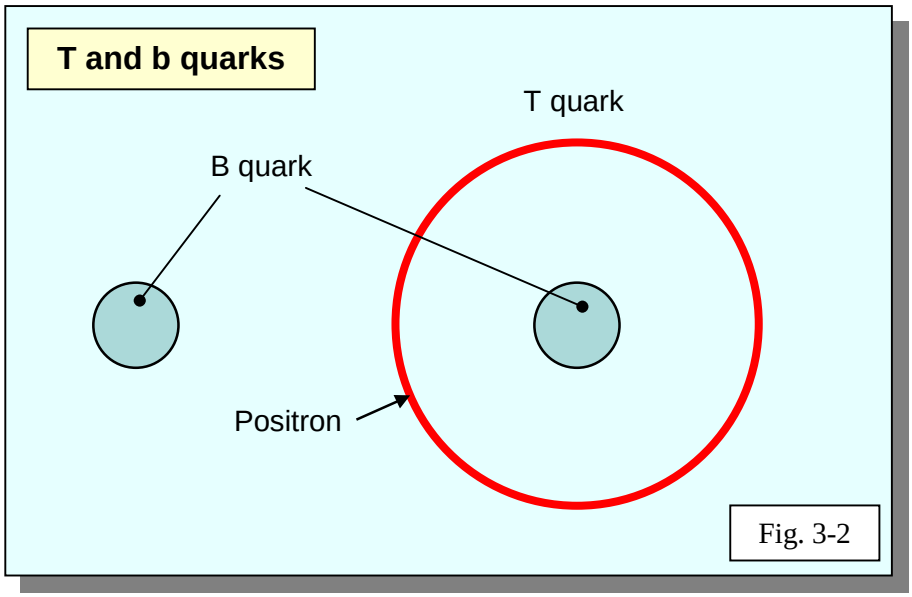
3.1 C and s quarks

In the "distributed charge" model, it would seem that the charmed quark would rise from the strange quark (fig. 3-1). A positron may surround the s quark. SCells, which are enclosed between the positron and the s quark, explain the difference of mass.



3.2 T and b quarks

As we know, the t quark mass is huge, 178 000 MeV. This does not mean, however, that it contains a great number of components. Since it is a closed volume. Few electrons and positrons are sufficient to make a t quark having a huge closed volume of 178 000 MeV. Inside this quark, we would probably find that 99,99999% is made up of sCells. The t quark has a volume hermetic to spacetime. Therefore, it has mass.

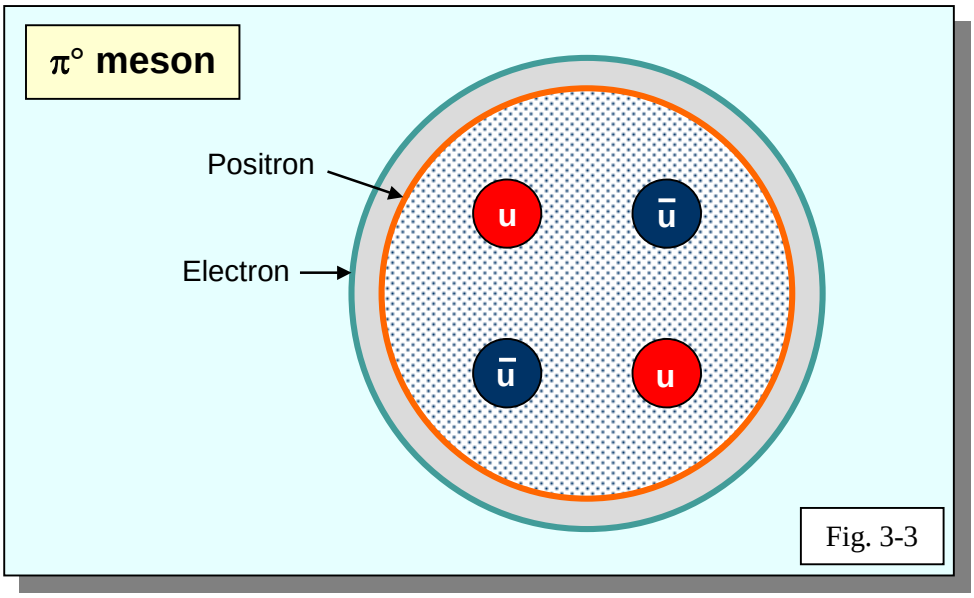


3.3 The π° meson

The π° meson would be made up of four quarks, u, anti u, d and anti d quarks. However, all physicists do not agree on this configuration; some papers indicate different schemes. This is normal since particles are made of spacetime (Part 2), and spacetime vibrations (gammas) can decay in various particles or associations of basic particles.

The electron and the positron come from the d and anti d quarks (fig. 3-3). These two particles maintain the four quarks locked inside the meson and act as the strong nuclear force.

Please note that the position of the electron and the positron may be swapped. Other configurations are also possible.



3.4 π meson vs. proton

The four quarks introduce attractive and repulsive forces (fig. 3-4 A). In the proton and the neutron, the three u quarks produce exclusively repulsive forces (fig. 3-4 B). This is why the closed volume, i.e. the mass, of the proton (938 MeV) or neutron (939 MeV) is greater than that of the π° meson (135 MeV), although this last contains an additional quark.

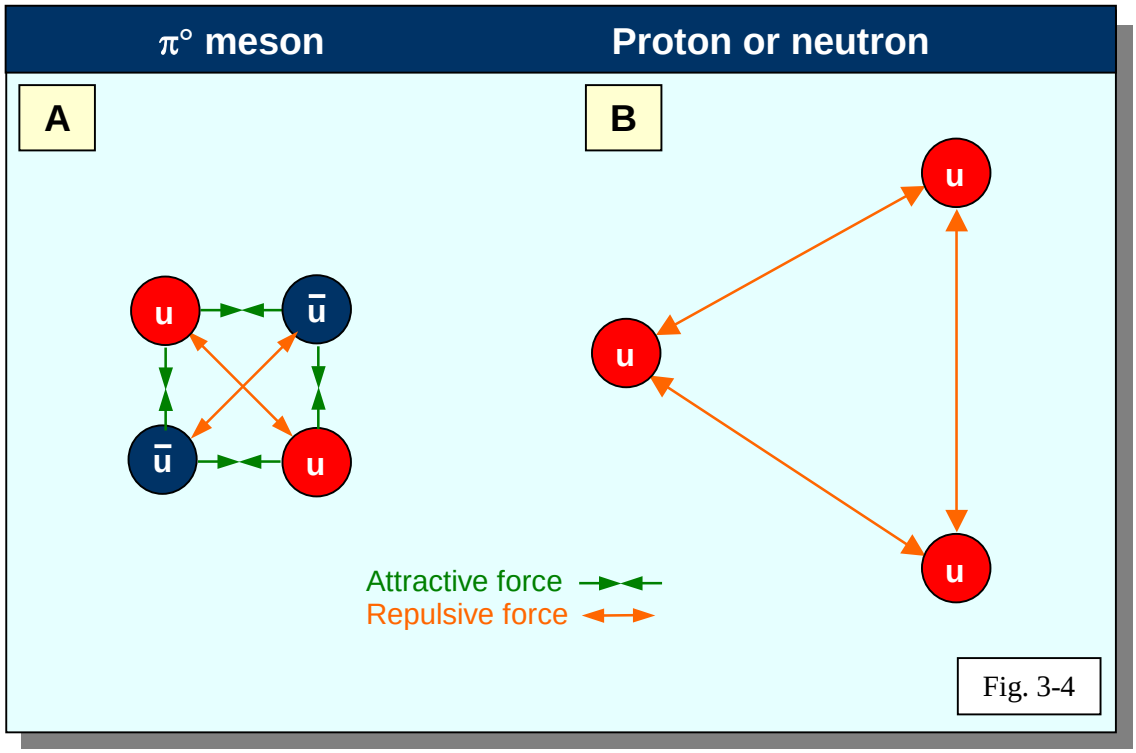


Fig. 3-4

3.5 Decay of the π meson

Assuming figure 3-4 is correct, the stability of the quarks is broken during an interaction. The two pairs of quarks are destroyed, as in the case of the electron and the positron of the π° meson. There remains only the electron or the positron from the external layer (fig. 3-5).

This internal annihilation is possible because the u-anti u pairs are very close to each other. The interaction is immediate and internal and, therefore, invisible to the experimenter. It is possible that such invisible interactions are more frequent than we would think.

This scheme (fig. 2-7) is in perfect accordance with experimentation that gives:

Neutral pion: 134,9766 MeV
Charged pion: 139,57018 MeV

The remaining electron or positron has a volume close to that of the π meson. This scheme suggests a muon (105 MeV) as a result. This is exactly what the experimentation indicates, with a Γ/Γtotal of 99,9877%.

Note: *The figure 2-7 is generic and may be adapted to other particles.*

Decay of the charged pion in a muon

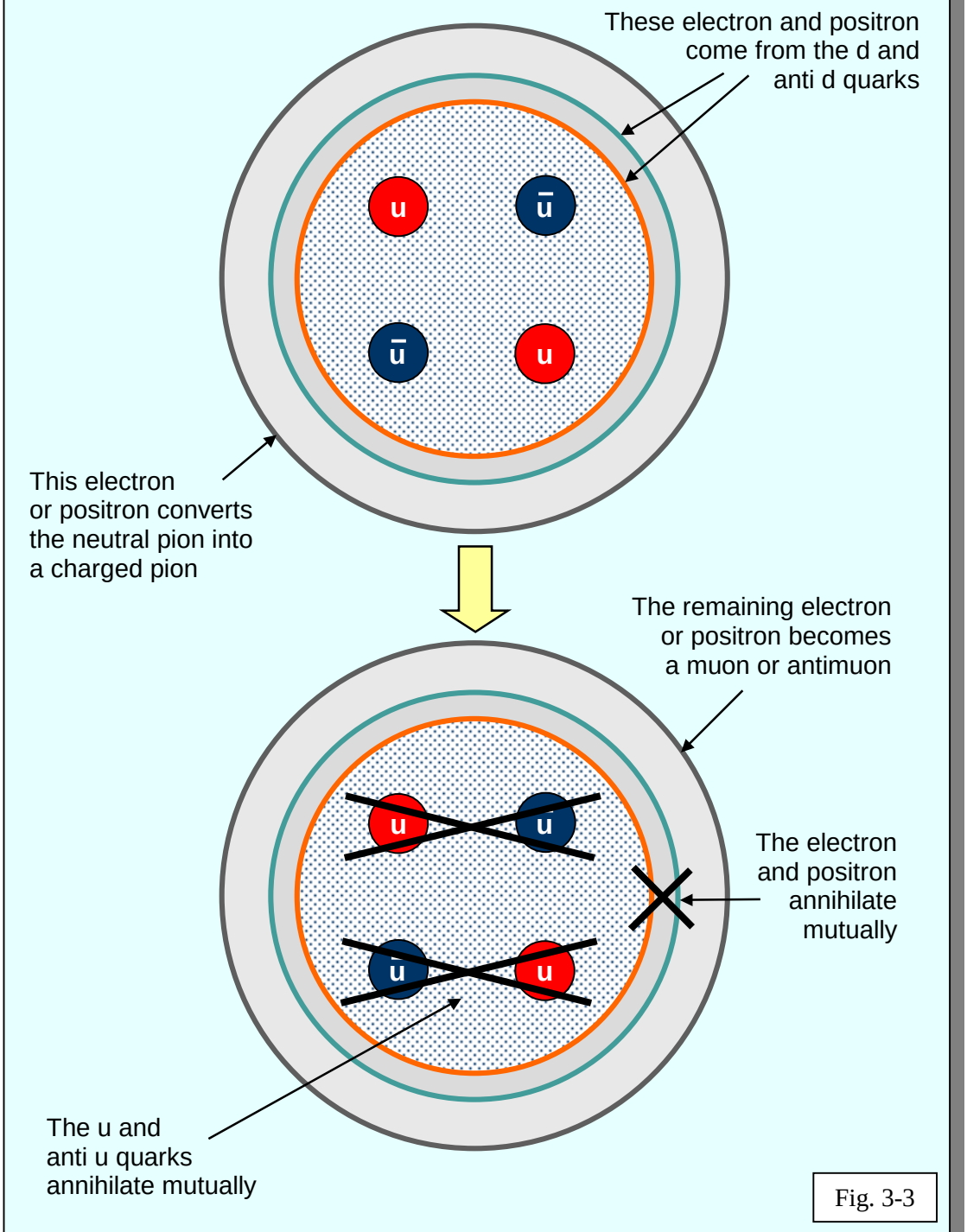


Fig. 3-3

4 Radioactivity

Some types of radioactivity remain unexplained. For example, it is difficult to understand from where the electron comes in β- radioactivity, since we suppose that the neutron (u d d) doesn't have an electron.

This chapter provides an answer to some questions about the origin of radioactivity within the framework of the Spacetime Model. It must be noted that this chapter covers only the basic principle of radioactivity, not the behaviour of the electroweak force. Therefore, the W/Z theory, which is correct in all points, is not discussed here.

4.1 Introduction

Radioactivity always takes its source in spacetime movements inside the nucleus. If the internal configuration of the nucleus is a little unstable, these spacetime movements break the deuteron, alpha or other structures.

On a mathematical point of view, we know that any wave, in a closed space, produces reflective secondary waves. Inside the nucleus, a multitude of waves are permanently reflected on electrons, protons, deuterons etc…. These waves are mathematically represented by vectors, such as gluons, bosons etc…. They are by no means particles but spacetime waves idealized by vectors.

Thus, what we call “bosons exchanges” are nothing but EM waves and their own multiple reflections from any part.

We know that quarks, leptons, bosons, waves… are made of spacetime (see Parts 2 and 3). So, it is not exceptional to see a W^- boson being transformed into an electron or anything else since W bosons and electrons are both made of spacetime.

4.2 β^- radioactivity

Some suggestions of possible schemes are represented in figure 4-1, next page.

The mass of a β^- isotope is higher than the mass of the chemical element. There is an excessive number of neutrons. The Spacetime Model says that the neutron is a proton with an electron (spin is no longer an objection to this assertion – see Part 4). This tends to prove that

the electron emitted from the nucleus comes from a neutron which is transformed into a proton, from a deuteron (see chapter 2) or from peripheral electrons acting as the strong nuclear force. Whatever the origin of the electron, radioactivity β^- tends to confirms that the neutron structure has at least one electron.

Note: The neutrino has not been represented in figures 4-1 and 4-2.

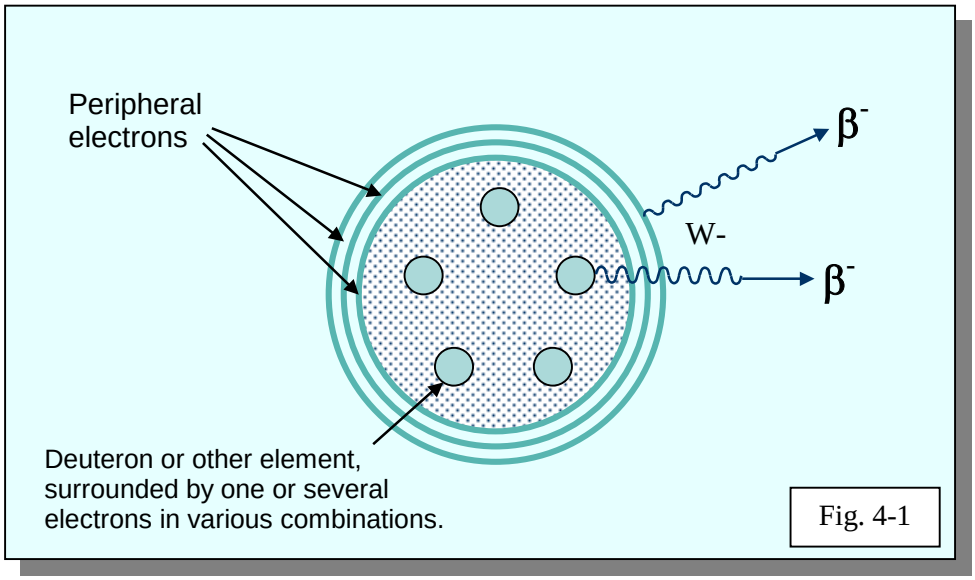


Fig. 4-1

4.3 β^+ radioactivity

The mass of a β+ isotope is lower than the mass of the chemical element of reference. There is a lack of neutrons. Since a neutron is probably a proton with an electron, there is a lack of electrons too. One of the possibilities of the β+ radioactivity is a spacetime movement produced inside the nucleus (fig. 4-2) which fills the missing electron in the neutron.

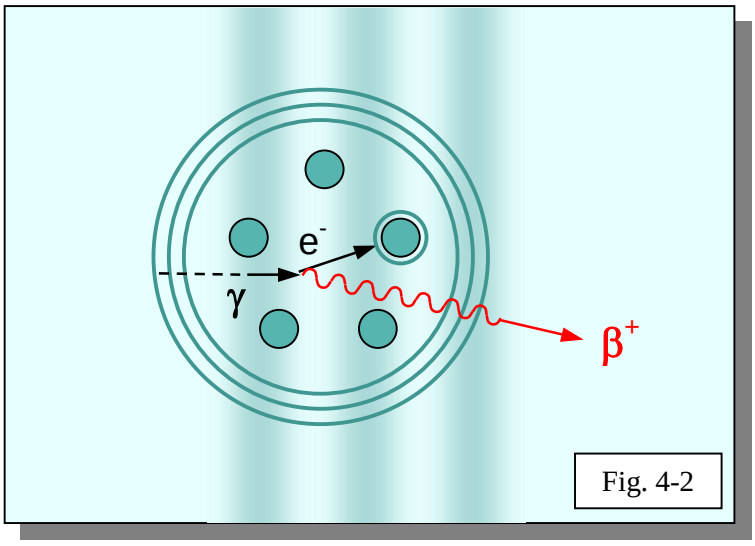


Fig. 4-2

We know that a gamma ray moving near a nucleus splits into electron(s) and positron(s) if its energy is sufficient. This subject was discussed in part 2. It is not possible to be nearer to a nucleus that inside the nucleus itself. This means that any high energy EM wave crossing a nucleus or created inside the nucleus may produce electron- positron pair(s).

The electron issued from the gamma is immediately used to link protons into binomials, like deuterons, or into other configurations. The positron is ejected by way of a W+ boson and maybe a tunnel effect thru peripheral electrons. Other schemes are also possible but this one gives a rational explanation of β+ radioactivity in perfect accordance with experimentation.

Since a gamma, a positron and a W+ boson are all made of spacetime, waves are converted into particles and the converse. All these interactions are very simple to understand, but require complex mathematics to describe them (QCD).

It should be pointed out that all these phenomena are well known: e+e- annihilation, e+e- creation…. Inside the nucleus, we probably have the same phenomena.

4.4 Alpha radioactivity

Alpha radioactivity lets us suppose that the He configuration is already present inside the heavy nucleus. However, we don't have proof of this.

Taking into account the "binary steps" of the nucleus, the Spacetime Model considers that the alpha is built by two deuterons when these particles take off the nucleus (fig. 4-3). Since the concept of "binary steps" is a reality (see graphs 2-2 and 2-3), alpha radioactivity must be in accordance with this configuration.

We consider that alpha particles are directly emitted from the nucleus. This point of view doesn't explain the binary steps, whereas the proposed scheme (fig. 4-3) does.

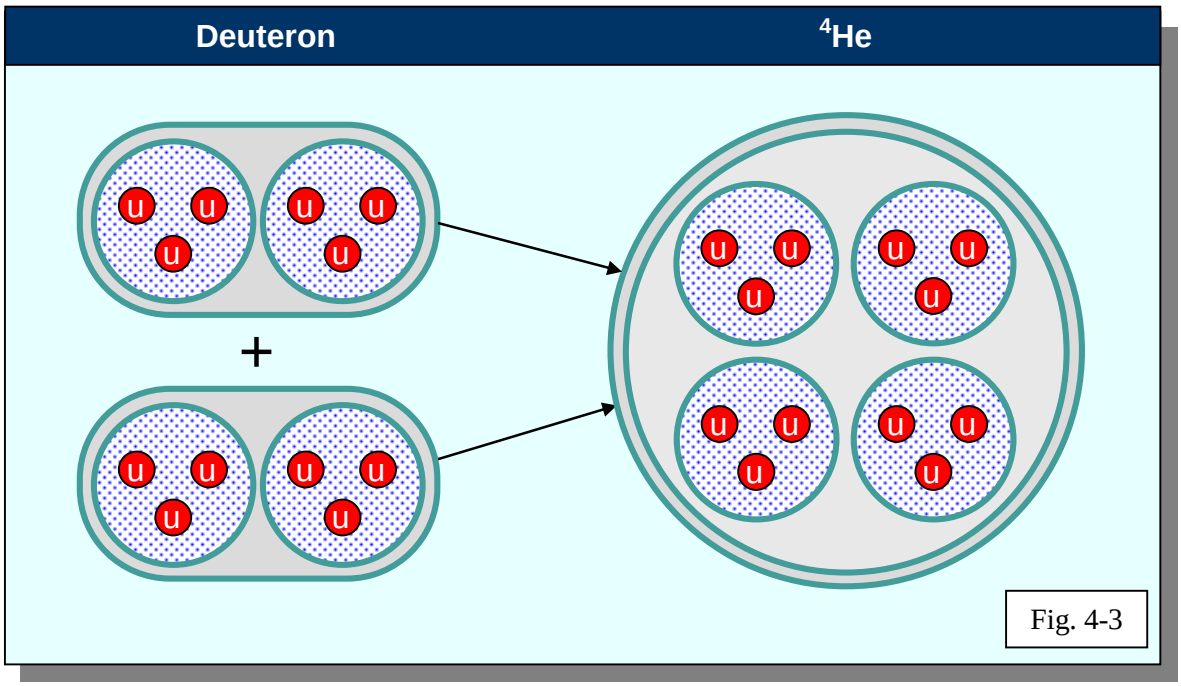


Fig. 4-3

4.5 Electronic capture

In accordance with the "distributed charge" model, the incoming electron has two possibilities: it either surrounds the nucleus, or it links two protons to make a deuteron or another nucleus.

5 Forces

Most physicists consider that all forces come from ONE generic force. Why one force rather two or three? No one knows, but one thing is sure: to understand the Theory of Everything (ToE) it is necessary to drop all preconceived ideas that have no consistent base.

In accordance with experimentations, the Spacetime Model considers that there would be only two fundamental forces. These two forces cannot be unified into a generic force, but include, nevertheless, a common element, spacetime.

5.1 Gravity

Gravity is a pressure force produced by "closed volumes" and not an attractive force produced by masses. Its origin is spacetime curvature made by closed volumes (Part 2).

5.2 The weak nuclear force

Weinberg and Salam (Nobel Prize 1979) proved that the weak nuclear force is the EM force. The Spacetime Model is in accordance with this theory. Whatever the words used, EM wave, W or Z bosons, protons, neutrons, electrons, gluons… the basic elements are always made of spacetime. So, it is logical to consider that the weak nuclear force is nothing but the EM force.

5.3 The EM force

The origin of the EM force is the variations of spacetime density inside the sCells. The magnetic force is a particular case of the Coulomb Force. The only difference is the sCell polarization: 1D, 2D or 3D.

5.4 The strong nuclear force

The strong nuclear force does not exist per se. Electrons and positrons surround some particles like a rubber band. This force is an "elastic force of constraint" which comes from the Hooke Law. It is identical to gravity, which also conforms to an elastic force.

In gravity, the pressure comes from sCells. In the strong nuclear force, the pressure is different but comes from electrons or positrons. Since **sCells, electrons and positrons are made of spacetime**, gravity and the strong nuclear force are finally identical.

5.5 Two fundamental forces

The only existing relation between the Hooke Force and the Coulomb Force is spacetime. These two forces cannot be unified since the first is a pressure force on any particles, while the second is an attractive - repulsive force, which relates only to the charged particles.

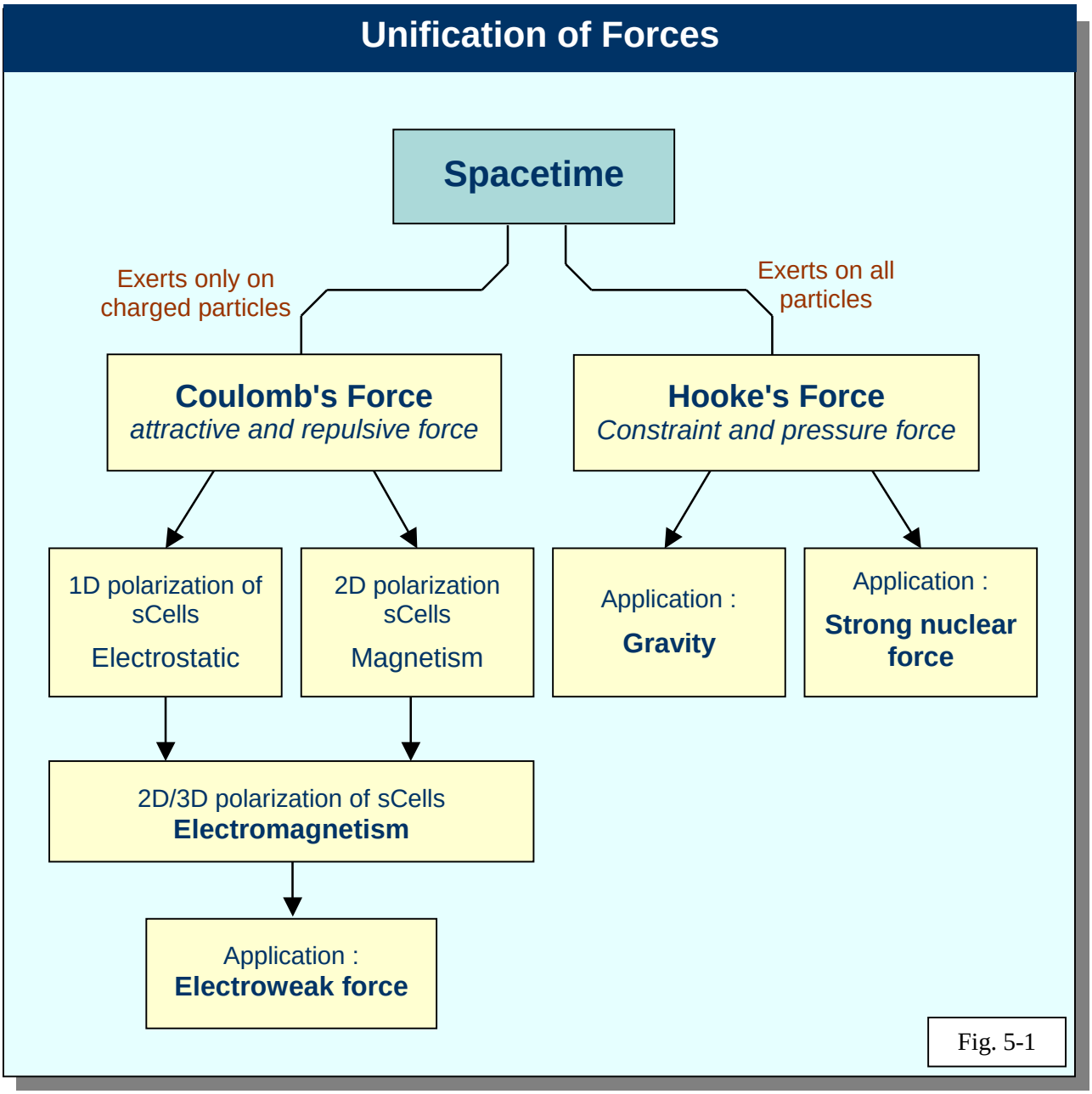


Fig. 5-1

6 The Universe

The origin of the universe poses a fundamental question: the "enigma of the electron" (see below). This question is of great importance because it allows for only two solutions. The creation of the universe necessarily resides in one of these two solutions.

Since the Big-Bang Theory doesn't solve this enigma, this theory is not credible.

Information given below is only an assumption since no one can prove anything about the birth of the universe

6.1 The "enigma of the electron"

Electrons and positrons have extremely precise closed volumes (masses): 510,998918 KeV. How can it be that all electrons and positrons of the universe have strictly the same volume?

Indeed, electrons in Europe, in the USA, in Asia… always have the same volume, 510,998918 KeV, a volume measured with an incredible precision of +/- 0,000044, or

< 0,0000086% !!!

To fully understand where the problem lies, let's imagine the following scenario:

A chairman says to a production engineer:

> *"In my factory, we make packets of sugar of 500 g. With the packaging, the total weight is exactly 510,998918 g. The precision is 0,0000086%."*

And he adds:

> *"We obtain the same precision in all our production. We can manufacture billions and billions of packets of sugar always having the same weight of 510,998918 g. each. And we are sure that this accuracy is reached with each packet without carrying out any control…"*

The production engineer can only be challenged by such a remark. Indeed, he knows that, in any production in the world, it is very difficult to obtain 0,001% tolerance without any control. To reach a tolerance of 0,0000086% with repeatability of billions and billions of pieces without any control is simply … impossible.

He will suspect that there is a trick or a gimmick. Obviously, such an assertion needs a rational explanation.

The "enigma of the electron" is exactly like this scenario. This enigma needs a rational explanation, other that *"Matter came from a Planck Length"*, which doesn't mean anything.

In reality, the universe is a kind of machine that manufactures electrons and positrons in astronomical quantity. These electrons are produced precisely with the same closed volume, namely mass. So, undoubtedly, there is a "trick" somewhere. It cannot be otherwise. The fundamental challenge is …to find this trick.

By which process can this astronomical quantity of electrons and positrons be created with exactly the same volume of

510,998918 KeV

…with always the same incredible precision of:

< 0,0000086% ?

The answer to this question solves 90% of the enigma of the creation of the universe.

This is the **GREAT QUESTION** and, by far, the most important mystery regarding the creation of the universe.

6.2 Two possibilities

This question may have many solutions, but two seem obvious:

- Division of spacetime
- Multiplication of sCells

These two solutions are very similar and are studied in the following section. The multiplication solution seems to be the most credible.

6.3 Division of spacetime

This scenario is explained in figures 6-1 and 6-2.

Spacetime is initially created in three parts: neutral, negative and positive. The positive spacetime densities are in red. The charge symmetry is conserved.

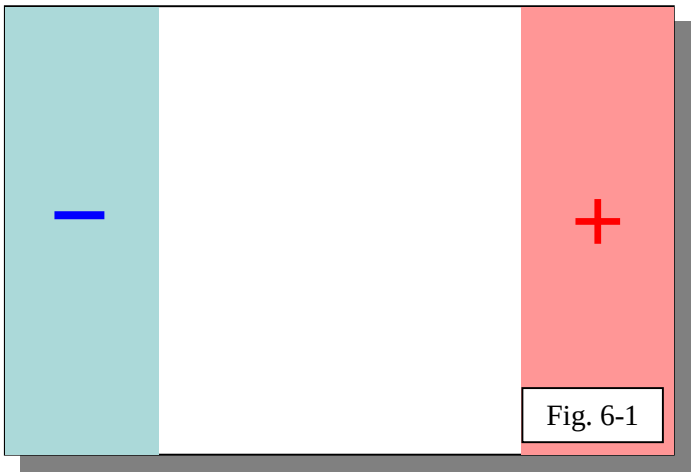


Fig. 6-1

A binary division takes place: 2, 4, 8, 16, 32, 64 … 2^n. It is repeated until reaching the quantum 511 KeV. With this limit, each element will have exactly $1/2^n$ of the total volume of the universe. We thus obtain strictly identical volumes.

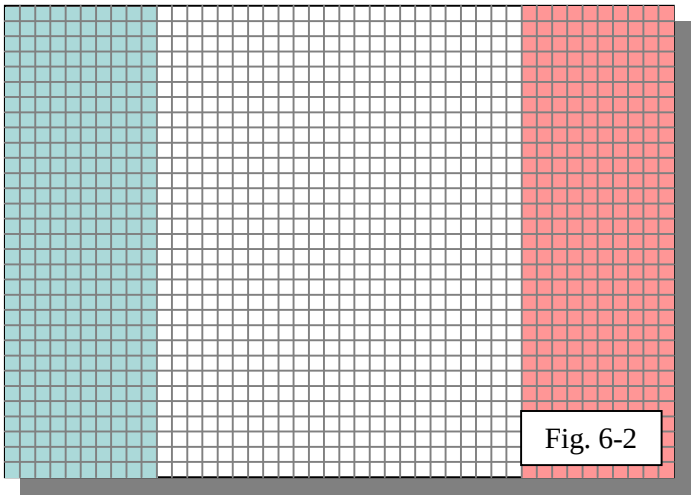


Fig. 6-2

6.4 Multiplication of sCells

The previous scenario explains the quantum of 511 KeV but does not solve the creation of spacetime that is explained below. This is why the following scenario is more credible than the preceding one.

It supports an alternative:

- **Simple multiplication**: A cell multiplies with identical volume, or mass, in 2^n steps: 2, 4, 8, 16, 32, 64, 128 etc…

- **Increase with division**: An original cell is growing then is divided by two, and so on. The divider is therefore 2, 4, 8, 16, 32, 64, 128 etc…. This version is more interesting than the preceding one because the creation of spacetime is fully explained. In addition, this scenario is close to the behavior of Nature on Earth (next paragraph).

6.5 The Nature behavior on Earth

Human beings, animals, plants etc… are "manufactured" according to a model of replication of cells. This model varies from one species to another but the guidelines are always the same.

For the human being, the cellular replication presents the following properties:

- **Precision:** The cell's creation is extremely precise. A cell of a given type is exactly the replication of another cell of the same type.
- **Reproducibility:** The six billion human beings on Earth are created on the same model. For example, cells of lever are always identical. Nature has an extraordinary capacity for replication in great quantities.
- **Huge amount of replication:** Two basic cells are sufficient to create a human being. Indeed, nine months after the initial conception, the number of cells reached is billions of billions.
- **Common process:** The replication process is sometimes very simple, as in bacteria, sometimes very complex, as in human beings. However, it is always the same principle.

This faculty of reproduction in nature and the simplicity of the process are simply incredible.

In other words, we must be conscious that Nature on Earth has an extraordinary capacity for self-reproducibility with the same accuracy. This capacity is found on Earth, but also on Mars, and on all components of the universe.

To explain the creation of the universe, we need the same reliable and accurate reproducibility but in greater quantity than that which we have on Earth

What exists on Earth	What we need to explain the universe
Precision Nature is able to make very precise replications.	We need a process able to create electrons of 510,998918 KeV with the incredible precision of <0,0000086%.
Quantity Nature is able to make replications in astronomical quantities, as in human beings, with billions of identical cells.	We need a replication process of electrons and positrons in astronomical quantities. The universe is "manufactured" through this unique process.

Fig. 6-3

6.6 Scenario of replication

The following scenario describes one of the possibilities of the creation of the universe. The conclusions are very interesting.

The first part of this scenario must, necessarily, be very simple. It is a major condition. In addition, it must take account of the quantum concept, which is a reality. This quantum of volume seems to be 511 KeV (see Part 3).

This process is well known on Earth, for example in the replication of bacteria. Nothing has been invented. Since Nature tends to always repeat the same models, this scenario illustrated in figure 6-3, on the next page, is very relevant.

It seems that the creation of the universe is nothing but a simple replication process

6.7 Spacetime

In this process, a question arises: "*What grows, only the 3D volume or 4D spacetime?*". When the universe was created, there were no masses. Out of the gravitational field, the spacetime curvature is flat. It is expressed as follows (Minkowski Equation):

$$ds^2 = c^2dt^2 - (dx^2 + dy^2 + dz^2)$$

or, in polar coordinates:

$$ds^2 = c^2dt^2 - dr^2 - r^2(d\theta^2 + \sin^2\theta\, d\varphi^2)$$

If we consider that:

- The universe was created from nothing, neither space nor time.
- There is a perfect symmetry. Nothing can be created without a counterpart.

… it is then necessary to take the Minkowski Equation and add $ds^2 = 0$.

This ds is an infinitesimal spacetime. At the beginning of the universe, as there was nothing, all ds^2 were equal to zero. In polar co-ordinates, since we have a spherical symmetry, we can ignore $d\theta^2$ and $d\varphi^2$. We get c.dt = dr. Usually, in physics, length is expressed by x and not by r. So we have:

$$c.dt = dx$$

This well-known formula must be interpreted as follows:

"Time creates space" or the converse

From a mathematical point of view, the dimensional quantities "time" (T) and "space" (L) are different. The dimensional constant c, which keeps homogeneity in the equation, should not be removed. So, we should not take this sentence *"time creates space"* word for word because from a mathematical point of view this sentence is not exact. It has the same imprecision as the sentence *"money creates employment"*. Of course, this sentence is correct, but not from a mathematical point of view since the words "money" and "employment" are of different dimensional quantities.

Creation of the universe

In the begining, we have only one sCell.

Like cells in bacteria, it increases up to 1022 KeV according x=ct

When it reaches this limit, there is a division by two. The volume is split into two parts of 511 KeV each since the quantum of volume is 511 KeV.

The same process is repeated to create 4 sCells from two.

The four sCells grow and the volume of 4 x 1022 KeV is divided by two making volumes of 8 x 511 KeV.

The same process is repeated indefinitely

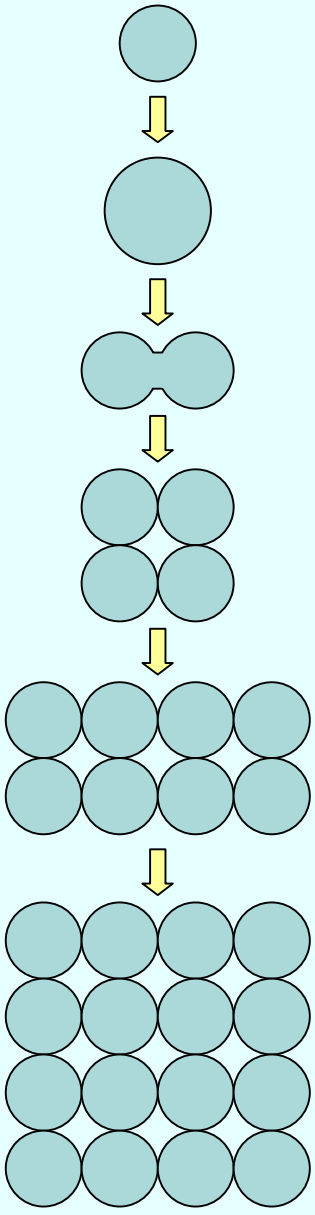


Fig. 6-4

6.8 Before the creation of the universe

From a philosophical point of view, this proposal renders obsolete the question *"What was there before the creation of the universe?"* The word "before" does not make sense in this context since time was created simultaneously with dimensions xyz. The same phenomenon exists on Earth.

> *Let's consider a baby who has just been born. Ask the mother: "what was the size of your baby two years ago?" This question does not make sense since, for this baby, time was created nine months ago. Space, i.e. the size of the baby, was created 9 months ago too. Two years ago, this baby had neither time nor space.*

As in this example, it is absurd to want to know what the universe was before its creation since there was no time and no space. The word "before" doesn't mean anything in this context. On the other hand, we may note that, in this example, the process is the same as in the universe: time creates spaces (or the converse).

6.9 The creation of objects

Let's imagine a company that is created. There is also a relation between space (the factory, the office, the parking…) and time. For this company, before its creation, time and space did not exist.

We may apply the same reasoning to common objects. For example, a stone on Earth has a maximum age of 4,5 billion years. Asking, *"What was the size of this stone 10 billion years ago?"* is a nonsensical question. …Many such examples can be given.

Since Nature tends to repeat itself, we may think that the creation of the universe follows the same principle as the creation of common objects we know on Earth. We have a creation date, and before this date, there was nothing: **no time and no space.**

The only consistent and interesting question is to know by which process the Universe was created.

6.10 Space vs. time

Everyone is able to describe spacetime with mathematics using special relativity formulas, but its comprehension is not so obvious.

On the universe level, spacetime means *"a Δx space created by a Δt time, or the converse"*. This is why space (3D) and time (1D) are inseparable. This relationship between time and space is emphasized in the proposal of new models of the creation of the universe further described.

6.11 Creation of the universe

Here we propose two scenarios (fig. 6-5 and 6-6) which have the same process of creation (phases t_0, t_1 and t_2, in blue). These two scenarios differs only in phases t_3 and t_4.

Scenario A

t_0

There was nothing, neither time, nor space

t_1

Due to chance or another effect, a quantum of space is created by a quantum of time, or the converse. Symmetry is preserved in accordance with $\Delta x = c.\Delta t$

t_2

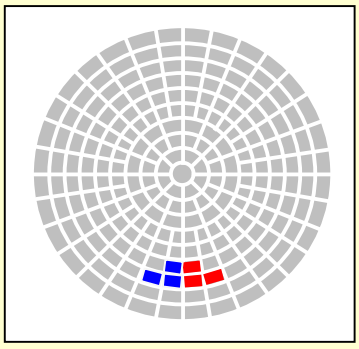
As time continues, sCells are created, always following the same formula:

$\Delta x = c.\Delta t.$

Therefore, the universe, which is made of sCells, is continuously expanding, as the time does.

t_3

Due to chance, the charge of one or more sCell(s) is shifted to another sCell (s). An electron-positron pair is thus randomly created. The gammas produced disturb the other sCells, and more electrons-positrons pairs are created, and so on. We get a sort of "plasma" of gammas, electrons and positrons.



t_4

Then electrons and positrons are combined in quarks to build the Standard Model, which becomes hadrons (protons, neutrons…), atoms, molecules, Bethe Cycle, Darwin Theory etc… see Part 3. Matter in galactic clusters may be created in this manner, due only to chance.

Fig. 6-5

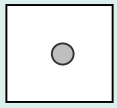
Scenario B

t_0

There was nothing, neither time, nor space

t_1

Due to chance or another effect, a quantum of space is created by a quantum of time, or the converse. Symmetry is preserved in accordance with $\Delta x = c.\Delta t$

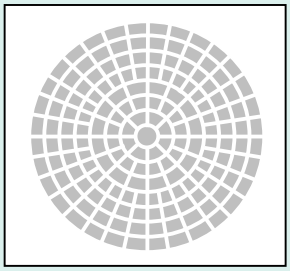


t_2

As time continues, sCells are created, always following the same formula:

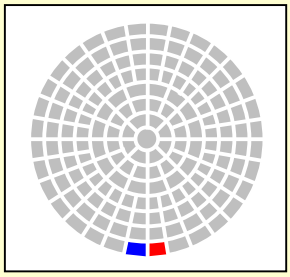
$$\Delta x = c.\Delta t.$$

Therefore, the universe, which is made of sCells, is continuously expanding, as the time does.



t_3

Billions of billions of sCells are created. Due to chance, a sCell presents a replication defect. Its charge is transferred to the adjacent sCell. So we get, an electron and a positron.



t_4

Electrons and positrons are replicated like cancerous cells.

Then electrons and positrons are combined in quarks to build the Standard Model, which becomes hadrons (protons, neutrons…), atoms, molecules, Bethe Cycle, Darwin Theory etc… see Part 3.

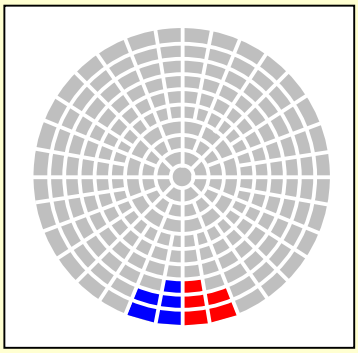


Fig. 6-6

Scenario A (fig. 6-5)
The matter is created randomly after the sCells. The charge of sCell(s) is shifted from one to another sCell(s). Electrons and positrons may be "manufactured" in this way. The movements in spacetime produce gammas, which can make another electron-positron pair from sCells and so on…

Scenario B (fig. 6-6)
Due to chance, the charge of a sCell is shifted to another sCell, thus creating an electron-positron pair. This pair, which is a sort of "malfunction of nature", is replicated, and so on, in accordance with the formula x = c.t.

Notes 1:
It is possible that the creation of the universe was a combination of these two scenarios or another scenario.

Note 2:
In phase t_2, matter doesn't exist. However, sCells can transmit EM waves and gravitational field.

Note 3:
It is interesting to note that the expansion of the universe seems to be outside galactic clusters, not inside. This statement is in accordance with these two scenarios.

6.12 Solved enigmas

The consequences of these scenarios are very interesting:

- **Same phenomena on Earth**
  All these phenomena have their equivalent on Earth. Since we know that Nature always tends to repeat itself, this scenario is much more credible than the unexplained and irrational Big-Bang Theory.

- **The electron enigma**
  This scenario solves perfectly the electron enigma discussed at the beginning of this chapter. Its volume, or the sCell volume, 510,998918 KeV, is replicated in billions of billions of billions of copies. The Big Bang Theory doesn't explain this enigma.

- **Starting from nothing**
  This scenario starts from nothing: no time, no space. Time and space are created mutually according to the Minkowski Formula $\Delta x = c.\Delta t$. This is probably due to chance but other explanations are also possible.

- **Density of matter**
  "Manufacture accidents", which transform a sCell in an e+e- pair, have a very low probability: 10^{-40}, 10^{-60}, 10^{-80} ? The electron-positron/sCell ratio is, thus, very small: 10^{-40}, 10^{-60}, 10^{-80}.... This ratio is in accordance with experimental measurements,

which state that the average density of matter in the universe is very low, only a few electrons per m^3.

- **Spacetime**
  This scenario gives a physical explanation of spacetime: *"A time Δt creates a space Δx or the converse".*

- **Charge of electron-positron pairs**
  The charge is transferred from one sCell to another. The +Δq of the one corresponds to -Δq of the other. This explains why electrons and positrons **have precisely the same charge** in absolute value and, consequently, solves the enigma of the charge of the proton which is that of an electron, and the enigma of antimatter.

- **Expansion of the universe**
  This scenario also solves the enigma surrounding the expansion of the universe. Time (unfortunately) continues to run; we can't stop it. In accordance with the $\Delta x = c.\Delta t$ formula, each second of our life creates 300 000 km of space, or more precisely, of sCells.

Time, which continuously runs, is the best proof of the perpetual creation of the universe, and thus of its expansion.

- **Antimatter**
  This subject has already been covered mainly in Part 3. These scenarios of the creation of the universe also explain the location of antimatter. Indeed, each electron created has its counterpart, the positron, which is, by necessity, close to it. It explains where is the antimatter of the universe: into the quarks, under our eyes.

  On the other hand, in the universe, there are as many electrons as positrons. With these scenarios, **it is IMPOSSIBLE** to find one electron or positron in excess. We have precisely the same number of each.

- **The Horizon Enigma**
  In any direction, the deep sky temperature is constant, about 2.7°K. This is why the "Inflate Model" has been added to the Big-Bang Theory. The Spacetime Model explains the constancy of the deep sky temperature very simply:

The e+e- pairs are created randomly

Small "islands" of matter (fig. 6-7) are, thus, created in the universe, without any relation to each other. The perpetual creation of matter is probably due only to chance.

Regarding the 2.7°K temperature, its origin probably comes from various interactions involving electrons, positrons, gammas, and combinations of these elements in these small islands of matter. This new approach concerning the creation of the universe is not incompatible with the 2.7°K discovery. On the contrary, the spatial distribution of the 2.7°K temperature seems to confirm the scenario suggested in this document.

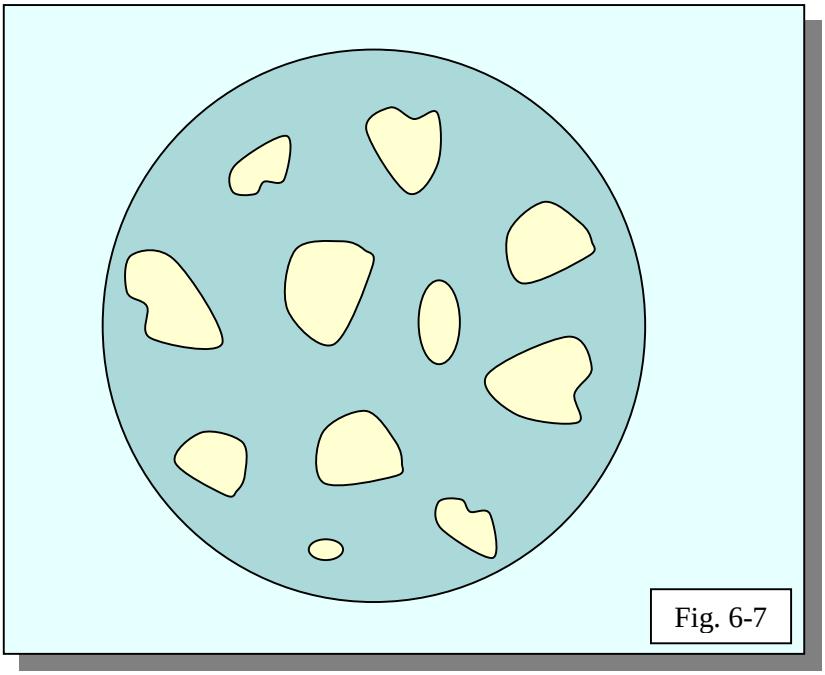


Fig. 6-7

Note
A part of the charge, i.e. density of spacetime, is initially transferred from one sCell to another. Let's assume that the density of spacetime has the value of 100. The amount of each part is probably due to chance as well. It may be, for example, 5%. In this case, the electron would have a density of –5%, i.e. 95, whereas the positron would have +5%, i.e. 105. If this were the case, in others galactic clusters, we may have some electrons and positrons having the same closed volume, but with different charges. This could have many consequences, such as the missing mass of the universe, or the "dark matter". This subject is not covered by the present document.

6.13 The assumption of the Big-Bang Theory

The following table compares the current Big-Bang Theory to the one described in this chapter. The main enigma to be solved is obviously that of the electron (see paragraph 6-1).

We can compare the Big-Bang Theory to a volcano. Is it credible to think that a volcano can emit millions of stones of 510,998918 gr. each, with a precision of 0,0000086%? Moreover, why would the amount of matter be exactly identical to that of antimatter under these conditions?

From a scientific point of view, the Big-Bang Theory has too many inconsistencies to be credible and must replaced by a more consistent theory.

In the following table, the symbol (???) means that the question is unanswered within the Big-Bang Theory, whereas all these questions are logically and rationally answered within the proposed model, the Spacetime Model. Each enigma below is fully explained in the preceding paragraph.

Enigma to solve	Big-Bang	Spacetime Model
Electron enigma	**???**	**Explained**
Starting from nothing	???	Explained
Perfect charge $q_{elect.} = q_{positron}$	???	Explained
Explanation of spacetime	???	Explained
What is matter (Part 2)	???	Explained
Expansion of the universe	???	Explained
Charge of proton $q_p = q_{electron}$	???	Explained
Where is antimatter	???	Explained
Construction of quarks	???	Explained
Overall explanation	(???) The universe came from a Planck Length that no one explains	Explained Replication of sCells according to spacetime equation: $\Delta x = c.\Delta t$

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