

# A DIFFERENT WINDOW FOR THE UNIVERSE

Gianni Donati

AIDIC (Associazione Italiana di Ingegneria Chimica)

*Home address:*

Via Meda 30

20017 RHO (MI)

ITALIA

e-mail [gia.donati@tiscali.it](mailto:gia.donati@tiscali.it)

## **Abstract**

Changing perspective sometimes better helps in the understanding of physical world.

Holding to basic principles, we have tried a small shift from existing theories and opened a different window on the micro and macro phenomena with the aim of finding a unifying solution.

The relation obtained between the pulsation of the nuclei and radiating, gravitational and electromagnetic fields is surprisingly supported by well known experimental facts whose interpretation has not yet been considered.

We believe that the vision of the world is simplified and represents a basis for future investigations.

# A DIFFERENT WINDOW FOR THE UNIVERSE

## 1- Foreword

The last sixty years have seen a tremendous experimental effort, pushed by technology, to investigate the ultimate nature of matter and the shape of the universe.

The experiments have been performed in large underground cavities, in monster cyclotron labs and in the sky.

A lot of data have been collected and the extreme consequences of the theories developed in between the end of 19<sup>th</sup> and the beginning of 20<sup>th</sup> century, including electromagnetism, relativity and quantum mechanics, have been drawn.

Never less the world has become more obscure and complex and we feel uncomfortable with the myriad of tiny scraps of matter that live less than one million of second, with undetected particles sustaining the key theories and with virtual particles that appear and disappear as phantoms in vacuum.

The nature of the nuclear bond is still a mystery: a particle like the meson is far to be an answer and quarks, hold together by gluons, are in our opinion still a “question mark”.

But there are other fundamental questions pending like the nature of gravity and how to include this weak force in a unified theory.

Everybody is now looking after the neutrino that Fermi suggested in  $\beta$  decay and, in spite the small number of this ambiguous particle detected, it is thought that it constitutes at least 90% of matter in the universe.

Another particle that is lacking in the standard model is the Higgs boson and scientist think that an electro synchrotron as large as the state of Texas will be needed to find it.

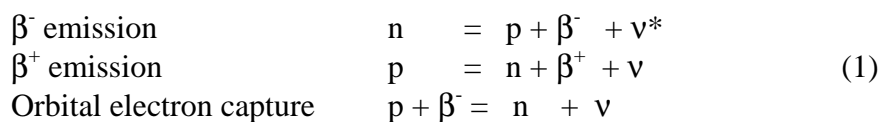
The risk to fall in a *black hole* or to be involved in a *big bang* is high.

Therefore we have grasped to facts and tried to open a new window on the universe that has the merit to be simple and is able to explain many of the mysteries still pending.

The theory has been described in previous papers [1,2,3] to which we refer for details and can explain, using well known experimental data, the relations between strong and weak forces and the relation between relativity and quantum mechanics.

## 2- The nuclear atom

The necessity of maintaining energy conservation in  $\beta$  decay led Fermi in 1934 to suggest the existence of the neutrino and to propose the following reaction scheme between protons p and neutrons n in the nucleus:



and the electron-positron annihilation reaction with the production of two  $\gamma$  photons having energy of 0.511 Mev each, equal to the rest energy of an electron.



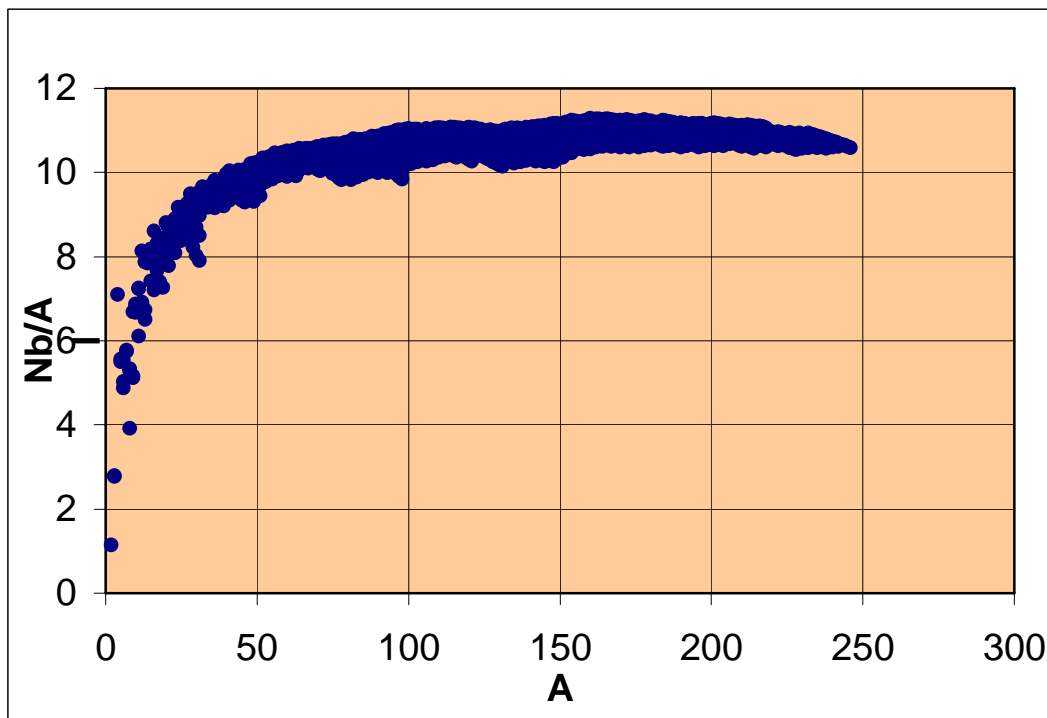
A first question arises: if these reactions occur in unstable nuclides why they cannot be present in stable ones?

The only difference should be that in stable nuclei the electron has not enough energy to leave the atom.

We have to remember that the protons and neutrons in the nucleus are bound together losing part of their identity and part of their mass.

There is strong evidence that mass lost (mass defect – Coulomb energy) and therefore the bond energy is around 2 MeV and precisely 2,044 MeV, that is two annihilations reactions (2) as shown around magic numbers and by a number of isobars and mirror nuclei [1].

Another simple observation is a geometrical one: the maximum number of spheres surrounding a sphere is 12 and in fact we observe that, under the 2,044 MeV hypothesis and Coulomb energy being taken into account, the number of bonds per nucleon tends asymptotically to 12 with increasing atomic number (Fig 1).



**Fig 1 – Nuclear bonds per nuclide Nb/A versus atomic number A**

The difference is due to the nucleons on the surface of nuclei, the ratio surface/volume decreasing with increasing atomic number.

However for lighter nuclides the geometrical rule alone does not explain completely the nuclear structure.

We have shown [1] that if we suppose that nucleons are free to move in nuclei and only p-n interactions give bonds, the combinations of possible non-repeated p-n configurations can predict the number of bonds.

For example  $\text{He}^4$  is a typical example with 14 interactions, 7 per nucleon, instead of the 6, 3 per nucleon, predicted by the simplest arrangement in the space.

In the preceding mirror nuclei  $\text{H}^3$  and  $\text{He}^3$  the interactions are 4 against the geometrically predictable 3 (2,7 per nucleon), while the subsequent mirror nuclei  $\text{He}^5$  and  $\text{Li}^5$  maintain an interaction number near 14 (5,5 per nucleon).

As an example, if we number with 1,2,3 the nucleons of  $\text{H}^3$ , proton 1 combines with neutrons 2 and 3 (bonds 1-2 and 1-3), proton 2 with neutrons 1 and 3 (bonds 2-3) and proton 3 with neutrons 1 and 2 (bond 3-2): the result is that 4 non repeated bonds are dynamically present in

H<sup>3</sup> nucleus in line with the calculated figure under the 2,044 Mev per bond and charge dependence hypothesis.

Applied to He<sup>3</sup> this rule gives again a value of 4 and surprisingly 14 is obtained for He<sup>4</sup>.

We have mentioned these simple facts as an additional proof that stable nuclides are subject to continuous transformations (1).

They do not decay but the emitted electron goes back to the nucleus in a dynamic way: the atom is a unique entity with nucleons and electrons playing the same game with similar shell configurations.

The atom is alive and behaves like an active volcano in which the electrons fall back and the neutrino emission does not alter its equilibrium for a very long time.

### 3- The neutrino flux and its relation with gravity

If we maintain Fermi physical representation of nuclear reactions (1) we can write balance equations as follows:

$$\begin{aligned} dN/dt &= -k_1 N + k_2 Z^2 + k_3 Z \\ dZ/dt &= +k_1 N - k_2 Z^2 - k_3 Z \\ dv/dt &= +k_1 N + k_2 Z^2 + k_3 Z \end{aligned} \quad (3)$$

with N, Z and v being the number of neutrons, protons/electrons and neutrino respectively.

If we assume steady state for all existing nuclides the first of equations (3) can be written:

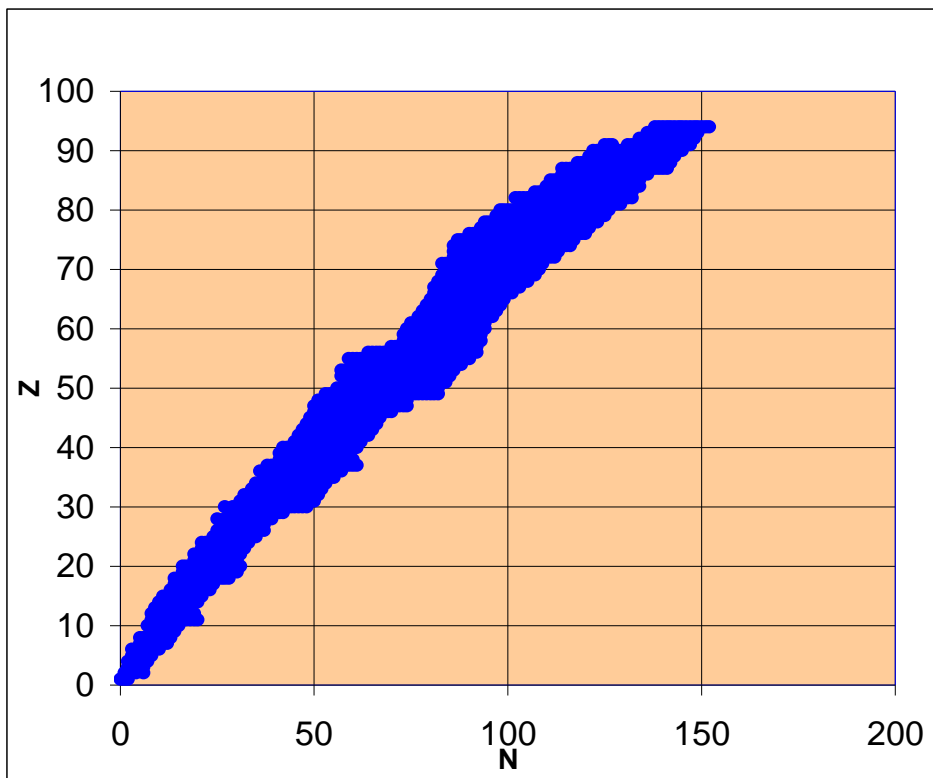


Fig. 2 - Z -N distribution for 1800 nuclides

$$N = k_3/k_1 Z + k_2/k_1 Z^2 \quad (4)$$

The fitting of this equation with the known 1800 nuclides N-Z distribution (Fig.2) gives a correlation with a surprisingly high determination index  $\rho^2$  equal to 99.69 % and parameters  $k_3/k_1=1.048253$  and  $k_2/k_1=0.005943391$ .

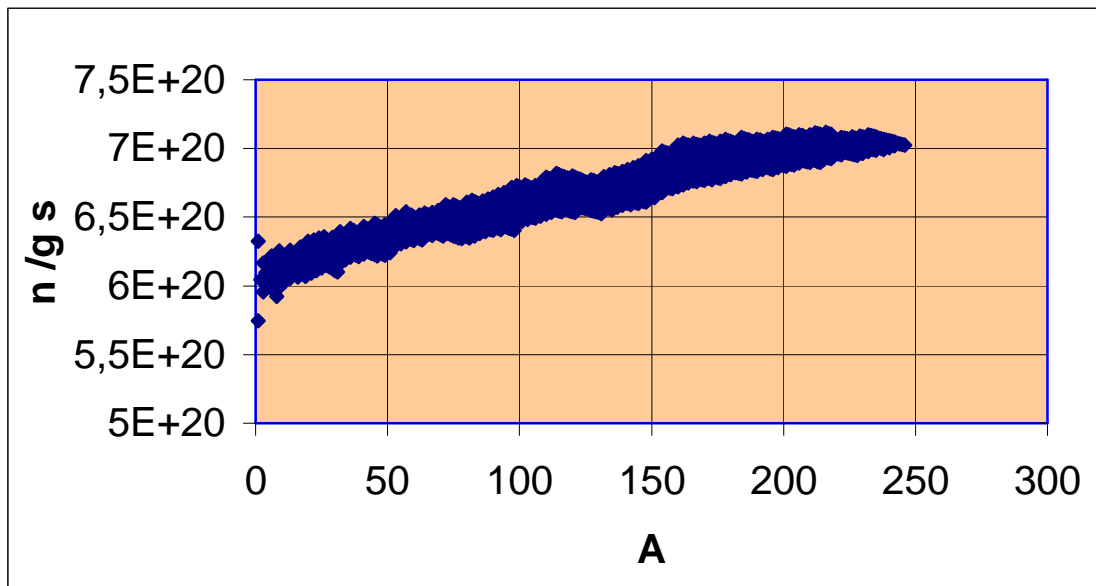
The fitting is centred on stable nuclides while other unstable isotopes show discrepancies in neutron number with – and + sign for  $\beta^-$  and  $\beta^+$  decay.

If we assume  $k_1 = 0,0009625$ , that is the experimental half life of the neutron of 12 minutes, the values of all fundamental atomic constants can be computed as:

$$k_1=0,0009625 \quad k_2=4,71554E-06 \quad k_3=0,00105382$$

The computation  $dN/dt = -dP/dt$  yields negative values for  $\beta^-$  emitters and positive ones for  $\beta^+$  emitters the higher values corresponding to most active emitters.

If we use these constants to compute with the third of equations (3) the rate of emitted neutrino, we discover that, referring to the gram of matter, the emission is almost constant over all nuclides with a value of  $6.668E+20$  neutrino per gram per second and this value does not significantly change from light to heavy nuclides (Fig.3).



**Fig.3 – Neutrino emitted per g and s versus Atomic number A**

This constant is, as a matter of facts, related to nucleons, whose weight does not change, except for mass defect, and looks like an additional universal constant.

The more this value appears constant if we add that the universe is made up with a mixture of nuclides.

As a consequence there is in the space an important flux of neutrino generated by matter and this flux referred to the mass of the body is almost independent of the type of the elements constituting matter.

The importance of this relation will be investigated and throws some humour upon the researches under way to find neutrino underground in deep cavities and upon the *big bang* hypothesis.

In this vision the universe has two complementary faces: one side there is coagulated matter made up of nucleons and on the other side we have the fine matter made up of neutrino evaporating from the solids.

The coagulated matter moves around in the universe under the laws of gravity and the fine one is emitted by bodies and goes to the infinite with the velocity of light.

The logic wants that these two components should be related under momentum conservation principle applied to nucleons mass and cross section. Therefore we can define a neutrino force as the other face of the coin where the gravitational force has been written by Newton some century ago.

$$\text{Gravitational force} \quad \mathbf{Fg} = \mathbf{G} M_1 M_2 / R^2 \quad (5)$$

Where:

$\mathbf{G} = 6,668\text{E-}08$  is the universal gravitational constant ( $\text{cm}^3 \text{s}^{-2} \text{g}^{-1}$ )

$M_1$  and  $M_2$  are the interacting masses (g)

$R^2$  is the square of the distance between the two masses ( $\text{cm}^2$ )

$$\text{Neutrino force} \quad \mathbf{Fn} = \mathbf{Fo} M_1 \mu c \sigma_n M_2 / (4 \cdot 3,14 R^2) \quad (6)$$

Where:

$\mathbf{Fo} = 6,668\text{E+}20$  is the neutrino flux per gram per second ( $\text{n g}^{-1} \text{s}^{-1}$ )

$\mu$  is the neutrino mass (g/n)

$c = 2,9973\text{E+}10$  is the velocity of light ( $\text{cm s}^{-1}$ )

$\sigma_n = 3,14 r_n^2 / m_n$  is the cross section per g of nucleon having mass  $m_n$  and radius  $r_n$  ( $\text{cm}^2 \text{g}^{-1}$ )

Imposing the equality of the two forces  $\mathbf{Fg}$  and  $\mathbf{Fn}$ , we can define the gravitational constant  $\mathbf{G}$  in terms of nuclear parameters and of the velocity of light:

$$\mathbf{G} = \mathbf{Fo} \mu c r_n^2 / (4 m_n) \quad (7)$$

Given  $\mathbf{G}$  one straightforwardly obtains the ratio of the neutrino mass to the nucleon mass:

$$\mu / m_n = 4 \mathbf{G} / (\mathbf{Fo} c r_n^2) \quad (8)$$

If we assume  $r_n = 1,05247\text{E-}13$  cm we obtain  $\mu/m_n = 1,20479\text{E-}12$  and hence, given  $m_n = 1,008983$  amu, the neutrino weight results  $\mu = 1,21561\text{E-}12$  amu or  $2,0186\text{E-}36$  grams or  $1,1323\text{E-}03$  ev

The neutrino is therefore  $2,21518\text{E-}09$  less the electron or positron mass.

Due to the described phenomena one gram of material loses  $4,24\text{E-}08$  g in one year and  $4,24475\text{E-}06$  g in 100 years and this material lost is located in a sphere having a radius of 1 and 100 light years respectively.

The Earth loses about  $2,537\text{E+}20$  g in one year and the Sun  $8,45\text{E+}25$  g per year.

The solid material we see and touch is continuously evaporating and the end of the story seems to be an infinite sea of neutrino moving far away with the velocity of light.

In addition the Sun emits thermal radiation with a flux of  $53900000 \text{ kcal h}^{-1} \text{ m}^{-2}$  that is  $3,3674\text{E+}21$  g per year and the earth receives radiation from the sun at the speed  $1170 \text{ kcal h}^{-1} \text{ m}^{-2}$  that is  $1,225\text{E+}10$  g per year that, as we can see, are far less than the mass given away with neutrino.

The neutrino is therefore at the same time the motor of the universe and the fuel that makes the whole machine move.

The neutrino is the cause that shapes the spherical bodies of the stars and planets and is responsible of the effects of gravity that we experiment in everyday life on our Earth.

The energy/mass consumed is at the expense of the solid material that decays in the long times of the life of the universe.

Even the so called stable nuclides will die with time and will be transformed in the unstable ones that in turn will in short times decay to yield different stable nuclides and different elements in the periodic table.

The neutrino fluxes sum and subtract following their orientation as vectors and the neutrino flux shape in the space is therefore similar to the gravitational field. The difference is that we lose discontinuities and infinities in mathematical formulae and calculations are much more easy even for complex geometries.

#### 4-The experimental evidences

The mass lost by the Sun and by planets is however so small compared with their masses that an experimental data appears difficult to be found.

Nerveless a data exists after the development of nuclear clocks and is related to the time of revolution of the Earth around the Sun.

The computation under the neutrino hypothesis of the delay of the Earth [2] gives a figure of 0,67 seconds per year and this should be completely attributed to the loss of mass of the Sun, no other theory or phenomena on the Earth or in the sky being able to justify the difference.

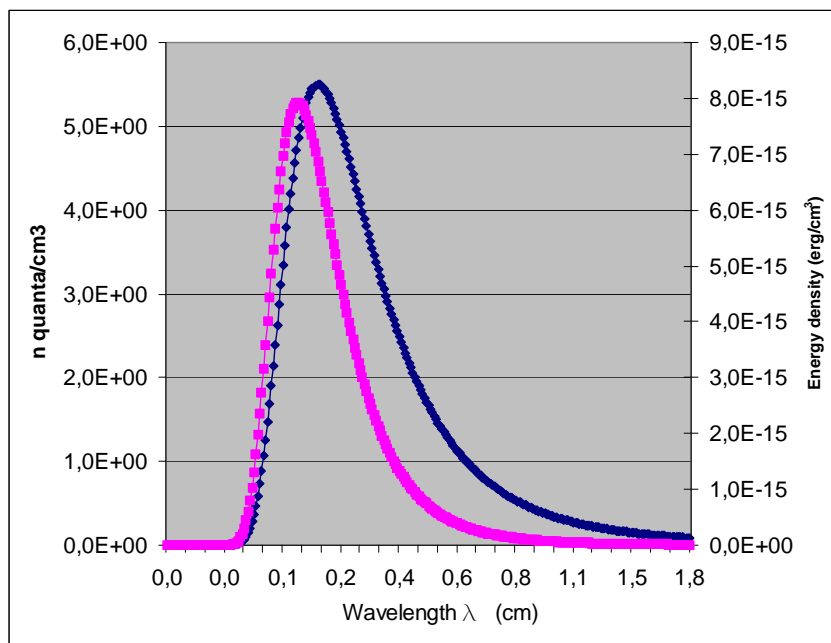
The difference measured by IERS between the earth dynamic time and the atomic time gives a vale of 32,184 s in between January 1958 and January 2006 that is almost exactly 0,67 s/year.

In spite that this data is so small, it cannot be explained by earthquakes, tsunami, fall of meteorites, interactions with other planets or other phenomena invented by scientists on newspapers.

The most important discovery of the 60th is that space is uniformly filled with a cosmic radiation whose temperature is about 3°K (Gamov black body) and that, according many scientists might be the proof of the theory of big bang.

This radiation appears, with good approximation, to be isotropic, that is its intensity is independent of the direction.

The measured average of the measurements gives a temperature value of 2,68°K, wavelength at the maximum  $\lambda_m = 0,1081$  cm in black body spectrum (Fig. 4).



**Fig 4 – Planck Distribution at 2,68°K – Energy density =  $u_\lambda d\lambda$ , n quanta  $\lambda u_\lambda d\lambda / h c$ ,  $u = \sum u_\lambda d\lambda = 3,9E-13$  (erg/cm<sup>3</sup>)**

As shown in a previous work [2] there are strong reasons to believe that the density of neutrino in this cosmic radiation should be relevant and the neutrino constitute an important part of the universe.

The universe might therefore be immersed no more in the ether but in a cold photonic bath of neutrino at a temperature around 2,68°K even if they are difficult to be captured..

The energy of photons can be computed following Planck and Einstein:

$$E = \mu c^2 = h \nu = h c / \lambda \quad (9)$$

Where  $\mu$  is the equivalent mass of photon,  $c$  is the velocity of light,  $h$  the Planck constant (erg . s) and  $\nu$  the frequency (s<sup>-1</sup>) equal to  $c/\lambda$ .

At every temperature a surface emits photons with a wavelength distribution that, for a black body, follows the well-known Planck model and with the wavelength at the maximum  $\lambda_m$  given by:

$$\lambda_m T = c h / (k 4,965) \quad (10)$$

where  $k$  is the Boltzmann constant.

We can therefore compute using equation (10)  $\lambda_m$  for each temperature and obtain at T = 2,68 °K a wavelength of 1,0813E-01 cm ( $\nu = 2,7725E+11$  s<sup>-1</sup>) and from equation (9) a mass  $\mu = 2,0437E-36$  g that is the mass of neutrino derived by the universal gravitational law and justified by the time delay of the Earth.

This is surprising because we do not see the neutrino, that is such an elusive particle able to cross the Earth without interactions, but we can feel its temperature.

The small number of neutrino per year captured in underground experiments either are those in the extreme left of the Planck distribution or have a temperature higher than the cosmic radiation.

In this vision the neutrino appears to be no less than a cold photon that is originated in the mass while warm and hot photons are emitted in the neighbourhood of the surfaces.

We add to this argument that hot photons generated in a solid body are absorbed by the body and cooled down to neutrino that can cross the body itself without interactions.

The nuclear pulsation and therefore the number of neutrino emitted by the atom is not influenced by temperature, as in all nuclear reactions, and only the neutrino energy is affected. The number of neutrino emitted is very large compared to the number of photons that are related to temperature and to the body surface.

The number of photonic quanta irradiated by the surface of the Sun is 1,298E+23 quanta/cm<sup>2</sup> s and globally 7,90172E+45 quanta/s while the number of neutrino emitted from the mass (nuclear fusion reactions not been taken into account) is 1,328E+54 quanta/s.

This opens a lot of questions including the real mass of the Sun but we hold near to the key question of the fundamental laws of the universe in the attempt not to lose our way.

## 5- Relativity and electromagnetism

We have now come to the conclusion that a space void of mass/energy does not exist and that the particles present in the space guarantee the existence of the universe as a unique entity.

The neutrino flux thrown apart by the Sun and the Earth with the velocity of light yields the force to win the Earth centrifugal acceleration while between Earth and Sun the neutrino with opposite directions sum up to give zero force in their centre of gravity.

In the same way the centre of the Earth has zero gravity and is subject to an intense isotropic flux of neutrino.



We have come to a physical interpretation of the gravitational field that Einstein pretended to be a physical entity and we have recognized that graviton and neutrino are the same particle. From the analysis of radiation fields we have concluded that heat and light photons are nothing less than warm and hot neutrino generated from warm and hot surfaces.

The void space becomes therefore crowded with matter/energy in a way that is difficult to imagine the Dirac virtual particles and to draw Feynman diagrams.

The most intriguing question is however the fact that bodies and even light have to move in this crowded space where they may find some influence of directional and isotropic neutrino flux.

This influence is zero when bodies have normal velocity, because we know that cold neutrino are able to cross light-years of lead without interaction, but may become important at relativistic velocities.

In a previous paper [2] we tried to compute these effects with the aid of relativity and of the optic Doppler effect with certain hypothesis on neutrino flux taken from our solar system but nobody knows what is the real flux because of the ambiguous behaviour of neutrino and consequently the hardly measurable density of the dark matter in the universe.

In other words at relativistic velocities the force that must be applied to a body to obtain a given acceleration do not only depend following relativity by the mass increase of the body but also by the nature of the non void space in which the body moves.

A body that moves with relativistic velocity and faces an important flux of cold neutrino moving in opposite direction sees these neutrino as hot photons and therefore able to interact with its matter.

This effect might be true also for photons that move in the space with the velocity of light.

Then one might guess that only the neutrino is able to reach the maximum physically allowed velocity in vacuum while photons can suffer some interactions.

On the other hand photon is considered to be the boson of the electromagnetic field and consequently even electromagnetic phenomena should propagate with a velocity less than the maximum velocity.

Dirac considered the electromagnetic field as the effect of the interaction of a photon with empty space with the generation of a virtual positron – electron pair that suddenly disappears causing vacuum fluctuations.

We know now that this is not the case because vacuum does not exist in nature and the effect can be better described by a polarization of the media present in the space similarly to what happens in dense matter.

One may argue, following Dirac, that this photon must have an energy at least equal to 1,022 Mev in order to be able to produce a positron - electron pair in the space and propagate with the Coulomb law the effect of the charge on the body surface.

For a charged body that moves in a given direction, it happens however that, when Maxwell equations are expressed in covariant form, the components of the electric and magnetic vector in the direction of motion are not affected by motion under Lorentz transformations.

We know from relativity that the frequency and therefore the energy of a photon increases in the forward direction and fades in the direction opposite to motion.

In a previous work [3] we suggested to increase the energy of the neutrino ejected from charged surfaces in order to be effective in pair formation at relativistic velocities.

If we use for example the inverse of the fine structure constant  $\alpha = e^2 / (2 \epsilon_0 h c)$ , as Dirac artificially made with his monopole, we obtain a photon with an energy 137 –138 times 1,022 Mev, a wavelength  $\lambda = 8,83812E-13$  cm and a frequency  $\nu = 3,39205E+22$  s<sup>-1</sup>, far beyond  $\gamma$  rays.

Now since there is no physical interpretation of the fine structure constant  $\alpha$  and may be we will find a relation of the “*vacuum*” dielectric constant  $\epsilon_0$  with the flux of neutrino filling vacuum.

Adding some other fiction to cover the unknown, may be that the neutrino flux opposing the electromagnetic photon has some role in contributing the energy for pair formation.

If however the photon of the electromagnetic field has such an high energy, the electromagnetic field in the direction of motion appears invariant to a velocity about 1/10000 of the maximum velocity  $c$ .

Therefore  $c$  may be thought as the velocity of cold neutrino while the velocity of excited neutrino, photons or light is somewhat less, saving the infinities in all relativistic equation.

## 6- Conclusion

Somebody may argue that there is some science fiction in the theory we have presented because it contradicts many of the theories developed in the last century.

But scientists have to recognize how many contradictions and fables are present in the 20<sup>th</sup> century view of the universe.

In the past Einstein disagreed with its cosmological constant, the same did Dirac with his monopole and recently Penrose [4], being critical with his mathematics, recognized the contradictions in existing theories and asked for a new window for the universe.

The theory we have described has the merit of being simple, of explaining with a unique particle the neutrino all phenomena from the atom to heat radiation and gravitational and electromagnetic fields and to show a way for the unification of the forces present in nature or at least for explaining why they cannot be unified by mathematics.

The experimental data used are taken from the properties of 1800 known nuclides, from the Newton law and the solar system, from cosmic radiation found in the 60ths and measured recently with great precision with satellites.

No explanation has been given since now of these well known phenomena and it is surprising that these data have a unique solution.

## References

- [1] G.Donati – *Il legame nucleare e il peso del neutrino* , La Chimica e l’Industria , pp 62 – 66 Giugno 2004
- [2] G.Donati – *L’universo invisibile (neutrino, quanti e relatività)*, ICPN pp 92 – 97 Giugno 2006
- [3] G.Donati – *Il Messaggero del campo elettromagnetico*, ICPN pp 80 – 84 Novembre 2007
- [4] R.Penrose - *La strada che porta alla realtà* ; Rizzoli , Prima edizione ; Novembre 2005