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A simple models explaining some ideas and discordances in general relativity  
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**Key words:** Wave-particle, space-time, planetary orbits, general relativity, concordance model, satellite Wmap observations, black energy, black matter, Big Bang explosion, universe expansion, repelling forces among quark, properties of the vacuum.

**Abstract.** A different simple ways to explain the meaning of the ideas of wave-particles, space-time, the properties of the vacuum, the genesis of the orbit of the heavenly bodies, the dark energy and matter, the expansion of the universe, the explosion of black holes, the repulsive forces among the quarks inside a proton are shown. The model proposed gets over the discordances between the general relativity and the results of the satellite Wmap observations.

**Riassunto.** Viene qui proposta una diversa e più semplice spiegazione dei concetti di onda-particella, spazio-tempo ed orbita dei pianeti. Si esamina poi la relazione newtoniana, in corrispondenza di valori della distanza estremamente esigui, mostrando che la forza attrattiva si trasforma in una forza repulsiva crescente con la distanza. Ciò ha consentito di spiegare l'origine dell'universo o di una stella da un buco nero, la forza inflazionarla nell'universo, la forza repulsiva dei quark nei protoni, l'energia oscura, le proprietà del vuoto e di superare la contraddizione fra il modello cosmologico di concordanza, e quindi della Relatività Generale, con le recenti osservazioni del satellite Wmap.

### Introduction

Space, time and mass are abstract and independent ideas, which do not belong to the reality: an evolving energy. The Big Bang, that is, the evolution of the energy is characterized by a sequence of states of the modifying energy. Man introduced the concept of time to recognize the position of a state in the sequence, and the concept of space to identify and distinguish the morphology of each state. In order to avoid the introduction of a further abstract concept, Galileo defined the mass: the reaction (inertia) of a body to the action of a force, that is, linking it to the ideas of time and space.

Physicist described the phenomena by means of this bodies, called parameters. Their results are too difficult to be understood by common educated people, on the other hand, too many phenomena are still not explained, the origin of almost all natural systems is unknown, and their evolution is unpredictable, whereas the most recent model: the General relativity does not agree with the Quantum Theory.

Einstein introduced the idea of the wave-particle to explain the properties of the light. Such an idea, though bright, is not immediately understandable by common people. The paper: Beginning and immortality of soul has shown that any physical relationship, representing a phenomenon, is valid only within the interval of definition of the parameters that appear in the equation. Outside such an interval, the relationship may represent a phenomenon which is different to the latter and sometime evidences an opposite behaviour, explaining how a particle becomes a wave and vice versa.

The Concordance Model, based on the theory of the General Relativity, has required the introduction of the dark energy and of the dark matter, which represent more than 95% of the known energy and matter. The recent observations of the satellite Wilkinson Microwave Anisotropy Probe (Wmap) do not confirm such a theory, since they show that the universe is expanding since two billions of years with an increasing rate. Cosmologists still suggest that this is due to the dark energy, an unknown and not observable source of energy responsible for the expansion of the universe.

In section 1 it was shown that the ratio  $E/t = kv$  indicates that the energy exchanged by a system ( $E/t$ ) and thus the vitality of a system is related to the velocity  $v$  of its evolution. When  $v$  is constant, or small or negative, the system tends toward the equilibrium of the thermal death, whereas when  $v$  increases. Our Universe, which is a living system could not expand with a constant rate, as confirmed by the Wmap observations.

Independent on the latter observations, the discordances of general relativity would suggest a different interpretation of space, time and mass and of their relationships proposed by physicists. We will look thus for an alternative and simple model, based on three basic fundamentals: (a) the dimension-language, (b) the Big Bang and (c) the newtonian force, when the distances between the masses is extremely small and their displacement is larger than their original distance providing a new explanation of the (i) orbital movements of the heavenly bodies, (ii) wave-particle, (iii) space-time, (iii) dark energy and dark matter, (iv) expansion of the universe, (v) repelling forces among the quark inside a proton and (vi) discordances resulting from the observations of the satellite Wmap and the General Relativity.

#### *1) Interaction between space and mass (the orbits of planetary bodies)*

Einstein showed that a heavenly body modifies (strains) the space-time, that in turn forces a smaller one to move around it along an elliptic orbit.

The idea of the space-time, though bright, is hardly understood by common people<sup>1</sup>. Let us try to provide a simpler explanation through the dimension-language.

The space recognize its own language-dimension that allows to add more spaces or to subdivide them. Similarly two bodies, having the same dimension-language (the gravitational one) recognize themselves and can join each other.

Space has a dimension-language different to that of the mass and therefore does not recognizes and rejects it opposing its invasion.

When a heavenly body outside a space is attracted by another one, located inside that space, invades the latter and is thus rejected by it. The effects of both the attractive and repulsive forces are similar to those undergone by a ballistic missile, launched with an energy corresponding to a range larger than the dimension of the Earth, that makes it bend the Planet and travel around it along an elliptic orbit.

#### *2) Interaction between space and photons*

Let us verify the existence of the condition required by the interaction between a photons and the cosmic space.

Space does not notice the presence of photons, strings and comic rays since their wavelength are too short (smaller than  $10^{-15}$  m) to be notices. In fact, the density of molecules

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<sup>1</sup> Einstein himself stated that such ideas could be understood only by ten people in the scientific community..

in the intergalactic spaces is very small<sup>2</sup>, so that a photon can hardly meet there any molecule and cannot thus perturb the space through its interactions with them (p. e. diffusion). In the absence of the first condition no interaction may thus take place.

A photon can meet though a heavenly body like a planet, transfer its energy and affect thus the space around the planet that will thus notice its presence (first condition), but the space, the body and the photon have different dimension-languages (second condition), so that there are still no possibilities for their interactions and the photon is sent back (reflected). When the body (particle or molecule) has a wavelength coherent with the dimension of the wavelength the latter is diffused.

It has been recently thought that the velocity of a graviton might have been higher than the speed of the light. This came out from observing the contemporary traces of a graviton and of a photon when they both had contemporarily encountered a planetary body and by noticing that the graviton reached the observer earlier than the photon. What did really happen? Both the photon and the graviton perturbed the body trying to transfer its energy, and they were then noticed (first condition). The body did not recognise the dimension-language of the photon (second condition) forcing it to bend it and travel around it taking thus a longer time. To the contrary, the graviton, being able to recognize the dimension-language of the gravitational body, went straight through it, taking a shorter time. This explains also why a planar electromagnetic wave bends around a gravitational body.

Palumbo (2005a) has shown the above physical mechanism which governs also the diffusion of the light.

Similarly the space notices the presence of a thermal or an acoustic wave since the compression and dilatation of their oscillations have wavelengths large enough to perturb it and thus to be noticed by the space, but such waves have a dimension-language not recognised by the space that do not allow then their transit.

In conclusion, the space allows only the transit of the elementary particle having mass equal to zero: gravitons, photons and gluons

### 3) The light: a wave-particle ?

The estimated energy of the explosion of the Big Bang is equal to  $10^{88}$  Joule (Greene 2003) (Palumbo 2005a). Such an energy ejected out of the original dark hole radiating energy whose residual has been discovered by Penzias e Wilson and called old fossil radiation. The parameters that characterized such a catastrophic event are out of any range of validity of those that appear in the relationships that describe the ordinary explosions. One can thus imagine that the radiating energy: i.e. the parcels of radiations were thrown into the vacuum space that surrounded the black hole. One is thus faced to radiations that travels within the vacuum. The same holds for the cosmic galactic radiations, for the solar wind and the solar radiation.

What above and the results 2) would indicate that the photons, and thence the electromagnetic waves:

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<sup>2</sup> At the Earth-Moon distance, there is 1 molecule per cubic centimetres. Taking into account the cross section of a molecule and of a photon the probability that a photon can meet there a molecule is equal to the probability that a needle with a size equal to 1 mm travelling inside a mc containing one particle with a size equal to 1mm meets it implying that a photon can hardly meet a molecule there

- a) may travel through the vacuum (cosmic space) when thrown by the great force of the explosion of a black hole, and because their wavelengths are too short to be noticed by the space,
  - b) transmit their energy to the particles with size coherent with their wavelength, so being noticed by them, but are unable to cross them, because the dimension-language of the masses (gravitational) differs from their (electromagnetic), and are thus rejected (diffused) by the particles,
  - c) are reflected by the large bodies or forced to bend them over for the same reasons.
- In conclusion the light is a wave, and there is no need to consider it as a wave-particle.

#### 4) *The space-time.*

The idea of the space-time would imply the existence of a direct relationship between them, but such a linkage is only virtual and indirect.

In the absence of any phenomenon and entity, such as before the Big Bang, space and time had no meaning. The universe was generated by an explosion, that is, through a catastrophic evolution, which is thus a cosmic imperative and an intrinsic property of all natural systems. Each body or system lives since it becomes (evolves) through the invasion of the dominium of the space and the dominium of the time. Variations of time and space, though both caused by the evolution, are independent each other and their linkage is not real.

#### 5) *Space, mass and time*

Space and mass have not a common dimension-language, since the earlier opposites the invasion of the mass into its dominium. Similarly, time and mass have not a common dimension-language since the inertia of the mass opposites the invasion of other entities into its dominium.

A dimension-language, common to space, time and mass was provided by the Galileo's equation  $F = ma$ , modified later by Einstein into  $E = mc^2$ . Dimensionally, the Galileo's force  $F$  may be written  $[m] \times [s] \times [t^2]$ . If one multiplies it by  $[s]$ , it becomes the left hand of the Einstein equation, dimensionally expressed by  $[m] \times [s^2] \times [t^2]$ , both showing the linkage among the space "s", the time "t" and the mass "m".

Einstein defined its equation "beautiful in itself", to emphasise the simplicity that links the aprioristic categories of space and time (Kant) and the relativistic Galileo's idea of mass.

We might notice here that such a beauty is simpler represented by the elegant dimension-language idea, through which the entities of the universe recognise themselves and interact each other. We may also state that also the Newtonian formula is beauty in itself.<sup>3</sup>

#### 6) *Dark energy*

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<sup>3</sup> The Newtonian equation  $F = K m^2/r^2$ , putting  $F = y$  and  $m/r = x$ , may be written  $y = K x^2$  that has the form of the equation of Mandelbrot (1983), since, for  $x > 1$  the orbits of the function are attracted to zero, for  $x = K$  the points lays of a circle with ray equal to  $K$ , and for  $x < 1$  are attracted to infinite. The points laying on the circumference (the edging points) are critical points. Their coloured representation on a computer's sheet provide imagines of extreme beauty (Peitgen et al. 1986)...

According to Strominger (1995), and Strominger et al. (1996), the values of the estimated energy of our Galaxy, of the Sun and of the Earth are respectively equal to  $10^{35}$ ,  $10^{26}$  and  $10^{20}$  strings with unit Planck energy and thus equal to  $10^{44}$ ,  $10^{35}$  and  $10^{29}$  Joule (Greene 2003). The corresponding estimates computed by astrophysics, from the observed values of the entropy of the black hole inside the Galaxy (Marziani et al.2002)), (Marziani et al.2003) the Sun (Lamberti 1984, 1991) and that corresponding to the Earth (Tenga 1994) were found respectively equal to  $10^{42}$ ,  $10^{33}$  and  $10^{27}$  Joule. These three independent theoretical estimates, computed according to the theory of strings, which take into account also the dark energy, is 100 times greater than the corresponding observed values, computed according to the observable energy, as expected. The dark energy and the dark matter may be thus attributed to the action respectively of bosonic strings and of supersymmetric fermionic ones linked by a relationship discovered by Palumbo et al. (2005). The earlier generate gravitons photons and gluons, and the latter the particles (Greene 2003).

### 7) Properties of the vacuum

The vacuum has the same properties of the matter. It is crossed by electromagnetic waves, generates particles, provides the energy to the universe. These discoveries are not recent, since two centuries ago, H.A. Lorentz hypothesized that in the vacuum the electromagnetic field would provide forces to each charged particle of the matter. These properties are consistent with the present model, which shows that: The electromagnetic waves and thence the strings cross the vacuum 2), strings generate particles (Greene, 2003) (Palumbo 2005) and represent the dark energy and matter and thus the energy of the universe 4).

### 8) The expansion of the universe

We will show that the actions of strings inside a black hole are repulsive and increase with the distance.

Let us start by analyzing the orbits of the gravitational equation  $F = G \times m_1 \times m_2 / r^2$ , for  $m_1 = m_2 = m$ : i.e.  $F = G m^2 / r^2$ .

for  $r^2 > G m^2$   $F(r) \Rightarrow 0$ , the orbits are attractewd by zero,

for  $r^2 = G m^2$   $F(r) = 1$  are constant and equal to 1,

per  $r^2 < G m^2$   $F(r) \Rightarrow$  the orbits are attracted by infinite.

The point  $r^2 = k m^2$  is a critical point since a small variation of  $r$  implies that the orbits may tend to zero or to infinite.

Moreover, from  $F = G \times m^2 / r^2$ , for  $\Delta F$  and  $\Delta r$  extremely small, such as inside a black hole  $\Delta F / F = 2\Delta m / m - 2\Delta r / r$ , and assuming  $\Delta m = 0$  one obtains:

$$\Delta F / F = - 2\Delta r / r \quad (1)$$

where the sign minus indicates that  $F$  decreases when  $r$  increases, implying that  $0 < \Delta F / F < 1$ .

Let us examine this relationship outside the above range and indicate  $F_1$  at the distance  $r$ , and  $F_2$  at the distance  $r + \Delta r$ .

- $\Delta F / F > 1 \Rightarrow \Delta F > F \Rightarrow (F_1 - F_2) > F_1 \Rightarrow F_2 < 0$  indicating that  $F$  becomes repulsive at the distance  $r + \Delta r$ .
- $\Delta F / F < 0$ , since  $F > 0$ ,  $\Rightarrow \Delta F < 0 \Rightarrow (F_1 - F_2) < 0 \Rightarrow F_1 < F_2$  indicating that  $F$  decreases when  $r$  increases, in other words that the attraction increases with the distance between two masses. The same holds for  $\Delta r$ , whose analysis indicates that when  $\Delta r > r$ ,  $F$  becomes repulsive and increases with the distance between the two masses.

Let us hypothesize now the presence of two strings, each one corresponding to  $10^{48}$  singular Planck unit strings inside the original black hole. Each unit string has an energy equal to  $10^9$  Joule and a mass equal to  $10^{-8}$  kg, so that our strings have energy equal to  $10^{57}$  J and a mass equal to  $10^{40}$  kg.

Assuming the distance between our strings to be equal to the dimension of a proton ( $10^{-15}$  m), then  $F = 10^{-11} \times 10^{80} / 10^{-30} = 10^{99}$  N.

When  $\Delta r$  becomes equal to  $10^{-11}$  m, and thence  $\Delta r > r$ , from what above,  $F$  becomes repulsive and increases with the distance between the two strings.

When one estimates such a repulsive energy:  $F \times \Delta r = - 10^{99} \text{ N} \times 10^{-11} \text{ m} = 10^{88} \text{ J}$ , he finds that it is equal to that obtained by theoretical studies ( $10^{79}$  unit strings, corresponding to  $10^{88}$  J) (Greene 2003).

The same results may be achieved when one hypothesizes previously the repulsive forces between each two singular unit strings and the total energy involved afterwards,

#### 9) *Repulsive forces between two quark inside a proton*

Similar computations may be performed for such an estimate. The mass of a proton is equal to  $10^{-26}$  kg. We may hypothesize the distance between two quarks to be 100 times smaller than the size of the proton ( $10^{-15}$  m) and thence  $\Delta r = 10^{-13}$  m, and their masses to be equal to that of a proton. Then, the enormous attractive force that links the quark is equal to  $F = 10^{-11} \times 10^{-52} / 10^{-26} = 10^{37}$  N.

When the quarks move for a distance  $\Delta r > r$ , equal p. e. to the size of the proton, the energy would be equal to  $10^{22}$  J and, according to (1), the enormous force  $F$  would become repulsive and increase with the distance.

#### 10) *The discordances resulting from the observations and the General Relativity*

The discordances resulting from the recent observations of the satellite Wmap and the General Relativity may be explained from the results reported in the above points 7) and 6) which show that  $10^{48}$  unit Planck strings, in the original black hole, corresponding to the present dark energy, would had determined the explosion and the persisting increasing expansion of the universe, confirmed by the observations of the satellite Wmap.