Notes

1 A detector for gravitational waves

I was persuaded of the existence of Maxwell's space (ether) over thirty years ago (1962). Since then I have always tried to reveal this mysterious space developing instruments based on various physical principles. I never succeeded by means of optical and electromagnetic waves equipments. In 1970, and for over two years I was able to reveal and measure such a space with a magnetic instrument, however I could not understand it.

In the following years I developed many other instruments. I cannot even recall how many models of laser interferometer, always different from each other, I put together without achieving any result. In 1993 I got the idea of replacing the light ray of laser with an electrons beam emitted by a filament of a vacuum tube. Electrons were accelerated inside a vacuum tube in order to hit a phosphorus-fluorescent anode. The light emitted by the anode was measured by means of a photoresistor which was part of a Wheatstone bridge.

My intent was to check whether the anode-emitted light changed when the instrument was directed differently towards the space, since the electrons beam could in turn have the same course and the one opposite to a possible motion of the space. In this way I believed I could avoid the obstacle represented by the return beam of a ray of light which usually takes place in a laser interferometer and which, as a matter of fact, could cancel any interference of the two beams. Within short I developed and operated such an instrument. It was the beginning of 1994.

Since then I observed with great surprise that voltage at the ends of the Wheatstone bridge changed considerably when the direction of the electrons beam was modified in space. Thus I tried to improve the instrument to make it more sensitive and reliable. During the three following months I carried out readings over 16 hours per day approx. and collected a fairly good amount of data. At the end of this period I realized that the instrument was working properly. It was the beginning of April 1994 when something very strange occurred.

While I was taking the measures, I started detecting quite irregular voltage values at the end of the Wheatstone bridge: all of a sudden, i.e. from a day to another, values which usually lay between 6.5 and 8.5 mV increased to $300 \div 400$ mV, with an increment of approx. 50 times. Initially I was not much concerned about it because I set the bridge to zero through the potentiometer located on

the same arm of the photoresistor. Subsequently the potentiometer proved to be inadequate and I added some resistances to one of the fixed bridge arms, i.e. additional 6 $k\Omega$ to the initial value of 10 $k\Omega$ with a total increase of over 50 %.

I thought the vacuum tube had depleted. I checked the regulated power supply but nothing was wrong: both power supply and digital voltmeters worked properly. For about 10 days the voltage had been rising continuously until it reached a total value of over 4 V compared to the initial voltage difference across the photoresistor of 10 V. Soon after the increase in voltage stopped all at once and, almost immediately it started decreasing; after 10 days it went back to the initial value. The phenomena lasted approx. 20 days all together.

I was very surprised by this occurrence since I could not explain this huge variation of voltage. After a couple of days the voltage started to rise again. At this point I realized that something very important was taking place. I put the instrument on the floor without ever moving it and started recording all variations which took place. It was the end of April 1994.

What does this instrument detect? After five years I consider it a very powerful detector of gravitational waves. At the beginning I did not realize it was all about gravitational waves and I did not believe that these waves could be detected so well; I did not know their structure and how they would propagate through the space. Besides I thought space (ether) to be like a "wind" which was blowing always from the same direction of the Universe, since our solar system together with its local galaxies is moving towards a pre-defined direction. Though I had to change my notion soon because by means of this instrument I perceived this "gravitational wind" blowing in gusts and changing direction all the time, without a fixed reference point.

In the meantime I had developed also a *magnetic sensor* based on the same principle of the previous one which was built in 1970. This magnetic sensor was placed on one of the scale-pan being the other provided with a lead counterweight. To increase the scale sensitivity I fitted it with a Wheatstone bridge. For three consecutive months I have been comparing recordings carried out with these two instruments so different from each other and I could verify that *the results of the magnetic sensor were in accordance with the photoresistor detector*. The only trouble with the magnetic sensor is that the scale nearly stops oscillating when the emitting source is on the horizon.

I carried out also an experiment with a Fabri-Perot laser interferometer, a 16 m light ray and multiple reflections between the two mirrors with voltage and temperature controlled. The instrument was positioned on a rotating table (1 revolution each 5 minutes) and the laser emitted wave was stable at approx. one part over 10^9 in $2 \div 3$ hours. To the test purpose I waited for a gravitational wave which would be recorded both by the photoresistor detector and the magnetic sensor, i.e. in this case I had two different instruments to detect an incoming gravitational wave. *Interference fringes on the interferometer have never changed* in spite of the very high measurement accuracy (8 orders of magnitude for the photoresistor detector plus 9 orders of magnitude for the interferometer for a total

of 17 orders of magnitude). This test convinced me thoroughly of the *inadequacy of such instruments to record gravitational waves*.

The photoresistor detector works in short like a barometer which by means of a glass tube filled with mercury and a metric rod can measure atmospheric pressure. Measuring the voltage difference at the ends of the Wheatstone bridge and multiplying it by its calibration constant K (km/s per mVolt), *variations of the speed of light speed caused by the incoming gravitational waves can be measured directly*.

Had I built this sensor some other time, i.e. had those considerable variations recorded at the beginning of 1994 not taken place, I am sure I would have never been aware of anything and this instrument would have turned out unsuccessful like all the others I built in the past!

During these last five years I developed other sensors of different shape, but all based on the measurement of a light source by means of a photoresistor, however only some of them proved to work correctly. Since 1997, besides the main sensor I have been operating the other three which provide results agreeing with those of the main one. These three new sensors are located in a different environment to the main one, in a different thermostatic chamber and are self-powered. This is an additional proof of the excellent operation of these instruments.

Lately, I also built *sensors utilizing a LED emitted light*. They detect *fast gravitational waves* fairly well but are not very reliable in case of large waves since a LED does not prove to be "stable" over long periods.

Primo Galletti
Rome, 30 September 2000

2 Detector's "K" constant

The detector's K constant is the number which estabilish the amount of variation, in km/s, of speed of light c per mVolt of voltage at the ends of the bridge, that is V_{CD}.

Generally speaking, the value of K is betwwen 25 km/s to 50 km/s per mV of voltage variation, depending on the operating time, measured in years, of the instrument. The longer is this time, the larger is K value.

When a gravitational wave is coming to the instrument, we observe only a variation of voltage, V_{CD}, which is due to photoresistor resistance variations placed on one of the arms of the bridge. We cannot see anything else. All other instrument are have no variations. Therefore, to calculate the K constant value we have at our disposal, only the voltage, V_{CD}, measured at the ends of the bridge.

By means, V_{CD}, we can calculate, for example, the photoresistor resistance variations as we know all the other resistances of the bridge.

But the solution of the detector "puzzle" shows us that *variations (increase/decrease) of, V_{CD}, in mVolt, times the K constant correspond to the variations (increase/decrease) of the speed of light c.*

To be more precisely:

- the speed of light increase as the wave undergoes through positive values;
- as a consequence, the dielectric and magnetic constants decrease proportionally as the speed of light increase;
- the electric charge of electrons (and protons) is inversely proportional to the dielectric constant and, thus, increase.

Therefore, it comes out that the anode current and the accelerating voltage variations (the instruments at our disposal do not allow us to detect!) due to the electric charge variations result as *directly proportional to the speed of light c variations.* The formula for the K constant, therefore, can be written as follows:

$$K = \frac{\Delta c}{V_{CD}}$$

It has to be kept in mind that, to simulate a variation of the electrons kinetic energy, one should vary both the anode current and the electrons accelerating voltage. As it is difficult to perform that, I decided to perform a quadratic variation of the anode current only, and to compensate the error calibration, two measurements were carried out: one with an increase of anode current and the other with a decrease of the anode current and, performing, then, the average of the two measures, the K constant is obtained.

To make clearer how to get the K constant, it is reported hereunder a real example of calibration performed on 29th January 2001.

I supposed that the coming wave has increased the speed of light c of 1 %, that is 3,000 km/s, then I increased the anode current of 1 % quadratic. As the anode current was 3,370 μA, the new value was the following:

$$3,770\ (1+0.01)^2 = 3,845.78\ \mu A$$

On the voltmeter placed at the ends of the bridge, voltage V_{CD} has changed from 50.3 mV to 132.4 mV, with an increase of 82.1 mV.

The anode current has, subsequently, been carried back to the start value of 3,770 μA. After this, we waited for a while, in order to let voltage at the ends of the bridge return to its start value of 50.3 mV.

At that moment, I performed a 1 % quadratic decrease and the anode current:

$$\frac{3,770}{(1+0.01)^2} = 3695.7\ \mu A$$

The voltage at the ends of the bridge, has varied, changing from 50.3 mV, to 35.3 mV, with a decrease of 85.6 mV. I performed, then, the average between the two voltage values:

$$V_{CD} = \frac{82.1+85.6}{2} = 83.85\ mV$$

Thus, for the K constant the following value was obtained:

$$K = \frac{3000}{83.85} = 35.78\ km/s\ per\ mV$$

During the following five days, from 01/31/2001 to 02/05/2001, there was a voltage decreased of -36.3 mV, thus the speed of light c had, therefore, decreased of:

$$\Delta c = 35.78\ (-36.3) = -1298.8\ km/s$$

Primo Galletti
Rome, 15 February 2001

3 Multiple Nucleus Quasars

Universe seems to be ruled by these extramassive *Multiple Nucleus Quasars* (MNQs) formed by several nuclei (some tens) tightly orbitating one around the other like the stars of a globular compact cluster do.

The radius of each nucleus should not be of more than 3 day-light. While the "proper" (or particle) mass, should be around $2 \div 5$ billion solar masses. The total size of these quasars has probabily got a radius corresponding to 3 month-light.

When one of the nuclei forming the NMQ reaches its critical mass, it collapses and locally generates such a very high quantity of energy to be able to "pierce" the surrounding space and to "exit" fron our Universe in an average time of $10 \div 15$ minutes, after which its gravitational effects are no more perceived. At the same time gravitational waves are generated, whose intesity is so haigh to cause the "re-emerging" from the space of some of the previosly collapsed nuclei, so that they return into the MNQ, in contributing to make its life longer. At the same time a chain of collapses starts causing those nuclei, which already have a critical mass to leave the Universe.

The collapsed nuclei, once they have "exit" the Universe, remain "buried" within space and, because of isolation, cannot lose their residual energy. But, in the future, can emerge again from the same point it left and, later on, again collapse.

The time a nucleus takes to collapse depends on the matter that is available around it.

Because of their very high gravitational mass (a small part of them is made of matter particles, but most part of their gravitational mass, is made of *space thickened* around them), these peculiar MNQs act as *"powerful attractors"* in, literaly, sucking any matter existing around them, including galaxies They take the enormous quantity of energy they need to live only in small quantities from matter in free fall on their surface, while most part of their energy comes from the interaction with the gravitational waves generated by the nuclei that reemerge or collapse.

It seems the quantity of nuclei forming the NMQ becomes higher as long as the quasars get older.

The internal structure of these MNQs *cannot be seen with instruments based on detection of electromagnetic waves*, as these waves cannot pass through the very high temperature gas shell surrounding them. *Their internal structure can only be seen with detectors based on gravitational waves.*

What is the life of these peculiar MNQs, acting as powerful matter attractors? At the moment, it is very difficult to forecast it. Sooner or later, matter surrounding them will be atttracted by these extramassive celestial bodies. We can therefore conclude that these MNQs might be the oldests celestial bodies that have ever been existing in the Universe. And the higher is the number of nuclei forming them, the older they are. Anyway their first formation requires some billion years. Because of the various collapses, the quantity of their nuclei increases, until they become a few tens and, at the same time, the collapse frequency increases.

Once all matter of the surrounding cluster of galaxies has been sucked, the quasar life cycle is extinguished, having taken outside the Universe, nearly all matter that was forming it. What happens then is that because of an expansion of Universe, all nuclei "buried" in space are scattered about.

It is therefore possible that life-time of these *"great attractors"*, is (at least) a some times longer than the time of doubling the Universe radius.

How many of these MNQs exist in the visible portion of Universe and how long does it take them to collapse? The recordings carried out up to now, show us that there could be more or less a general collpase every year. And as it is possible to see in a satisfactory way no more than 9/10 of the visible Universe, corresponding to about $80 \div 90$ % of the total volume, taking into account as well the expansion of the Universe, we can estimate that the frequency of these collapses, after correcting it from *redshift*, is about $4 \div 5$ per year.

Sooner or later the MNQ sucks the cluster of galaxies surrounding it. While growing, the quasar is self regulated, "spitting" its nuclei out of the Universe, as it cannot grow bigger than a certain mass.

The MNQ mass we see is the "gravitational" one, therefore the "proper" (particle) mass is remarkably smaller. The ratio between "gravitational" and "particle" mass corresponds to about $10^{18} \div 10^{19}$.

Primo Galletti
Rome, 15 February 2001

4 Matter Life Cycle

This section is totally devoted to a careful analysis of the diagrams produced by the sensor. The total working hours have been now more than 60 thousand, that is to say seven uninterrupted years of recordings.

It seems the Universe seen by this instrument is quite different from the one described by the present most popular theories. The first thing one notices is that this Universe seems unlimited, unlimited in time and in space, always expanding with a continuous acceleration of the celestial bodies therein included.

If things are like this, how is it possible that the Universe is supplied with new matter in order to balance rarefaction produced by its expansion?

In carefully observing the gravitational waves, we can notice that, further than the waves due to huge cosmic collapses, waves of intermediate size are missing while only small waves above the big ones can be seen. Their peculiar notch shape, indicates *the "birth" of new matter*.

This matter *which were outside our space*, and that has never been disturbed there, where it has been, has stayed there waiting to be born since an unlimited time.

The analysis of the area of these small waves, has allowed me to calculate the mass that "enter" into space and that can be as about a some million solar masses. The time needed to come in, takes about $1.5 \div 2$ hours. The coming in of matter, takes place more than once a day. The phenomenon can be clearly seen when the big waves of collapses show a quite flat graph.

This new matter coming in and that can be either in the form of neutrons or hydrogen atoms, generates young star clusters or, if the matter coming in occurs near a galaxy, very likely, the gas cloud will be attracted by this latter one. No matter how things go, but sooner or later, these gas clouds will be fresh matter feeding all galaxies.

These "bubbles" of matter are born everywhere in the Universe. Why do I say this? It is because in observing the large galaxies through a telescope, I can see they are surrounded by a large number of small globular clusters. Furthermore, the bigger and older the galaxy is, the larger is the number of clusters surrounding it.

This new matter that is "born" everywhere keeps constant the ratio, existing in the Universe, between hydrogen and helium, and we can measure it.

Where will the new matter go? It will follow the life cycle of all matter we observe. That is to say at the beginning it will burn transforming into helium and going on into heavier metals. Going on like this for some billion years, in the end it will happen it passes by a "big attractor", that is an extramassine Multiple Nucleus Quasar (MNQ). So it will collapse on one of the nuclei of this latter in converting all its mass into energy. Matter at this point has lost nearly all its energy and the little energy left, will be necessary to start the great collapses that usually take place.

We can say that, at this point, matter life cycle is concluded. The only possi-

bility left is a new re-emerging that will follow later on and that will temporarily supply energy to these big attactors. We can say however that, at this point, matter is "dead".

Once the MNQ has eaten up all matter surrounding it, only a large empty space awaiting to be filled anew is left. The old exhausted matter will remain, however, buried outside the space for an unlimited time, there where there was the collapse.

How many tens of billion years are necessary to undergo this life cycle? I have no idea about it of course!

What has birth is bound to die. Matter as well.

Primo Galletti
Rome, 30 August 2001

5 The detector "puzzle"

It has taken us more than three years to succeed in giving a satisfactory explanation to the fact that the resistance of the photoresistor has so high variations.

If we try to explain the sensor behaviour in using the present laws of Physics, based on an *"empty" space* therefore, on a constant speed of light, we will immediately fail in our attempt. If, on the contrary, we accept that a *"physic" space* behaves like any other dielectric substance, in presence of an electric field, whose characteristics vary when there is a gravitational field, everything becomes easier.

An analysis of the electric field as well as of the gravitational field reaching the sensor, have allowed me to notice that *when there is a gravitational wave, the dielectric constant of space undergoes remarkable variations.* Those variations are translated into variations of the electric charge of electrons and a protons. The varying of the electrons electric charge causes a variation of the energy by which electrons hit the vacuum tube screen in producing a variation of luminosity and consequently a variation of the photoresistor resistance.

Therefore, *voltage variations recorded at the ends of the bridge are, as consequence, variations of the dielectric constant.*

Consequently, well known foundamental constants of Physics, such as the dielectric constant and the magnetic permeability of space change, owing to the effect of gravitational waves. From the well known relationship of Electromagnetism:

$$c^2 \ \epsilon_0 \ \mu_0 = 1$$

it comes out that, also, *the speed of light is varied.* In my opinion, the above relationship represents the foundations of all physical phenomena, including those that occur in the Universe.

The energy of the electrons hitting the vacuum tube screen of the sensor, directly depends on their electric charge and on the voltage of the anode that, in its turn, depends also to the electron's charge. *Said energy is, therefore, directly depending on the square of the electron charge.*

If, for example, the electron electric charge is decreased, it also decreases the acceleration voltage and, due to this fact, the measuring instruments record no variation of anodic current and voltage acceleration.

What is the indication we can guess from the square root of the increase of anodic current? Said figure is the exact increase of the speed of light, while the inverse indicates the diminishing of the dielectric constant.

These facts encourage me to conclude that spaces behaves more or less like any other dielectric facing an electric field. And as space density is variable, also its refraction index is variable (which results as directly proportional to the dielectric constant).

Considering the analysis of the sensor behaviour, from the beginning, I started to notice the link existing between the electric field and the gravitational field. For example, a place situated on the surface of a celestial body has the speed of light lower than in another place in the outer space, and an observer moving about finds

that the speed of light is always constant while on the surface of the celestial body space results as more dense, and therefore having higher dielectric constant, for which reason the speed of light is lower.

If we replace speed of light, magnetic permeability and dielectric constant respectively with resistance, inductance and capacity, we will solve the sensor "puzzle" very well, including the interpretation of the graphs it produces, but such a replace brings about deep modifications on the foundations of Physics.

Furthermore, if we admit the space has a particle structure, it will explain many other phenomena which have remained without solution up to now, as well. In this way it is possible to see a tight link between the electric (and magnetic) field and the gravitational field. Both these fields result as *mediated by space particles.*

I make here a first example. If we build an oscillator with inductance-capacitance (or resistance-capacitance), its oscillations will always have the same frequency, independently on the place where it is situated. That is to say, *the gravitational field has no influence on its oscillation frequency.*

I also make a second example. In a certain place of the surface of a celestial body, the speed of light is lower than another placed situated outside, even if an observer moving from the surface of that body to the outer space will find that the speed of light always remains the same. On the surface of that celestial body space is denser, therefore the dielectric constant is higher and the speed of light will be lower.

As in a gravitational field when there is a decrease of the speed of light, there will consequently be an increase of its intensity, we will notice a corresponding increase of the dielectric constant as well as of the magnetic permeability. If the speed of light decreases, the *standard rod* will correspondently diminish, as well as the luminous waves do, while *their frequency always remains the same.*

These facts are sufficient to explain why light waves coming from collapsed bodies do not show consistent shifts towards red.

The most important consequences for Physics are:

1. Time, as a physical and material entity, disappears, and is replaced by particle space.

2. Space curving is no more produced by the gravitational force. To curve the space huge energies in very small space are needed.

3. The speed of light is not constant and does not represent a limit. Therefore, energy and momentum are variable.

During these latest years in making several observations and in analyzing the graphs produced by the sensor, I have had a good insight of gravity physical laws, through mathematics rules allowing me to perform gravitational calculations about celestial bodies, including stars and planets, which may have collapsed or not.

The rules used for these calculations, are very similar to those applied to the electric field studies. It is therefore possible to see very well a deep link existing

between gravitational field and electric field and to notice how density and the structure of all particles forming the space (ether) state the characteristics of these two fields.

Space particles do not rotate on their axis as elementary particles do, and take a *cubic* (stable) shape when they are far from any electric magnetic and gravitational field as well. A half of the cube has a positive charge, while the other half has a negative charge.

Their cubic structure, occupies the whole free space. There is no limit to their compression, expansion or stretching. These entities have the possibility to stretch more than any other substance. Their volume has a definite size which is twice the electron's and (exactly!) sixteen times bigger than the proton's. When a particle is at rest it has a linear dimension (side of the cube) of $2.32\ 10^{-15}\ m$.

The present Laws of Physics do not accept the existence of this particle space. And they do not accept as well the variability of the speed of light. It will take many more years before these new concepts linked to the structure of space will be understood and, in my opinion, a revision of them will take several decades.

The present Laws of Physics have now exhausted their task. They do not allow any more to discover anything really important. Just some discoveries of little importance are possible. On the contrary, I start perceiving a large quantity of very new and unbelievable ones.

Primo Galletti
Rome, 31 August 2001

6 The evolution of the measuring instruments

Gravitational waves of high, low and very low intensity, continuously strike the Earth and our Solar System. We can compare this situation to that of the ocean waves continuously striking the coastal areas. Solitary giant waves (e.g. "T-sunami"), may correspond to gravitational waves of high intensity, produced after collapsing of the nuclei of a *Multiple Nucleus Quasar* (MNQ). Less intense and quite more frequent waves produced by storms might correspond to the *"notches"* produced by new matter coming into the Universe, while small waves like those produced by the shore of a coastal area can be compared to those short duration gravitational waves produced by the impact of stars strucking the MNQ nuclei surface.

One characteristic of all these waves is that *they do not show any regular o periodic behaviour but they come in in a totally casual way*, having the peculiarity of an unrelated noise so that, the Earth has always undergone this *gravitational noise*.

Gravitational waves interact very little or do not interact at all both with matter and fields (electric and magnetic). This is one of the reasons why we have never perceived their presence. But this is not, however, the main reason! There is another more important reason for our not perceiving gravitational waves. To understand this better, we think it useful to make some considerations on *the birth and evolution of measuring instruments*.

Along with man's evolution there has also been the evolution of measuring instruments, which have become more and more *precise* for our use. A measuring instrument can be judged the more *precise* if:

- the better it is in a position to give in different times the "same" measuring values for those parameters concerning processes "judged", by us, as being steady;

- the better it is in a position to give in different places the "same" measuring values for those parameters that, "according to us", should have the same value.

Thus, a measurement instrument can "survive" only if it matches the above requirements.

Measuring instruments, as well as all matter, are considerably modified when they are plunged into a gravitational field. In the present situation, as we are always continuously struck by gravitational waves coming from different parts of the Universe, we can state that in the course of centuries the evolution of measuring instruments has taken the way to be less and less sensitive to gravitational waves. Or better: *measuring instruments have undergone an evolution (in a true darwinian sense!), in "adapting" themselves more and more to gravitational waves.*

This is the reason we have indicated this adaptation as an *"accordance to the speed of light"*, as we think this term may better express this process.

Following the solution of the detector's *"puzzle"*, we can say a measuring instrument results insensible to gravitational waves during its measuring process if it fit the following relationship:

$$\frac{physical\ dimensions\ (linear)}{speed\ of\ the\ light} = constant$$

An instructive example showing this evolution is given by the clock, that is to say the instrument used to measure time and frequency.

No doubt the first clocks were based on the (supposed!) periodicity of the Earth's rotation on its axis, measured by the day-night course and viceversa. Later on, when it was understood that defects were existing in this kind of process, we started a new measuring one whose periodicity seemed to be better: the revolution of Earth around the Sun.

Clocks have had a big raise in their "quality" when oscillators were applied to them. At first they where mechanical (e.g. the pendulum) devices, then electrical ones (e.g. LC circuits). Having, namely, periodic processes "bounded" in a smaller space.

Electric oscillators (L-C or R-C) were found to have better periodicity and, then, are considered more "precise" than mechanical ones, therefore more successful for their better "complying with" our needs.

Later on, L-C (pr R-C) oscillators have been replaced with quartz oscillators which have immediately shown higher precision characteristics.

The superiority of quartz oscillators in comparison with the previous ones having lumped parameters, consists in the fact that both inductance L and capacitance C are *in a more direct relation with their physical dimensions*. Therefore, in this latter case it is possible to avoid those unwanted and detectable side effects due to the use of different materials, a fact that in the end results in higher dispersion of energy per each oscillatory cycle.

Later on quartz oscillators have been replaced by interferometers. That is to say by transmission line oscillators.

Instruments which use the principle of a transmission line (interferometers are the best known representatives of this principle), that is to say on a *direct comparison between physical dimensions and speed of light*, are those which better than others, can fit the previous relationship. That is to say, the measuring process at the basis of an interferometer can, better than any other, be *in "accordance" with the speed of light*.

This is the reason why the evolution of measuring instruments has used this kind of technology and no doubt we can say that the XXth century was the century of interferometers!

Therefore, it follows that *an interferometer is the less appropriate instrument to detect gravitational waves*. The remarkable efforts that scientists have made and are still making to detect gravitational waves have proven, up to now, quite useless and this is a proof of this fact. The method of the oscillatory mass, which is also used today to detect gravitational waves, could have been more successful if it were

not based on detecting frequency variations induced by gravitational waves. There is, in this case, an evident analogy with the quartz oscillator!

Another interesting example is the one of cadmium sulphide photoresistors. The cadmium sulphide photoresitor has been used as a photo-sensitive element to measure the intensity of light since the '50ies but it has shown to be an unreliable instrument. So that, it was soon replaced with instruments "judged to be better" such as photodiodes.

The cadmium sulphide photoresistor, in case it is kept working for a long time, tends to "formatting" and to become sensitive to gravitational waves, as *it is sensitive to the real luminous energy* hitting it.

On the contrary, the photodiode has not got this "inconvenience" as *it is sensitive to the energy hitting the device per unit of surface.* As both these values vary along with the square of the speed of light, their ratio (that is to say the luminous intensity), does not vary in presence of a gravitational wave!

Regretfully, cadmium sulphide photoresistors we can buy today do not have such a good formatting process as the old ones. Very likely, they have been "stabilized" with substances which are more sensitive to the luminous intensity and have then become more "precise" and "reliable" for their daily use as photo-sensitive elements. But direct experience has shown us that they have lost their "formatting" capability and are no more able to become, within few years, powerful detectors for gravitational waves.

Aldo Aluigi
Rome, 31 August 2001

7 "New" fundaments for Physics are needed

The discovery of gravitational waves, might require a thorough revision of the *Fundaments of Physics*.

As I previously stated, it seems that without any doubt the waves recorded by our detector are nothing but *variations of the dielectric constant (and magnetic permeability too) of space*.

The fundaments of this new Physics must be based on the deep link existing between the electric and magnetic fields with the gravitational field. These three main fields in Nature, that are at the basis of all observed phenomena, including the cadmium sulphide detector itself, are subject to the mediation of the "physic" space (*ether*).

If we use the present laws of Physics, based on the constant of the speed of light, to try to explain the detector behaviour, we would fail since the beginning. On the contrary, we have seen that if we replace speed of light, magnetic permeability and dielectric constant with resistance, inductance and capacitance respectively, the "puzzle" of the detector, including the interpretation of the diagrams it produces, can be solved very well.

This replacement, however leads to deep changes of the Fundaments of Physics. For example, if we build an inductance-capacitance (or resistance-capacitance) oscillator, its oscillations will always be at the same frequency, independently on the place where it is situated. Namely, *the gravitational field does not affect the frequency of its oscillations and, consequently, it does not affect any clock that can be placed be there*.

In a gravitational field, the speed of light diminishes by the increasing of the intensity of the field, and both the dielectric constant and the magnetic permeability increase proportionally as well.

On the surface of a celestial body space is denser therefore, the dielectric constant is higher and the speed of light is slower. That is, in a site placed on the surface of a celestial body the speed of light is slower than that in another site outwards of the body, *even if the value of the speed of light recorded by an observer moving from one site to the other one is always the same*.

If in a gravitational field the speed of light diminishes, the *"standard" rod* proportionally get shorter, and the same occurs to the wave-length of luminous waves, while *their frequency remains always the same*. Thus, *there is no redshift having gravitational origins*. This would explain why light waves coming from collapsed bodies do not show any shifting to red.

In the end, if we admit, that space is made of particles, it is even easy to explain the origins of matter as well as many other phenomena that, up to now, are not easily explained.

We can summarize all this as follows:

1. *"physic" time* disappears, and it is replaced by *"physic" space* (particle);

2. the electric field, the magnetic field and the gravitational field have one single mediator: the *space particle*;

3. the speed of light is no more constant and does not represent a limit. Consequently, *both energy and momentum are varying*;

4. *the varying of their dimensions for the bodies plunged into a gravitational field is directly proportional to the speed of light*;

5. the space "curving" produced by the force of gravity disappears. To "curve" the space, only high quantities of energy are needed;

6. matter and anti-matter are formed in "curving" space particles.

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Rome, 31 March 2003

8 Planck Constant

The note hereunder is devoted to one of the most important fundamental constants of modern Physics: namely, *Planck constant*.

It is well known that this constant of modern Physics was introduced at the beginning of 1900 by Max Planck, who was trying to explain the anomalous behaviour of a "black body" radiation.

There was something anomalous in using Physics classical methods to calculate the total electromagnetic energy inside a cavity, as the result would diverge to infinity.

In order to overcome this difficulty, Max Planck had a rather hazardous idea, namely, that the radiation field in the cavity was the result of the thermodynamic equilibrium of an (infinity) series of electromagnetic oscillators, which energy E_n can only be exchanged in multiples of an elementary quantity $h\ \nu$. Namely:

$$E_n = n\ h\ \nu \tag{1}$$

where, h is a constant (Planck constant) and ν is the oscillation frequency.

In this way, the calculation of the electromagnetic energy (namely, integral of energy density, on the whole spectrum of frequencies) might have been replaced with a sum of a series of (infinity) terms converging to a finite value.

The equation obtained by Planck proved to be quite exact and when compared with the formula by Stefan-Boltzman, it was easily possible to calculate the value of h.

The method Planck used caused serious troubles to the Physicians of that time, as new problems were still unsolved. More precisely:

1. what are really these oscillators in Planck's hypothesis? Do they really exist? How are they formed and where are they?

2. Why does the exchange of energy among the oscillators occur in discrete quantities which are multiples of the elementary "quantum" $h\ \nu$?

3. Is energy $E_\nu = n\ h\ \nu$ to be intended as owned by a single oscillator or by n (coupled) oscillators, each one with $h\ \nu$ energy?

About the last point, the interpretation of the *photoelectric effect* (see Einstein 1905), introducing photon as a particle, indicated as more likely the idea of n oscillators all having an energy corresponding to the elementary "quantum" $h\ \nu$. However, how could it be possible to solve the problem of coupling these oscillators?

Regretfully, the idea of a "physic" space, had been rejected in that period, in favour of an "empty" space, which was more lined up with the idea of a constant speed of light, which fact did not consent to overcome said difficulties, that were "solved" thanks to the introduction of the *Heisenberg's Principle of Indetermination*.

We want to discus one more time this subject hereunder and show how the existence of a "physic" space made by *particles* may allow us to overcome in an easy way said difficulties by leaving aside the *Principle of Indetermination*.

The characteristics of this "physic" space are the following:

- "physic" space consists of particles which, when they are at rest, (that is to say when there are no fields), have a *cubic* shape and are set in order to fill the space, they dispose of, completely;
- the structure of "physic" space at rest is a regular periodic one, that we can image as very similar to the structure of some crystal solids;
- every *space particle* is divided into two parts (half-particles), which are the same both as regards physic dimensions and mass, which are linked one-another;
- the electric charge of each half-particle is similar but has opposite sign, and its absolute value is the same as the electron/proton one. The way they are placed in space is such as to cancel opposite charges, so that this latter results as neutral;
- the electric, magnetic and gravitational fields have one *mediator* only, which is the *space particle*. In a certain way, Planck constant represents one of the most important of these physic characteristics.

  It is *a gravitational quantity which has nothing to do with Electromagnetism.*
- electromagnetic waves in a cavity are nothing but *modes of vibrating of space particles*, and they are very similar to those we find in solid lattices, enabling us to explain some of their physic characteristics, especially at low temperatures (e.g. specific heat, etc...).

What is, then, the connection between Planck constant and the space particle?

Calculations about electromagnetic radiation inside a cavity can be performed in a very similar way as to calculate vibration modes in crystal solids (Debye, 1912).

As we know, number Δn_ν of vibration modes per unit of volume having a frequency between ν and $\nu + \Delta\nu$ is given by:

$$\Delta n_\nu = \frac{8\ \pi\ \nu^2}{c^3}\ \Delta\nu \tag{2}$$

According to dimension ξ_0 (the side of a cube) of the space particle, it is possible to fix the maximum frequency of the electromagnetic radiation of the lattice,

formed by space particles, can "sustain". We obtain [1]:

$$\nu_{max} \approx \frac{2\ c}{\xi_0} \tag{3}$$

As Planck constant h has been considered in terms of energy, we have to refer to the following equality:

$$2\ h\ \nu_{max} \approx \frac{m_0}{2}\ c^2 \tag{4}$$

where, $m_0/2$ is the mass of half space particle, while factor 2 on the first hand, considers the two possible polarization states of light.

If we combine (3) with (4), we will obtain the following important equation:

$$h \approx \frac{1}{4}\ m_0\ \xi_0\ c \tag{5}$$

which punts into evidence the relationship between Planck constant and the physcal characteristics (m_0 and ξ_0) of space particles.

How can the mass m_0 of a space particle be calculated?

We have to keep in mind first of all, that *the matter is "built" beginning from space particles*. When energy is engaged to "curve" a space particle, what comes out is always a particle and an anti-particle of matter.

Engaging about 1.1 MeV one electron and one positron are obtained, while with little less than 2 GeV it is possibile to obtain a proton and an anti-proton.

Electron that needs only few energy to be built is a spherical particle having a "minimum" curvature, with a density which is nearly the same as the space one where it is plunged, therefore, *its volume is nearly corresponding to the volume of an half-particle*. Namely, the equation between ξ_0 and the electron radius R_e is the following:

$$R_e \simeq \sqrt[3]{\frac{3}{8\ \pi}}\ \xi_0 \tag{6}$$

A proton which requires energy 1836 times higher than an electron, is a spherical *compressed* particle with density higher than the space one where it is plunged.

Furthermore, proton has a radius which radius is (exactly!) half the electron radius, therefore its density results 8 times higher.

Proton is a particle with a "maximun" curvature, forming along with electron and space particle the only existing steady particles (that is to say that have endless

[1] The correct equation we obtain in calculating the total number of vibration ways in the lattice, is the following:

$$\nu_{max} = \sqrt[3]{\frac{8\ \pi}{3}}\ \frac{c}{\xi_0}$$

which, substantially, is not so different from (3).

life). All other particles having higher curvatures are unsteady and sooner or later decay.

As both proton and electron are "plunged" into space, if we try to measure their (mechanical) mass with a scale (that is plunged into the same space too!), owing to *Archimede Principle*, we will obtain a (nearly) zero value for the electron and a 1/8 times lower value than that of a half space particle for the proton. Therefore, if we do not consider the "electric" and "magnetic" contributions to its mass, we can write the following equation:

$$\frac{m_0}{2} \simeq \frac{8}{7}\, m_p \tag{7}$$

That is to say, *it is possible to determine mass* m_0 *of the space particle, in a direct and very exact way, by means proton mass* m_p! (7) allows us, therefore, to obtain the following:

$$m_0 \simeq \frac{16}{7}\ 1.67\ 10^{-27} \simeq 3.82\ 10^{-27}\ kg$$

If in (5) we replace the value thus obtained, it is possibile to get dimension ξ_0 of the space particle. We will obtain:

$$\xi_0 \simeq \frac{4\ h}{m_0\ c} = \frac{4\ 6.67\ 10^{-34}}{3.82\ 10^{-27}\ 3\ 10^8} \simeq 2.32\ 10^{-15}\ m$$

Therefore, the density of space results as corresponding to:

$$\delta_0 = \frac{m_0}{{\xi_0}^3} \simeq \frac{3.82\ 10^{-27}}{\left(2.32\ 10^{-17}\right)^3} \simeq 3\ 10^{17}\ kg\ m^{-3}$$

Furthermore, the electron radius obtained through the "gravitational way" gives the following value:

$$R_e \simeq \sqrt[3]{\frac{3}{8\ \pi}}\ 2.32\ 10^{-15} = 1.14\ 10^{-15}\ m$$

The electon is also in equilibrium with the surrounding space. From this equilibrium it is possible to figure out, through the "electromagnetic way", the corresponding radius R_e. The relative calculations (we are not indicating hereunder not to be too long) gives the following value:

$$R_e = 1.13\ 10^{-15}\ m$$

A comparison of both calculations which are independent from each other (being the former a gravitational and the latter an electromagnetic calculation!) gives differences lower than 1 %! Considering the context of our approximations, we can consider the result very satisfactory.

What will be the present context of *Quantum Mechanics* now we have suggested this new meaning for its most important constant? But, above all, what will it happen to *Heisenberg's Principle of Uncertainty* representing one of its main fundaments?

What we intend to stress today, by sure, is the fact that the existence of a particle "physic" space might lead us to a remarkable simplification in the concepts of the *Quantum Mechanics*, without using its "worrying" *Principle of Uncertainty*.

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Rome, 31st January 2004