Interaction of Gravitational Waves with Matter

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The two *Gravitational Waves* of high intensity recorded from 16th to 23rd August 1999 and from 25th to 30th August 1999 (see **Graph 1999_6**) have drawn attention to their interaction with matter.

The recent restarting of the "gravitational activity" that was recorded from June to September 2002 (see **Graph 2002_5**), even if of lower intensity, gives us further proof of this interaction.

We intend to give hereunder, a (first attempt) list of the effects that gravitational waves cause to bodies, and we make a separation between waves of high intensity produced by collapsing of the nuclei of *Multiple Nucleus Quasars* (MNQs) and short time duration waves produced during the fall of celestial objects on the surface of said nuclei.

1 Gravitational Waves of high intensity

Effects on the Earth. In August 1999, during the rise front of the first gravitational wave, a *series of very strong earthquakes that happened at the same time on the surface of the Earth, was recorded.* The second gravitational wave caused further earthquake shakes of very high intensity too.

How does this phenomenon happen? When a gravitational wave arrives, the Earth nucleus *suddenly restrains and that event causes an Eastward slipping of the Earth's mantle.* The slipping gets greater and greater while reaching the external layers up to Earth crust.

Furthermore, this slipping is maximum at the equator and the nearer we get to the poles the lighter it becomes, until in that area this phenomenon is no longer perceptible.

This phenomenon, that starts with the wave uprising and lasts as long as the wave (or the waves if there are more than one) does, is caused by the interaction of the gravitational waves with the Earth magnetic field [1].

About $2 \div 3$ months after the arrival of these waves, it was possible to notice the *reactivation of volcanoes in a quiescent phase.* In Italy volcanoes like Etna

[1] With its magnetic field, the Earth acts as if it were our *magnetic sensor* placed on a scale and reacting with a force (in the same direction of the wave) every time a gravitational wave invests it.

have started very intensive eruptions. This intensification of the volcanic activity lasted during the whole year 2000 and we can say that only in year 2001 things went back to a sort of ”normality”.

The volcanic activation is due to the *heating of the Earth caused by the friction arising between nucleus and mantle of the Earth* during the Eastward slipping of the latter one. The intensifying of the volcanic activities, depend on the diffusion of heat towards the surface; therefore these start later the arrival of the wave [2].

Due to the impact with the gravitational wave, another two relevant phenomena are likely to be produced on the Earth:

- a *slowing down of the Earth rotation around its axis*;
- a *displacement of the terrestrial magnetic axis.*

Slowing down of the earth rotation should last during the whole wave's phenomenon [3].

As far as the entity of the displacement of the terrestrial magnetic axis, instead, this does not only depend on the intensity of the wave but it depends also on the direction from which the wave arrives.

Effects on the Sun. The waves of August 1999, caused also on the Sun an increase of the solar activity with subsequent intensification of the solar spots. This started in spring-summer 2000, that is to say with a further delay (of about $12 \div 18$ months) than on the Earth.

During said period, an *intensification of the surface ”explosions” with an increase in surface temperatures and a higher radiation than the average was recorded.*

The impact of gravitational waves on the Sun is similar to the one on the Earth, but it produces a higher intensity because of its higher magnetic field (about 10 thousand times higher). Therefore, the heat that is generated inside the Sun on the arrival of these waves is also much higher. Furthermore, the bigger mass and the presence of a strong magnetic field hinder its diffusion towards the surface, so that this heat will be released much later. There is also to remark that the phenomenon of slowing down of rotation could be more evident on the Sun.

Effects on the other planets of the Solar System. The other planets of our Solar System, show phenomena which are very similar to those observed on the Earth.

[2]This cannot be said for those volcanoes that, like Vesuvio, are not active. To be shaken, these volcanoes need particularly intensive (and quite rare, of course,) waves. for which reason it is supposed their activity should begin, probably starting with a big explosion, at the same time as the telluric shake.

[3]The slowing down of the Earth is very likely only temporary. Later on and in a longer time, the Earth's rotation speed will increase again (due to the ”cyclonic” effect) restoring the initial value, as cyclones and anti-cyclones continuously forming accelerate/decelerate the Earth rotation depending on the heat they receive from the Sun (it has to be kept in mind that the cyclone momentum is (always) higher than that of the anti-cyclone).

Jupiter, for example, could show more intensive phenomena due also to its higher rotation speed.

For what concerns Uranus, on the contrary, due to the fact that its axis lays on the same plan of the orbit itself, the forces produced by gravitational waves are likely to result lower.

Bodies like the Moon that do not have any magnetic field gravitational waves do not produce any effect.

Effects on the other celestial bodies. The interaction of Gravitational Waves with the Earth and the Sun helps us to explain also other kinds of phenomena observed in the Universe that, up to now, they are not easy to explain.

1. It is possible to observe very old stars belonging to (elliptical) galaxies, which, notwithstanding the fact they have completely or nearly completely exhausted their thermonuclear fuel, are still shining in the sky with a feeble light.

2. It is to note that most of the heat, still irradiated by these stars, comes from gravitational waves crossing them.

3. Anomalous motion of some celestial bodies having high density, such as pulsars or neutron stars. These celestial bodies go through the space in a zig-zag motion and, in some specific directions, they can sometimes reach a remarkable speed (hundreds of km/s). As the rotation of these celestial bodies is very fast and, furthermore, they have an extremely high magnetic field, the forces generated by gravitational waves, result much higher and so powerful that they, are thrown aside exactly like bullets in the same direction from which the wave arrives. There is also to say that, due to the impact with the wave, a high quantity of energy in the form of heat is released, for which reason even if these objects have completely exhausted their thermonuclear fuel, their temperature is quite high. This phenomenon, even if less evident, can be noticed, in white dwarf stars too.

2 Short time duration Gravitational Waves

For what concerns gravitational waves lasting for a short time, up today, we can state that:

1. these waves are produced by celestial bodies, such as stars, planets, etc... falling on those nuclei forming MNQs, or on *common quasars* placed in the center of some giant galaxies;

2. these waves last up to a few seconds for what concerns the most massive bodies (e.g. some tens solar masses), and they can be of only a few cents of a second or even less, for the smallest bodies;

3. the intensity of these waves is very low (a few hundreds microVolts). The corresponding variation of the speed of light goes from a few tens to a few thousands m/s;

4. in those waves coming from longer distances it is possible to notice the effect due to redshift.

A very remarkable phenomenon produced by these waves interacting with matter is that *in electronic circuits, they produce a low frequency noise.*

What today we can state is that *the 1/f noise there is in electronic circuits has, no doubt, gravitational origins*!

We intend to come back, later on, for a further discussion on this important subject.

3 Collapsing of a MNQ near us

It is well known that at a distance of about 200 million year-light from us, there is the cluster of galaxies in which center there is, very likely, the MNQ commonly called *Great Attractor*.

What would it happen on the Earth (and on the Sun as well!), in case of collapsing of one of the nuclei of this MNQ so near us? We know the impact produced by a gravitational wave on a celestial body is directly proportional to the variation, respect to the time, of the speed of light. There is now to consider that the intensity of a wave depends on the distance of the MNQ (geometrical effect, which is inversely proportional to the square of the distance) as well as on the redshift (effect due to the expansion of Universe) which, in causing the waves to become wider, proportionally reduces their amplitude. The redshift however, has effect also on the time variation (derivative) of the wave intensity too. Therefore *collapses happening near to us generate gravitational waves not only of higher intensity but also shorter in time.*

We are today in a position to calculate the intensity of a gravitational wave produced by the collapsing of one of the nuclei of the *Great Attractor*, that might cross our Solar System. The most intensive waves recorded up to now (those of August 1999), whose intensity was about 1 Volt, left from a distance of about 4 billion year-light. Considering the effect of distance only it would, therefore, result the following amplitude:

$$1\ Volt \times \frac{4\ 10^9}{200\ 10^6} \approx 20\ Volts$$

Furthermore, because of the effect due to redshift (the waves of August 1999 had had a redshift of $z = 0.56$), if we neglect the redshift of the *Great Attractor*, there would be an increase of the above amplitude of:

$$\frac{1 + 0.56}{1 + 0} \approx 1.6\ times$$

while, at the same time, the wave rise time would be reduced for the same quantity. Therefore, the forces generated by the wave (directly proportional to the time variation of the speed of light) on celestial bodies like the Sun and the Earth have an intensity corresponding to:

$$20\ Volt \times \left(1.6\right)^2 \approx 50\ Volts$$

that is to say *50 times higher than those produced in August 1999*!

The slipping between the nucleus and the mantle and consequently, also by the Earth crust are very likely much more violent and devastating. *The heat released is much higher for which reason volcanic eruptions are more intensive and last longer, that is to say tens of years.* The amount of gases discharged into the atmosphere should be such as to obscure the Earth for a long time, maybe hundreds of years or more. *Its temperature would increase by several degrees thus causing most species living on its surface to be seriously endangered.*

At the same time, high quantity of energy in the form of heat would be released into the Sun for which reason, *its temperature should remarkably rise and remain such for a long time, causing the Earth temperature to further increase.*

After a strong (and sudden) slowing down of the rotation speed caused by the impact if the wave, the Earth would later have a strong re-acceleration up to higher speeds than at beginning. Only when its temperature will be lowered (that is to say when the Sun has expelled all its extra heat too) rotation speed can return to its normal values.

The terrestrial magnetic axis too might undergo substantial displacements, depending on the direction from which the wave arrives.

A similar sort should involve the other planets of our Solar System and particularly those, as Jupiter, which own rotation speed is high.

4 Effects of gravitational waves on climate

After more than 8 year continuous detections of those waves, we can no doubt state today that *distribution in time of the waves investing us is completely random.* There are periods having intensive activity interlaced with periods of standstill.

Those periods having low gravitational activity should correspond to periods of cold and scarce solar activity. Telluric and volcanic activities, too, are very likely remarkably reduced in said periods [4].

Well known periods of *intensive cold and reduced solar activity*, such as that happened between 1650 and 1750 (Maunder period) and between 1800 and 1850 (Dalton period) very likely matched with periods of low intensive gravitational activity.

[4] It might be of great interest to put those periods of rich solar activity in relation with the telluric and volcanic activities occurred on the Earth.

Other periods of particularly intensive hot as just after year 1000, a period that lasted for nearly two centuries, are related, instead, with periods of more intensive gravitational activity [5].

It was recently discovered that some of the most important mass extinctions happened on the Earth in the past, were accompanied by an intensive volcanic activity that lasted for a long period. Because of all this, *it is unbelievable that the cause of all that was the impact of a meteorite.*

The arrival of huge gravitational waves produced by the general collapsing of MNQ, that occurred near us, is more and more frequently indicated by us as the cause of some of these great extinctions [6].

5 Discussion

We are not yet in a position to say anything more definite on the mechanisms of interaction of gravitational waves with matter and in particular with the electric and magnetic fields.

What we can state now is that:

1. *the forces acting on a body invested by a gravitational wave depend on the variation speed (derivative respect to time) of the signal recorded by the detector (namely, of the speed of light)*;

2. *gravitational waves interact with magnetic fields through the variation of the speed of light (magnetic permeability of "vacuum")*;

3. *gravitational waves also interact with electric fields through the variations of the speed of light (dielectric constant of "vacuum")*;

Therefore, the passing through of a gravitational wave, the quantity of heat released in those celestial bodies having an intensive magnetic field and having very low resistivity should be remarkable and such to cause *an unbalance in the energy for the same celestial body.*

The life of stars, including our Sun too, should be, therefore, longer than what expected due to the extinguishing of their thermonuclear fuel [7].

[5] The disappearing of some important civilizations in the past (as it happened for the Mayas that disappeared before year 1000 (following a period of draughts) might be related to scarce gravitational activity with low temperatures and, therefore, no rains.

[6] There is to keep in mind that the general collapse of a MNQ leaves the area where the event happened without any or with small quantity of matter. Checks about these "empty" areas near us, might give further support to this idea.

[7] This unbalance of energy on the Sun between the thermonuclear reactions happening there and the electromagnetic energy irradiated is called today the problem of the *missing neutrinos*. Therefore, *such a problem does not exist*, as the extra energy emitted by electromagnetic radiations is very likely produced by gravitational waves continuously investing the Sun.

The heat generated by passing through gravitational waves on the Earth, is the main cause of the condition of fusion of the mantle and (maybe) of the nucleus too [8].

All this is the same also for other planets of the Solar System (and very different from the Sun) such as Jupiter, Saturn or Neptune which, as well known, also emit more energy than they receive by irradiation from the Sun: *this excess of energy is due to the heating produced by gravitational waves passing through*.

On Jupiter, in particular, this heating effect is higher because of its *higher rotation speed*.

[8] As someone still mentions today, this has not due to the residual radioactivity still existing inside it.