Part 5: More on the "birth" and "death" of Matter

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Rome, 28 February 2002

We dealt about the *"death" of old matter* by a peculiar mechanism of cosmic collapses of the nuclei of *Multiple Nucleus Quasars* (MNQ) and about the *"birth" of new matter*, revealed by the presence of "notches", overlapped on the main signal recorded by the detector. [1].

The presence of these "notches" has been detected only after setting up the second thermostatic chamber, which has allowed to stabilize the sensor temperature within a *few milliKelvins*.

In the meantime, the interval of the reading of data had remained unchanged with 1 reading every twenty minutes and no variation had been made until April 2001, when we set up a new Data Logger (Agilent 34970A), which allowed to start a new series of data acquisitions of *1 reading per minute*.

The remarkable increase of time resolution (20 times more), has allowed the following:

- to find out the exact shape of the "notches"
- to be less uncertain about the size of the nucleus at the moment of its "going out" of the Universe.

All this has been possible, thanks also to a temporary rather good "gravitational stillness" existing since the end of 1999 allowing, during the period July-October 2001, to record some collapses that were very little disturbed by the underlying signal.

1 The "birth" of new matter in the Universe

The following analysis is based on graphs concerning "notches" recorded by the new Data Logger, starting from May 2001 until December 2001.

It is possible to remark from the graphs how different is the shape of these "notches" from the one previously detected. These "notches" have a *rectangular*

[1] See **Parts 2** and **3** of *A detector for Gravitationale Waves*.

shape, which has a negative amplitude, with a falling front that lasts for about 1 minute while the rise front appears to be steeper than the falling one (see **Graphs 2001_06_N1**, **2001_08_N1**, **2001_08_N3** and **2001_10_N1**).

The negative amplitude of the signal is about $2 \div 3$ mV, while their time duration is rather varying and may be *about ten minutes up to several hours* (see **Graphs 2001_05_N2**, **2001_08_N3**, **2001_09_N12**, **2001_10_N2** and **2001_10_N3**).

The "notches" having a wider amplitude also show steeper falling/riseing fronts. Namely, it is possible to distinguish very clearly "notches" having an amplitude of $2 \div 3$ mV, whose fronts last for a few tens of seconds, and other, hardly distinguishable, "notches" having an amplitude of $100 \div 200$ μVolts, whose fronts last for minutes (see **Graphs 2001_08_N2**, **2001_10_N4** and **2001_10_N5**). The presence of *redshift* is rather clear in these waves, too!

Particularly, **Graphs 2001_09_N6**, **2001_09_N9** and **2002_01_N1** show the presence of some "noises" due to black-outs that took place in the (external) electrical grid. It is evident to remark in these graphs, that the observed notches" are not the recordings of external disturbances because, as already pointed out, the latter ones show positive peaks extinguishing after few minutes.

Also what can be seen in **Graph 2001_08_N0** are not "notches". In this case too, the graph indicates a series of *internal disturbances*, but they were produced by a "cold" welding which was immediately repaired.

Most "notches" that is possible to observe, are overlapping the falling front of the main wave as, on the contrary, they are very rare on the rise front. **Figure 1** offers an explanation to this.

When observing the figure, it is easy to realize that the "notches" overlapping the falling front are those generated very near the perpendicular line by the propagation front of the main wave passing through the observer (see N1 and N4), while those of wider amplitude, reaching the observer later on, are generated at farther latitudes (see N2 and N3).

2 The life-cycle of the matter

To what already previously stated about *the life-cycle of the matter* in the Universe, we want to add the following points.

1. This matter, which *has "birth" for the first time* is, very likely, is "buried" into the space and it is spead out of the Universe in correspondence with the spots where we see it has "birth".

2. The falling front corresponds to the "piercing" of space by matter that pushes to "enter". The "entry" of matter lasts all the time the wave goes on, while the rising front represents the later "closing up" of space.

3. The amplitude of the "notches" keeps constant during the whole time of this event. Practically, this means that, the amount of matter per unit of

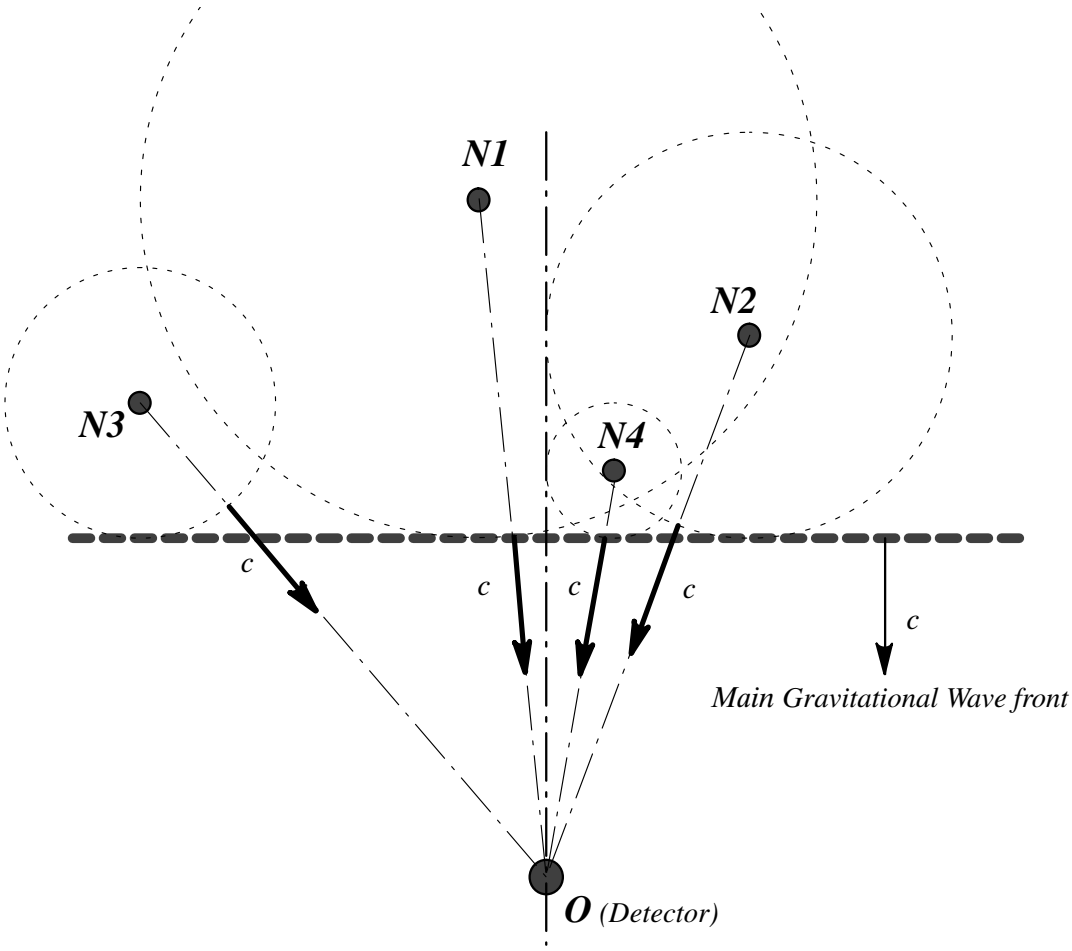

Figure 1: The birth of "bubbles" of "new" matter

time that enters is always more or less the same or, if preferable, the "hole" produced in the space will have, more or less, the same "dimensions".

4. Very likely, the birth of these "bubbles", as we think, may more easily take place in regions where there is no concentration of matter, as the "piercing" of space is easier where same is not too "thickened" [2].

5. The origin of many *neutral hydrogen clouds* present in the Universe should be namely this one [3].

6. The new matter formed in this way should, therefore, *fill the areas "emptied" by the general collapses of the MNQs*. The larger hydrogen clouds will form

[2]One has to keep in mind that *matter "thickens" space around it* and the more matter is concentrated the higher this thickening is.

[3]See, also, the several recently discovered galaxies having a low surface intensity.

young galaxies, while the smaller ones will become young star clusters, that in their turn are attracted by the larger galaxies in order to supply these latter with "fresh" matter.

7. Furthermore, the birth of this matter is, probably, stimulated by those gravitational waves having a high intensity produced when the MNQs nuclei collapse. Therefore, while passing, these waves should leave behind a "bubble" wake which, in expanding, they produce the observed "notches".

8. In a Universe that is constantly expanding, where the "old" matter is "eliminated" through the mechanism of cosmic collapsing, the "birth" of "new" matter is *an essential element to keep an always "young" Universe*, as shown by the high hydrogen quantities present in it.

3 On the "exit" of a MNQ nucleus

The remarkable increase of time resolution in acquisition of data has revealed some details of great interest, concerning the collapse of a NMQ nucleus.

The collapses that took place between in August and October 2001 (see **Graph 2001_05**) were recorded also with the new Data Logger, which had already been operating since a few months and had been set for 1 reading per minute. It was therefore possible to record the exact moment of the "exit" of some nuclei.

Graph 2001_08_P1 shows the primary peak of the "exit" of a nucleus recorded on the 11th August 2001 while **Graph 2001_10_P1** shows the one recorded of 12th October 2001. The recording made on 11th August is particularly clear and precise, as no meaningful variations of the underlying wave were present, while for what concerns the recording made on 12th October, the precision is a little lower.

What we can remark in this picture is really surprising. *The nucleus takes less than one minute to "exit" instead of about* $10 \div 15$ *minutes* as previously guessed!

Given this, it is possible to calculate a more precise higher limit, for the nucleus dimensions, at the moment of its "exit" from the Universe. The recorded waves have a redshift of $z = 5.5$ therefore, if we take as 1 minute the (measured) time the signal takes to change its slope and divide it by widening w of the wave $w = z + 1 = 5.5 + 1 = 6.5$, the *actual time* is obtained which results less than about 10 seconds.

How is it possible that such an object, that we have seen has got a *mass corresponding to a some billion solar masses*, may "disappear" in such a short time?

Let's make a more detailed analysis of how all this happens. While matter is gradually falling on the nucleus, this latter contracts because of the increase of the gravitational field. Therefore, the (outside) gravitational pressure that (space) acts on matter gradually increases, while the nucleus mass increases.

With the increasing the gravitational field, the speed of light on the surface of the nucleus decrease.

The (inside) pressure of the matter is directly proportional to the electromagnetic energy it has and, as it is directly proportional to the square of the speed of light, it gradually decreases [4].

As long as the nucleus is larger than a given (critical) size, matter can "resist" to the gravitational pressure. But below said size, the gravitational pressure prevails on the electromagnetic one, therefore the collapse starts [5].

Collapse phase lasts about 3 days, therefore, the critical radius at the moment of collapsing results as:

$$R_N \approx 3\ light - day = 3\ 86,400\ 300,000 = 7.8\ 10^{11}\ km\ (\approx 5,000\ AU)$$

which means that the nucleus dimensions are 100 times larger than our Solar System.

Collapsing goes on until the nucleus dimensions reduce to such a value that space "curving" occurs around the nucleus and this latter "sinks" into the space itself

We say, at this point, that the nucleus has "left" the Universe, as its gravitational effects no more take place [6].

Its dimensions at the moment when it "left" should be therefore:

$$R_N \leq 10\ second - light = 10\ 300,000 = 3\ 10^6\ km$$

that is to say, 200 times bigger than Sun.

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[4] Matter "exit" from the Universe through the mechanism of cosmic collapses is "dead" matter, that is to say, almost without any of its electromagnetic energy, because of the very low speed of light there is on the surface of nucleus.

[5] It is possible to recognize a two-dimensional analogy for high intensity gravitational waves with the *solitary waves propagating in basins*. For these (two-dimensional) waves that spread on the surface of water the ratio between propagation speed c of the wave and deepness h of the basin is the following:

$$c \propto \sqrt{h}$$

While for what concerns (three-dimensional) gravitational waves, the ratio is instead:

$$c \propto \sqrt[3]{\frac{1}{\delta}}$$

where δ is the space density. The inverse of h can be easily identified as density!

[6] The "exit" and the "entry" of a MNQ nucleus can find its two-dimensional analogy in a well known experiment of Physics, known as the *Cartesian "devil"*.

We can take, as example a waterproof very elastic sphere (e.g. filled with sponge rubber) and put in a container with water. The sphere will be well floating as the surface in contact with water will adapt to the value needed to support its own weight.

Let us gradually increase (for example with a piston) the pressure inside the container. While the pressure increases the sphere reduces its radius, until it reaches a critical radius, for which the surface on the water becomes not sufficient to sustain the sphere weight.

At this point weight prevails on the buoyancy and the sphere sinks into the water, thus disappearing from the view of a (two-dimensional) observer who is on the surface of water.

If we reduce the pressure again, the sphere swells again coming back over the surface.

The nucleus is "buried" inside the space at the same place from which it "left". We have, however, seen that it is possible for it to "emerge" again owing to the collapsing of other nuclei lying nearby. During these events, an high (rarefaction) gravitational wave is produced that the residual electromagnetic energy, still remaining in it, may prevail "swelling" the nucleus, which "re-emerges" again from space [7]. It is however only a temporary re-emersion, as as soon as the wave has exhausted, space comes back to its original density and the nucleus "sinks" again into the space.

4 Conclusions

We intend to conclude this part with something important for us. In the previous paragraph, the nucleus dimensions have been calculated at a speed of light of $c_\infty = 300,000\ km/s$ that is to say, at the speed corresponding to space at "rest" [8]. For this reason said dimensions of the nucleus are not the *real*, but the *apparent* ones, as they result to an outside observer (to the gravitational field) as it is the case of our detector.

As the speed of light is inversely proportional to the cube root of density, δ, of space:

$$c_N = c_\infty \left(\frac{\delta_\infty}{\delta_N}\right)^{1/3}$$

[7] We can say that (electromagnetic) energy "swells" matter which, for this reason, can more easily "float" in space. It is obvious that we must be willing to accept the idea of a space with a very high density, higher than one of protons, the most massive (stable) particles we know about!

The fact that space must have a very high density can be understood also through the following reckoning. Space is the propagation medium for electromagnetic (and gravitational!) waves as matter is one for acoustic ones. Acoustics shows us that a high propagation speed also correspond to a high density of the medium. For example, a density of water of 1,000 kg/m^3 corresponds to a speed of 1,500 m/s while a density of $8,000 \equiv 10,000\ kg/m^3$, such as that of some solids, corresponds to a speed of about 5,000 m/s.

If we accept that the square of propagation speed is directly proportional to density, we obtain for space the following:

$$\delta_\infty = 1,000\ \frac{300,00^2}{1.5^2} \approx 10^{13}\ kg/m^3$$

It is obvious that the above calculation is only indicative and has no pretension to be rigorous! We will see that density of space (at "rest") can be easily calculated from the *mass of proton* and *volume of electron*, and said value is:

$$\delta_\infty = 3\ 10^{17}\ kg/m^3$$

[8] A local observer who is within the gravitational field, cannot notice anything and continues measuring the speed of light as 300,000 km/s for the fact that his "sample rod" has proportionally reduced, too.

the (local) speed on the surface of the nucleus is much lower. Consequently, the real dimensions of the nucleus should result much lower too

We will see later on that it is possible to calculate the speed of light on the surface of the nucleus, starting from dimensions of the "fork" and it will result a very low speed, at least lower than 1 m/s! For which reason the real dimensions of the nucleus at the moment of collapse should be the typical ones of an object such as the Sun and while "exit", the object is non bigger than a soccer ball!

It is obvious that these are completely new phenomena our mind is not yet in a position to understand.

What can we do then? Shall we throw all this away because we cannot understand it or because it does not "satisfy" our *Principles of Physics*?

We have decided to accept these phenomena as granted, as we have done with our detector and as we are intended to do with many other phenomena which, up to now, have had no explanation and that, in our opinion, have been thrown into "trash can" in too much haste.

In doing this, however, we must be willing to give up many of the ideas given as granted for (too!) long time in Physics.