

## Author Bio

Electrical Engineer of National Technical University of Athens (NTUA) , Master in Energy Technology of Ecole Polytechnique Federal de Lausanne (EPFL), Cybernetic research (Brunel University ,London UK). Diploma in Physics of National & Kapodistrian University of Athens. PhD student in Physics. Physics research.

### IT'S BIT ALL THE WAY DOWN

#### BASILEIOS GRISPOS

#### **Essay Abstract**

Most religious cosmologies consider the Universe static and eternal, while Gods were embedded and acted on it, in order to make the world we live in. Cosmology is considered as a science only recently and bears notions of cosmological myths; like the universe came out of nothing. New physics, new tools and new experiments are needed in order to study this preexisting nothingness and answer what happened before Big Bang. Multiverse is the most favorite explanation among physicists. That is isolated regions in an inflationary background. These regions evolve and give rise to universes with their own parameters. The mechanism that creates each island universe remains unknown.

#### **1. Introduction**

*"And God said, let us make man in our image, after our likeness; ..... So God created man in his own image in the image of God created he him."*

*<The old Testament-Genesis 26>*

Medieval scholarships have been influenced mainly from Aristotle's view on the Physical sciences which were extended into the Renaissance years and finally they have been replaced by Newtonian Physics. Since Newton time, scientists were looking to explain apart from contemporary problems and the old conjectures or theories of ancient Greek philosophers.

One of the most important problems of the scientific community and the church was the place of earth in the universe. Aristarchus (circa 280 B.C.) was the first to make a breakdown of the geocentric-anthropocentric world picture and defined his heliocentric universe, despite the strong belief among his fellowships that not only the earth but a certain place, the Delphi-Oracle was considered as the center of the world, at least among Greeks.

Eratosthenes (circa 250 B.C.) was the first who measured the circumference of the earth and the distance between earth and the moon, which means that he solved a problem posed by some other scholars at that time.

When the second millennium AD began, people knew that the earth was round but Kepler and Gallileo (*eppur si muove*) were able scientifically to prove it and that the heavenly bodies are in certain distance away from earth.

Another important problem among the scientific community was the fifth postulate of Euclid's geometry, the solution of which brought the advent of others geometries. Equally important theory was the existence of the atoms according to Democritus (circa 500 B.C) which the scientists of the late 19<sup>th</sup> century were able to prove (Brownian motion, convincing evidence for atoms).

Meanwhile the progress of science during the 19<sup>th</sup> century gave the means to brilliant scientists to formulate new theories which put old theories-paradoxes of antiquity on new grounds, namely:

Gödel's first incompleteness theorem, gave a new inside to the liar paradox (Epimenides paradox circa 600 B.C.)

The idea of continuity eventually answered the riddles of motion and the paradox of Achilles and tortoise (Zeno's paradox circa 450 B.C. versus Cantor's Continuity hypothesis)

Max Planck's Quantum mechanics gave credit to Carneades (circa 150 B.C.) for his probabilistic aspect of nature .

The people of antiquity who invented these conjectures were men of genius and insights to phenomena around them, but they didn't have the means to prove their theories, which they have to wait more than two thousand years for a proper answer, with the advent of modern science and technology.

Even though the scientists of the last 500 years were in their majority religious people , they considered useless or impossible to explain scientifically the old holly manuscripts and they left room for the philosophers, theologians and priests to tackle these problems , who from their part having realized that science is entering their domain of interest were trying to reconcile science and religion, mainly in the domain of creation of the cosmos that is the cosmology and the evolution of the species.

The ancient Greeks were the first to try to explain the creation of the universe with no resort to theological reasoning. Anaxagoras (circa 500-428 B.C.) claimed that the universe was not ruled by gods and Xenophanes(circa 550 B.C.) claimed that if cattle and horses had conscious and could paint as men do, they would depict their gods' shapes after their *likeness* , that is horses like horses and cattle like cattle .

People of a certain genius and ability were not only among the scientists but also among priests and theologians, they were not story-tellers or soothsayers and I am not talking about the Masters of Ancient Wisdom of Theosophical Society, but ordinary people and inspired men who made their own conjectures in the form of

faith. Most of their stories were inconsistent with reality and the outcome was and still remains unanswered problems and doubts.

Imagine you were a citizen in 500 B.C. which theory would you believe the existence of the atoms or the existence of a giant turtle supporting earth? The only difference between these two aspects of reality is that the first one turned out to be true after 2500 years and the second one has to wait maybe a little bit longer.

All these inspired men of religion or science were trying mainly to answer the problem of existence of the universe (why there is something rather than nothing) and what is matter, space and time? Physics at its best simply describes the interaction and evolution of particles in the spacetime, it is a bookkeeping job of particle zoo activity.

## **2. Cosmology as a myth**

Most religious cosmologies consider the Universe and Gods as two different pre-existing living entities. The universe was considered either static or eternal or bound to the cycle of birth, death and rebirth as a living entity, while Gods were embedded on it acted in order to make stars, earth, heaven, the living creatures, etc.

In Rigveda cosmology there is a poem telling that there was only :

*"A self supporting mass beneath , and energy above.*

*Who knows , who ever told , from whence this vast creation rose?*

*No gods had yet been born-who then can ever the truth discloses?"*

In The old Testament-Genesis 1-2 ,we read:

*"In the beginning God created the heaven and the earth. And the earth was without form, and void; and darkness was upon the face of the deep.- "*

And in Gospel according to John: *"In the beginning was the word"*

Cosmology was considered until recently as the domain of religion, but since 1920's cosmological observations turned cosmology into science. Many cosmological models have been proposed since then and their common characteristic is mainly that the universe came out of nothing. It is assumed that a preexisting space endowed with certain properties gives rise to the Universe we live in.

What happened before Big Bang and what caused Big Bang was left to Philosophers and theologians for an answer, but nowadays Physicists claim that this is also their domain of interest and it is a scientific challenge to be tackled.

They construct theories based on observational facts which in many cases bear religion preconceptions and notions of old myths, like fears of the Doomsday prophesy for humanity (the unstable vacuum, the big crunch, etc.).

The most popular theories among the scientific community is the multiverse, and that there is one with anthropically favorable vacuum, containing life and intelligence; this is the famous Anthropic principle. The recycling universe is a strong candidate against multiverse hypothesis but it suffers from the drawback of recycling old ingredients. (Of course if you like, you can have both multiverse and a recycling one or even all of its constituent universes). The main problem with all these theories is, that they cannot be tested because it is not possible to look before the era of decoupling and they are more or less conjectures if not faith.

It seems although that the old anthropocentric view strikes back with the Anthropic principle, (or Weak Anthropic principle, or principle of Mediocrity), which the physicists use it, as a last resort in the absence of any sound scientific explanation of the existence of the multiverse. In the search for a nonanthropic explanation many physicists are trying to find a mechanism to pick out a vacuum, based on logical deductions from existing theories (i.e. string theory)

If we accept the multiverse scenario then the following question arises: What is the mechanism of reproduction of the universes?

### **3. Cosmology as a science**

During the 20<sup>th</sup> century we realized that the Solar is only a tiny point in a no preferred location of the universe, and that was the good news, the bad news was that we are not even made of the predominant matter of the universe, but only from a small fraction 4.4% of it and we don't know what the rest is composed of. Thus the sun is a tiny speck in the vast multiverse and we are a minor pollutant, a discovery that put an end of the anthropocentric view.

In order to understand Nature, we have so far two different branches of science, which run parallel to each other, Physics and Biology. The first tries to explain the behavior of inanimate matter and the second one the animate, it seems that we have divided the nature in two completely different worlds, with completely different behavior, the one that is made of Carbon compounds (Silicon compounds is also a possibility) and the other one with all the rest known elements.

Physicists deal with inanimate matter and to every new observed phenomenon make complicated theories by adding unsupported or supported by the experiment processes and ad hoc postulates like: *Principles* (Hamilton, Uncertainty, Pauli exclusion, Anthropic, etc.) or a *Conservation Laws* (Energy, Momentum, Charge, Lepton, Baryonic, Isospin, Strangeness, etc.), *Invariant quantities* (the speed of light) *processes like symmetry* (C,P,T symmetries, Parity, etc.) or broken symmetry etc.

On the other hand, Biologists have mainly The fundamental tenet of Darwinism (or the modern version of it): "*evolution proceeds through natural selection*", and as for the rest, biology remains a rather probabilistic science with less prediction power than physics. With the advent of quantum mechanics, physics became also a

probabilistic science. Therefore an uncertainty principle seems to be inherited in the laws of nature, and according to the Big Bang theory, Quantum Mechanics behavior is taken for granted and it is exhibited in the first place, that is before anything else might happen. It suggests tacitly that before the creation of any pocket universe the deep was and still is acting quantummechanically. It is considered the Big Bang as a quantum fluctuation.

In both sciences the main problem still remains the Kitchen-egg one, which is manifested as the Big-Bang theory in Cosmology and the protein-DNA formulation in the first place in biology and the scientists have been gently warned not to ask questions about it (the science must go on and the existential problems can wait).

Amoebae feed on bacteria by engulfing them and multiply by mitosis (dividing in two). When food sources are exhausted, amoebae begin to aggregate into a number of collection points. These points are points of high concentrations of a chemical which they themselves secrete. The same argument applies to galaxy formation. The matter moves preferentially towards relatively high *Gravitational Field*, which themselves secrete (with a little help from Dark matter). Therefore Newton's laws are equally can be applied to bacteria and to galaxies.

It seems that the behavior of inanimate and animated matter may have some common characteristics and that nature does not make any distinction between them. This common behavior is manifested better in huge agglomeration of matter, like galaxy clusters and eventually why not the multiverse itself (if it exists)

Therefore we may state that: "The Universe has been evolved as a self-organized system given the initial condition. It has the ability of reproduction and the power of multiplication". This statement put on equal footing the carbon (or silicon) with all the other elements.

Life in our Universe therefore is not an accidental phenomenon but it is closely related with the structure of the universe according to some emergent parameters . .

The group selection criteria is obvious in the low level organization of the matter, that is the formation of galaxies and the evolution of bacteria, but as the organization of the matter proceed to more complex structure this criterion maybe is becoming more complicated.

Ordinary matter is organized in certain levels and each one reveals its own special characteristics.

We can classify those levels as follows:

- Subatomic Level: All the elementary particles according to the standard model i.e. neutrino-quarks-Bosons (photons, gluons,  $+W, -W, Z$ , Barytons)
- Nucleus level
- Atomic level –from Light elements (Hydrogen, Helium) to heavy elements (Uranium).
- Molecule level: Organic Molecules and inorganic molecules

- Organic matter in cluster formation composed of proteins without nuclei acid or DNA or RNA (i.e. Prions).
- Substances- microorganisms
- Complex adaptive systems, such as Protozoa-animals (ex. Bacteria becoming resistant to antibiotics )
- Animals with internal structure and Plants.
- High Level of Organization (Human' s brain).

Notice, that each level is more complex than the previous one and the increase of complexity is due mainly to the passage of time. Toward more complexity is also inherent inside each level and especially in complex adaptive systems.

This drive towards more complex situations as time goes on, is a tendency of Nature for more stable offspring and fitness. In the atomic level the simple hydrogen atom passes to more complex ones like say, iron. The emergence of more and more complex atoms finally comes to an end (it stops in Uranium because further development end up in the unstable transuranium offspring) and then Nature switches to the next more complicated level (in this example from atom level to the molecule level) and an evolution towards more complexity starts all over again from the simplest one, say water molecule, to highest complexity say DNA. Therefore, as time goes on, we meet more and more complex systems (Human's brain from simple ingredients quarks) , where chance and selection play an important role. The same final state may be reached from different initial conditions and in different ways (Principle of Equifinality).

If we imagine the deep as a sea full of bits of information endowed with certain rules or forces acting on them, we may say that a similar procedure governs this imaginary realm of information. Bits are continually organized in level of increasing complexity and when their number reach an upper bound in a specific level of organization , it switches to the next more complicated one and finally they end in a pop-up sub-atomic particle or photon or spacetime.

Furthermore we can assume that the stored bits in their final level constitute the possible superimposed states of subatomic entities and if these stored bits exceed a certain threshold then a single state appears without the act of observation. In this case particles and space-time emerge from the deep. These bulks of information behave like an excited atom which has a certain amplitude to emit a particle at any time.

This mechanism can give rise to the simplest particles, that is neutrino photons, gluons , quarks etc. and subsequently these particles are combined together in order to form more complicated ones, as previously explained.

If this mechanism is true then multiverse can be arise from this sea of Bits and each universe can exhibit its own characteristic parameters which are so fine tuning in order to be viable, otherwise collapses. All these island universes evolve according to a Darwinian group selection and there is not distinction between animate and

inanimate matter. The evolution inside each universe give rise as time goes by to more complicated structure, building each own level of organization. That is each universe constructs beings with each own characteristics, *after its likeness*, which are stable as it is the certain universe, otherwise it won't be there in the first place. If all these beings are like ours is irrelevant, therefore no fine tuning is necessary or an Anthropic Principle and the beginning of each universe shall not be exempt from the laws that apply to other points in later time.

This aspect of reality needs new tools, new evidences and new theories and some of them maybe the followings:

#### Some possible Evidence:

(a) Pop-up particles that is the virtual particles which are indeed real particles. How and why they come out. What kind of particles are these? They can view as excitations of underlying fields and are detectable as forces and not as particles. Can we compare these pop-up particles with pop-up universes?

(b)The complex process of Cosmic rays formation. Where the cosmic rays come from ? Are the energetic cosmic-rays pop-up photons of a very energetic underlying field? Is there an underlying object like Black Hole or not?

(c) The low entropy of the universe, is it possible to be explained from the existence of a sea of bits?

(d) Dark flow and strange attractors, are evidence of another universe?

(e) Does the realm of information gives also rise to the Dark energy, which pervades the whole multiverse and determines the way the multiverse shall evolve and binds the universes?

(f) Dark matter, is it a pure energy secretion in the form of gravity (pop-up gravitons) in order to bind stars into galaxies and galaxies into clusters? Or is it composed of some exotic particles?

#### Theories:

Certain operators in Physics, when applied to a closed surface sniff out what happens inside the volume. A typical simple example is the electromagnetic stress tensor. In the double split experiment the electrons smell the available patterns in front of them and decide which one to follow. Holographic principle states that all the information content of a volume is encoded on its boundary. Therefore certain operators and a new theory are needed in order to penetrate the coupling era and see inside. Maybe something beyond quantum mechanics will explain the unfathomably complex of universe.

#### Tools:

During the 19<sup>th</sup> century new tools (mainly: Vacuum Pump, High Energy source, Refractive Gratings) helped scientists to develop new physics. If new physics is

sought again after 100 years, then we have to invent new tools and not to develop more complex experiments.

#### **4. a bit of a story**

After 100 years from now, with the advent of quantum computer, it was a common practice among people to bear (maybe under his/her skin) a mini super video camera with huge storage capacity to record every minute of his/her life. The world government decided also to keep track, with airborne mini-cameras, of every event on earth in order to avoid global destructions. It became very easy therefore to follow a person's life or a certain project or event, on earth. In the remote future all you have to do is to write down (in the super internet facebook or youtube) the name of a project or a man or a historic moment and within a second it appears in front of you as it happened. Suppose after 1000 years, life became extinct on earth in a very short time due to an unknown very dangerous and rapidly proliferated airborne virus; this sudden event caused the entire infrastructure to remain intact. Alien immortal creatures travelling on a rogue star between galaxies finally approached our sun, in their journey towards the center of our galaxy to get momentum from the black hole there. They decided to visit earth but they didn't have enough time due to the big escape velocity of the rogue star and so they send reconnaissance probes only to find intact infrastructures. Soon after they had repaired all the power stations on earth, electricity started flowing again, which made all the computers around the globe to function again. The alien collected a huge amount of information stored in the super power quantum computers and their archaeologists discovered and studied what happened the last 1000 years on earth. In order to analyze all these data they construct a virtual reality of earth and began to study the events as it happened in chronological order of the last 1000 years. At the end they decided to penetrate into this world in order to make the doomsday to be avoided. They knew the interrelation between "bit and it" and how to get an "it from a bit", and so they took the last bits available except the bits that corresponded to the lethal gene virus and make earth again alive. Soon after their intervention, life becomes to flourish again on earth.

Note 1: Information is conserved and only the last bits of something which correspond to the evolution of the previous bits can be materialized. Therefore causality is not violating.

Note 2: Rogue stars are hypervelocity stars that have been ejected from the galactic core by a super massive black hole and travel between galaxies. The driving force for manoeuvring a rogue star is achieved by the slight distortion of the nearby spacetime, with the accumulation of the necessary amount of pop-up dark matter in a certain direction.

Note 3: Immortal beings are constructing as follows: A human heart beats approximately  $10^{10}$  times during a 100 years lifespan. We define the life span of a being to be approximately  $10^{10}$  beats of his heart, therefore an animal with 140



beats per second its lifespan shall be 50 years. Suppose there are beings with a heart  $10^{24}$  beats/sec, so their lifespan is  $10^{34}$  sec. in comparison with  $10^{20}$  sec. of the current age of the universe.

Note 4: A wave function of an Elementary particle has frequency equals to  $10^{24}$  cycle/sec and lifespan  $10^{-8}$  sec therefore it beats  $10^{16}$  times during its short lifetime ,this is the reason why Physicists consider these particles (they decay through electromagnetic or weak interaction ) as stable or immortal.

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