Origin and destiny of the Universe

DANIELE ZAMORI

Abstract- In this paper there will be a theory about the destiny of the Universe, regarding a solution about the future movement of the Universe. Examining the actual theories about the destiny of the Universe, and ,doing a reductio ad absurdum, we could formalize a solution. Unfortunately the things that we know about the Big Bang are few, and without any kind of evidence it is pretty difficult to create a plausible solution.

1. INTRODUCTION

The Universe. An amount of energy, planets, stars, life… Everything that we know is intrinsically included in the Universe. But, "How was the Universe born?" and "How will it die?" or "Will it die, one day eventually?". There aren't correct answers to these questions. We could just hypotize what happened and how it happened. The Universe is so much complex that we can't even say if everything that we know about it is 100% right, or if there is something that we didn't get (even for the things that we already think to know). Among the grat amount of questions that we have, the destiny and the birth of the Universe are the most interesting. As I said, we haven't got enough information to give a correct answer. The only thing that we could do now is to use the knowledge that we have, and start our hypotesis. We are going to give a possible explanation of the Big Bang[1] and, with that, we are going to see what **could happen**, using the logic and the answers that we already have.

2. MODEL

The Big Bang is the name that we gave to a moment where the entire Universe was compressed in to a point, and, at a certain point, started the expansion that we are still living 14 bilions of years later. Now, leaving for a second the Big Bang, we know that the circle of life says that everything that has an origin must have an end and nothing is eternal. Knowing that we could think "How could the Universe end?", actually, this is a very difficult question. We know, examining the Red shift[2] process, that the Universe is moving and it is not static[3]. The backgournd radiation[4] also, demonstrates us that the Universe is still following the radiation of the Big Bang. This goes against the theory of the stationary Universe[5] too. Now we know that, with the Big Bang, everything was confined in a "small point"; assuming that, it is impossible to say that the Universe is infinite, because it is impossible to confine something that isn't limited. So, we can say that the Universe has a limited space and the expansion is contantly increasing the distance to this limit. After that, we need to considerate the fact that the Universe is expanding itself thanks to the background radiation. This involves that the Universe needs a sort of force to prevents its collapse. This vision of the Universe cinducived to an end fits perfectly with the idea of the circle of life. This

also gives a meaning to the concept of end, but without a specific death of everythig. This theory puts his base on the concept of "Big Crunch"[6] - collapse of the Universe and rebirth – but with some difference points.

3. SOLUTION

First of all I need to say that this is only a **possible solution** for the points that are uncertain about the Big Crunch. The goal of this paper is to give a different point of view regarding this hypotesis, focusing more on the logical aspect of it, and, using the deduction, to link the points. Now, assuming that the Universe tend by his nature to collapse, we need to figure out what could happen if all the atoms in the Universe are in the same spot at the same moment. If we consider relativity[7] and gravity, we know that time is strictly related with gravity, so, what could happen in a moment when the gravity force is covered with the entire energy of the Universe in just one point? With a singularity like that, it is possible to assume that time won't go on, but it would just stop, in an eternal moment of "freeze". Said that, the new expansion must be in a point when the time is not presssed enough to block the regression of the Universe. So, the atoms must start the expansion in a determined time which mustn't be too early and not too late. We will call this "collision factor z".

So we can formulaze that $z = \lim_{t \to +0} \dfrac{mVt}{d}$ where the factor z is equal to the limit of an initial time tending to an infinitesimal above 0 of the product of mass, Volume and time, all divided by the distance. Hypotizing now that the Universe should follow a ciclyng process, we could say more, because, following the law of mass conservation[8], the energy couldn't create or destroy herself, but she transforms. If energy can't be created or destroyed, we can say that for every phase of the cycle of the Universe, energy is always the same $\sum_{k=1}^{\infty} Ei_k = \sum_{k=1}^{\infty} Ef_k$ - the sum of the "initial" energy is equal to the sum of the "final" energy. This could explain even better the concept of the cycle, which takes always more the concept of an end but not a death. This cycle could also be infinite, because if the amount of energy is always the same, even the forces are the same, and if that is correct, another collapse can't be evitable. Now, this concept has some problems, the biggest one is regarding the thermodynamics, in the specific, entropy[9]. The problem relative to the "second principle of thermodynamics[10]" which asserts, in this case, that the entropy of an isolated system tends to increase over time, until the balance is not reached. So, if the systems tend to increase their entropy during time, how could that be possible, during the collapse, entropy decreases? This question is, at the moment, one of the greatest refutations of the theory of the Big Crunch. For trying to answer this I quote the words of Silvio Bergia "The apparent contrast between the second principle of the thermodynamics and the generation of order in the Universe in expansion"[11]. As he says, it is possible that the Universe is born in a status of low initial entropy, and from that, a lot of subsets have breached out, called by H. Reichenbach "branch systems"[12]. Once they started their process, they left their "mother system" and started their evolution irreversibly towards increasing entropy thresholds. Thi vision of Erwin Schrödinger and Reichenbach could fix the problem of the low initial entropy. Now the problem is still remaining, because we know that the entropy follows a specific time arrow. So, how is it possible that entropy, which increases over time, is passing to a maximum entropy status, to the lowest possible? I'm going to make an example for trying to give a possible solution. I hypotize that when the Universes touches the maximum status

of expansion, and the maximum status of entropy, the time arrow inverts its course. This is caused by the collapse/regression of the limited space of the Universe. In my humble idea, the Universe follows a movement of a "gas in a box". For example, if I put a gas inside a box, with a piston, the gas will expand and will occupy all the points in the box, reaching his maximum status of entropy – relatively to this situation, of course -. Now, if I start to press the gas with the piston, the maximum limit of space decreases, and the gas is forced to use the remaining space to adapt. We could hypotize that the same pattern could follow the collapse of the Universe, because, assuming that the Universe is a system closed or isolated, it couldn't have a sort of limit. Therefore, if the limit exists, our space, collapsing on itself, decreases his limit and gives life to an inverse process that will follow a different time arrow – the time arrow that sees the entropy following a regression process . With those assumptions, it is possible to say that the Big Crunch is actually a feasible way to predict the destiny of the Universe. The re-expansion process is also correct, because the sum of overall energy is always the same for every cycle. This means that it is possibly repeatable. The "collision factor z" is also pretty much always the same, thanks to the "law of conservation of energy"[7].

4. REDUCTIO AD ABSURDUM

For trying to demonstrate the theory that I proposed, I'm going to do a "reductio ad absurdum". So, if I'm wrong, it means that the Universe won't collapse on itself. This, in my humble opinion isn't realistic. We already assumed that everything has an origin and an end, the cyclic Universe is the only option that gives an origin and an end without a "death". Moreover, the energy of the expansion will transform one day, and our Universe is already reaching its "critical density". We know that the Universe is a system with a limit, so the regression should decrease the limit and invert the time arrow of entropy. If this assumption isn't correct, this would account the concept of entropy if the space is decerasing. The new expansion should happen before of the "freezing" of time, pratically before of the "collision factor z". The new expansion is possible thanks to the "law of conservation of energy", which allows to say that the energy is always the same for every cycle of the Universe. If I'm wrong, the law isn't correct. This vision could also explain why it happens always the same thing – regarding the cyclic life of the Universe-, because the sum of energy is always the same, which means that the consecuences and the process is actually repeatable.

5. CONCLUSION

After that, we could assume that the hypotesis of the Big Crunch is possible. Maybe not the theory by itself, but with this vision I personally think that there is a possibility to connect the facts. The "collision factor z" could symbolize the exact moment when the time is at the moment to be "freezed" in a singularity and the precise instant when the atoms are at their limited point of contrast. Assuming that the sum of energy of the initial phase is the same for the next one, we could theoryze that the process is actually repeatable. The Universe takes also a meaning of eternal but not neverending life, which could open the road to different possibilities which regard the eventually of other Universes that could follow the same path. This also gave us the idea that our cycle is not by force the first, but could be an x cycle of the eternal life of the Universe. We assumed that it is hard

– or maybe even doubtful – to say that the Universe is not going to collapse on itself. So, with this concept, we can say that the Big Bang is actually the beginning of the cycle, but also its end.

6. REFERENCES

[1]*Big Bang,* Fred Hoyle, 1949.
[2]*Red shift,* Hippolyte Fizeau, 1848.
[3]*static Universe,* Albert Einstein.
[4]*background radiation,* Robert Wilson, 1964.
[5]*stationary Universe,* Albert Einstein.
[6]*Big Crunch.*
[7]*Relativity,* Albert Einstein, 1905.
[8]*law of conservation of mass,* Antoine Lavoisier, 18th century.
[9]*entropy, 1824/1861 – first definition-.*
[10]*Second law of thermodynamics,* Sadi Carnot, 1824.
[11]*Silvio Bergia,* "L'apparente contrasto tra la seconda legge della termodinamica e la generazione. d'ordine nell'universo in espansione", 1997.
[12]*branch systems,* H. Reichenbach.