International Journal of Theoretical and Mathematical Physics 2015, 5(2): 25-27
DOI: 10.5923/j.ijtmp.20150502.02

A Note: The Big Bang Theory

Prithwijit Sarkar

Pressman Appts Flat 4c & D, 111 NSC Bose Road Kolkata, 700040 wb, India

Abstract The theory or idea of a Big Bang is that the universe evolved from the singularity. But from where did the singularity form? And what was the reason or rather the process of formation of singularity? The process of formation of singularity is due to tearing of Space – time fabric.

Keywords Entropy, Singularity, Big Bang

1. Introduction

The Big Bang Theory is a profound theory in cosmology. It states the way our universe was created. It states that it all started from a bang. Which gave birth to the universe and earlier the universe was enclosed in a region of singularity. In this paper I will try to shed some light on how this singularity was formed. In this paper three condition have been take under perspective of study and they are $universe_1$ (U_1), Singularity (S) and current universe (U_2). For each condition their entropy such as S_{U1}, S_S and S_{U2} are calculated. As known that an universe evolved from a low entropy state to high entropy state. Hence by solving the equations I will show that singularity was at low entropy state and hence to reach stable condition it exploded in order to release energy and loose energy in order to reach at higher entropy. And the singularity was formed by tearing of space-time fabric and the whole energy of universe1 was passed away to the torn portion in the space-time. Which later transforms into singularity after the whole energy is gained.

2. Symbols

a. S_{bh} - Entropy of Black Hole
   1. S_{U1} – Entropy at $Universe_2$
   2. S_S – Entropy at Singularity
   3. S_T - Entropy at Torn Portion
   4. S_{U2} – Entropy at $Universe_2$

b. κ_b - Boltzmann's Constant

c. $4lp^2$ - Planck's Length

d. κ - Surface Gravity

e. M - Mass

f. Ω - Angular Velocity

g. J - Angular Momentum

h. ϕ - Electrostatic Poential

i. Q - Charge

j. c - Speed of Light

k. A – Area
   1. A_{U1} - Area of $Universe_1$
   2. A_S - Area of Singularity
   3. A_T - Area of Torn Portion
   4. A_{U2} – Area of $Universe_2$

3. Big Bang: With Respect to Space-Time Tearing

A singularity can't form without space-time fabric getting warped. The idea of a Big Bang comes when we reverse the time while formation of a black hole that is when a black hole is formed singularity is inevitable and reversing the time depicts that from a singularity a whole universe can be made. But the question appeared to me was that if a singularity is formed by the warping of space-time then in the case of the Big Bang there must have prevailed a universe earlier that was transformed into singularity. My work explain how this singularity was formed.

And the explanation is: The $universe_1$ had prevailed earlier but then due to certain causes the space- time fabric torn and as the universe was expanding the torn portion was also increasing and its area increased than that portion it entropy also became higher than that portion and the total energy went to the torn portion, slowly its area would keep on increasing and it would keep on taking in more and more energy. And when the whole energy would have been taken by the torn portion, finally the space-time would disappear forming a singularity. The torn portion that formed the singularity had immense energy and the singularity was a low entropy state. And staying at low entropy state made it

* Corresponding author:
sarkarprithwijit@gmail.com (Prithwijit Sarkar)
Published online at http://journal.sapub.org/ijtmp

unstable and to achieve higher entropy it released some amount of energy (here's the point where Big Bang took place). Slowly and steadily the small new universe (universe$_2$) expanded to reach at a stable state thereby reaching at higher entropy.

4. Equations

$$\delta M = \kappa\delta A/8\pi G + \Omega\delta J + \phi\delta Q \quad (1)$$

$$\delta E/c^2 = \kappa\delta A/8\pi G + \Omega\delta J + \phi\delta Q \quad (2)$$

$$\delta E = c^2(\kappa\delta A/8\pi G + \Omega\delta J + \phi\delta Q) \quad (3)$$

$$\delta E = c^2\kappa\delta A/8\pi G + c^2\Omega\delta J + c^2\phi\delta Q \quad (4)$$

$$-c^2\kappa\delta A/8\pi G = c^2\Omega\delta J + c^2\phi\delta Q - \delta E \quad (5)$$

$$-\kappa\delta A/8\pi G = (c^2\Omega\delta J + c^2\phi\delta Q - \delta E)/c^2 \quad (6)$$

$$-\kappa\delta A/8\pi G = \Omega\delta J + \phi\delta Q - \delta E/c^2 \quad (7)$$

$$\kappa\delta A/8\pi G = \delta E/c^2 - \Omega\delta J - \phi\delta Q \quad (8)$$

$$\kappa\delta A = 8\pi G(\delta E/c^2 - \Omega\delta J - \phi\delta Q) \quad (9)$$

$$\delta A = 8\pi G(\delta M - \Omega\delta J - \phi\delta Q)/\kappa \quad (10)$$

From Hawking Radiation:

$$S_{bh} = \kappa_b A/4lp^2 \quad (11)$$

$$A = S_{bh}4lp^2/\kappa_b \quad (12)$$

$$\delta A = \delta\left(S_{bh}\,4\,lp^2/\kappa b\right) \quad (13)$$

$$1/\kappa_b\,\delta(s_{bh}4lp^2) = 8\pi G(\delta M - \Omega\delta J - \phi\delta Q)/\kappa \quad (14)$$

$$\delta(s_{bh}4lp^2) = \kappa_b\{8\pi G(\delta M - \Omega\delta J - \phi\delta Q)/\kappa\} \quad (15)$$

$$4lp^2(\delta S_{bh}) = \kappa_b\{8\pi G(\delta M - \Omega\delta J - \phi\delta Q)/\kappa\} \quad (16)$$

$$\delta S_{bh} = \kappa_b\{8\pi G(\delta M - \Omega\delta J - \phi\delta Q)/\kappa\}/4lp^2 \quad (17)$$

$$\delta S_{bh} = \kappa_b\{8\pi G(\kappa\delta A/8\pi G + \Omega\delta J + \phi\delta Q - \Omega\delta J - \phi\delta Q)/\kappa\}/4lp^2 \quad (18)$$

$$\delta S_{bh} = \kappa_b[\{8\pi G(\kappa\delta A/8\pi G)\}/\kappa]/4lp^2 \quad (19)$$

$$\delta S_{bh} = \kappa_b\{\kappa\delta A/\kappa\}/4lp^2 \quad (20)$$

$$\delta S_{bh} = \kappa_b\delta A/4lp^2 \quad (21)$$

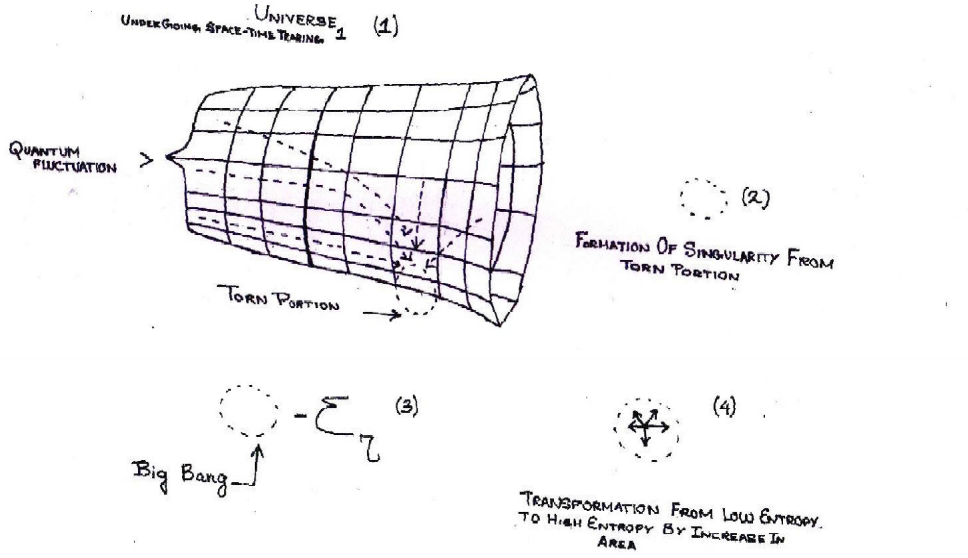

Figure 1.

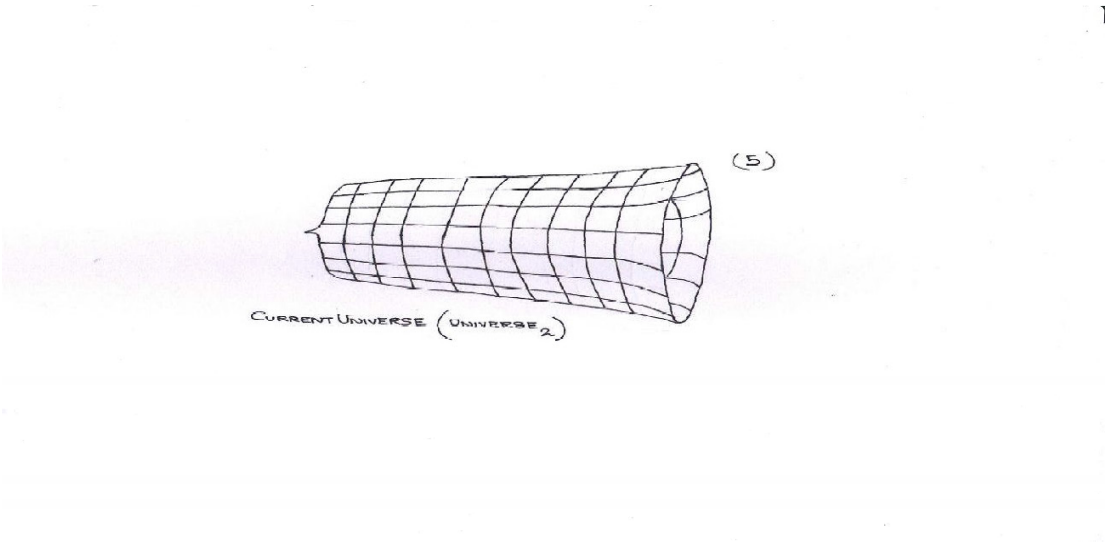

Figure 2.

5. Calculating Entropy for

a. $\delta S_{U1} = \kappa_b \delta A_{U1}/4lp$ (for Universe$_1$)

b. $\delta S_T = \kappa_b \delta A_T/4lp^2$ (for Torn portion)

c. $\delta S_S = \kappa_b \delta A_S/4lp^2$ (for Singularity)

As, $A_S = 0$ or $S_S = 0$

Hence singularity is at lowest entropy state.

d. $\delta S_{U2} = \kappa_b \delta A_{U2}/4lp$ (for universe$_2$)

As $A_{U2} > A_S$ (hence the unverse$_2$ is expanding to reach higher entropy state)

6. Results

As the area of the torn portion increases its entropy also increases and as the area of torn potion increases than that of the area of its surrounding it goes at higher entropy than the region and automatically it absorbs the energy of that region as energy flows from higher entropy to lower entropy. When the total energy is absorbed by the torn portion the universe folded on themselves form the singularity. Now the singularity that is formed from the torn portion is at low entropy or is unstable and it gives out some energy with a bang to go to higher entropy state or to achieve stable state.

$$S_{U1} < S_T \text{ and } S_S < S_{U2} \text{ or } A_{U1} < A_T \text{ and } A_S < A_{U2}$$

7. Conclusions

The liberation of energy with a bang is the occasion that led to the birth of the universe in which we live and this occasion is called the Big Bang. Hence I would like to end my paper by saying that Big Bang was a consequence of space-time tearing.

REFERNCES

[1] Introductory Lectures on Black hole Thermodynamics by Ted Jacobson (page – 15).

[2] S.W Hawking "Particle Creation By Black hole" (page - 43).