FOREX Publication
Open Access | Rapid and quality publishing

International Journal of Applied Science Research (IJASR)
Research Article | Volume 1, Issue 1 | Pages 33-35 | Nov. 2021

CMB IS THE BEST PART OF THE UNIVERSE WHICH RESPONSIBLE FOR EXPANSION

APURBA SAMANTA[1]
[1]*Assistant professor, Indian Institute of Technology, Roorkee*
*Correspondence: **apurbasamanta79@gmail.com**

ABSTRACT: Cosmic Microwave Background (CMB) is one of the oldest parts in the universe. After the Big Bang, plasma and CMB spread out and also created huge temperature in all over the universe. This plasma and radiation filled the universe and cool down gradually. When it was too hot then the photon like massless particle radiate energy and cool down the universe's temperature .Temperature is related to the pressure and pressure is also related the density of the universe. In this paper we see that the pressure which is created by temperature that is responsible for accelerating expansion of the universe. On the other hand we see that CMB's present temperature (2.7K) is too low for that reason photon released high energetic radiation which wavelength is so big, called Microwave. As long as the universe's temperature will gradually decrease and photon will release very high wavelength radiation called Radio wave.

General Terms: Your general terms must be any term which can be used for general classification of the submitted material such as Pattern Recognition, Security, Algorithms et. al.

Keywords: CMB, ACCELERATING EXPANSION UNIVERSE, PLANCK DISTRIBUTION, BLACK BODY RADIATION

1. INTRODUCTION

This exploration shows us a new way in universe expansion. This exploration is totally depends on Planck distribution and Black Body radiation in Quantum Mechanics. If a Body/particle which can absorbs all the radiation and also release the radiation is called Kirchhoff's Black Body. According to this law, we assume that CMB's photon is treated like Black Body. This photon radiates his energy in universe that increases temperature all over the universe and universe exponentially expand through universe's temperature which is create after the Big Bang.

ARTICLE INFORMATION
Corresponding author: Apurba Samanta;
Received; Accept for revision; Published;
Print ISSN; Paper Id;
Citation: DOI details
Webpage-link:

2. MATERIALS AND METHODS:

Step: 1

Stefan's fourth power law says that this black body emission power is proportional to fourth power of temperature.

$E = \sigma T^4$ …… 1 [E=Emission power of photon through black Body]

σ = Stefan constant

T=Temperature of the Black Body radiation]

Scientist Wien experimentally proofs his theory (Wien's first displacement law) by the Planck distribution law.

λT=K ……. 2 [λ =wave length of the emission radiation

T=Temperature of the Black Body radiation K=constant]

CALCULATION FIRST PART:

These two equations substituting each other's,

$\lambda^4 T^4 = K^4$ [Multiple fourth power in both sides]

$T^4 = {K^4}/{\lambda^4}$…….3

Numerical value,

Wien's law, k=4.965 $\frac{ch}{\lambda kT} = 4.965$

Present universe radiation wavelength:

$\frac{ch}{\lambda kT} = 4.965$

$\lambda = \frac{3\times10^8 \times 6.627\times10^{-34}}{4.965\times1.3806\times10^{-23}\times2.7}$ m [put all the value k, h, c, T]

$\lambda = \frac{19.881\times10^{-3}}{18.49959}$ m

λ = 1.07×10^{-3}m

λ= 0.107×10^{-2}m …… (i)

This wavelength value numerically matches the microwave wavelength.

Future universe temperature: According to equation (3) we predict that the universe radiation wavelength is converting to radio-wave and also temperature (T=0 K), $T \rightarrow 0$

Numerical calculation is shown below,

Similarly,

Wien's law, k=4.965

FOREX Publication
Open Access | Rapid and quality publishing
FP- International Journal of Applied Science Research (IJASR)
Review Article | Volume 1, Issue 1 | Pages 33-35| e-ISSN: XXXX-XXXX

T = $\frac{ch}{\lambda k \times 4.965}$

T = $\frac{3\times10^{8}\times6.627\times10^{-34}}{4.965\times1.3806\times10^{-23}\times10^{3}}$ K [put all the value K, h, c, λ]

[λ =10^3 m is the radio wave wavelength; we assume this wavelength relates the future universe's photon radiation wavelength].

T = $\frac{19.881\times10^{-3}}{6.8517\times10^{3}}$ K

T = 2.901615657 $\times 10^{-6}$ K

T = 0.0000029016 K …….(ii)

This temperature is most likely zero, so our prediction is matched to numerical value.

According to Equitation 3, we see that the Temperature is inversely proportional to the wave length. Then it is insert the equation 1, so

E= σT^4

E= $\sigma K^4/\lambda^4$ …… 4

We see the equation 4 and tell the photon emission power is inversely proportional to the fourth power of the wave length, so E $\propto \frac{1}{\lambda^4}$.

Step: 2

According to the Planck distribution,

The thermal distribution by photon function,

$U_v = \frac{8\pi h\nu^3}{c^3}\frac{1}{e^{h\nu/KT}-1}$……5

According to the specific intensity is I =$\frac{cU_v}{4\pi}$

Then it's integrate we found,

U=aT^4 [a =Radiation constant]

Stefan constant is the, $\sigma = \frac{ac}{4}$

Radiation pressure is the photon P,

P=$\frac{1}{3}aT^4$…….6

According to the cosmology, pressure and density interrelated to each other

P =$\omega\rho$ ……7 [ρ = Energy density

ω = Equation of state]

[When the radiation dominant universe present then$\omega = \frac{1}{3}$

P= $\frac{1}{3}\rho$ ……8 [ρ = Energy density]

Mass is the main thing of the photon but in relativistic case the photon mass is zero so assume the proton mass so in general case P $\propto$ ρ

Value of equation 3 put in equation 6,

$T^4 = K^4/\lambda^4$

P=$\frac{1}{3}aT^4$

$T^4 = \frac{3P}{a}$……..9

Put this value equation 3,

$\frac{3P}{a} = K^4/\lambda^4$

P=$\frac{1}{3}\frac{aK^4}{\lambda^4}$……..10

According to equation 10, we see P $\propto$ $\frac{1}{\lambda^4}$

Value of equation 8 put in equation 10,

P= $\frac{1}{3}\rho$

3p = ρ

Put this value equation 10,

$\rho = \frac{aK^4}{\lambda^4}$ ……..11

According to equation 11, we see also $\rho \propto \frac{1}{\lambda^4}$

According to equation 4,

E= $\sigma K^4/\lambda^4$

Put the value according to equation 10,

E = $\frac{3P}{a}\sigma$…….12

$\sigma = ac/4$=ac/4

This value equation 12,

E = $\frac{3}{4}cP$ ……13

Similarly,

FOREX Publication
Open Access | Rapid and quality publishing
FP- International Journal of Applied Science Research (IJASR)
Review Article | Volume 1, Issue 1 | Pages 33-35| e-ISSN: XXXX-XXXX

$E = \frac{1}{4} cp$. ……..14

We see equation 13& 14,

E ∝∝P

E ∝ ρ

3. RESULT

According to Stefan and Wien's substituting law [equation (4)] we see that early universe's photon emission power is inversely proportional to fourth power of photon radiation wavelength. So, we tell that after the Big Bang early universe's temperature was so hot and this temperature is also related to the photon emission power (equation 1).Universe temperature and photons emission power is increases and the emission radiation wave length is decreases, called gamma ray. Universe temperature is gradually cool down and photons emission power is decreases then wavelength slowly increase (x-ray > ultraviolet ray > visible ray). Then our present universe temperature is so low (2.7K) and photons emission power is so decreases then wave length is converted Visible to Microwave. As long as the temperature is decreases the radiation wave length change into radio wave and temperature value is nearly zero. [See: value (ii)]

Our universe accelerating expansion is depend on photons emission power and also related to universe's temperature. Universe internal density is also inversely proportional to photons radiation wavelength [see: equation (11)]. After big bang the universe temperature was increase then the photons energy density is too high. Density and universe external pressure is generally proportional to each other. High density creates high pressure in homogeneous universe. This huge pressure produce accelerating expanded the whole universe. As long as temperature will gradually decrease so, radiation wavelength increases and the density is low then pressure is decreases, for this cause universe expansion is decrease. One time universe big crunch will be happen for the low temperature and photons equilibrium imbalance.

ACKNOWLEDGMENTS:

I am very thankful to Sir G. Mondal (Asst. prof in technical college) and also thanking State central library, Kolkata. I acknowledge Dr. Dipanjan Mitra (junior scientist in S.N Bose national centre for basic science Kolkata) for his valuable suggestion. I also thankful to my friend Sudipta Mondal for technical support and highly grateful to Sir Saktipada Pal. My special thanks to my father Mr. Samir kumar Samanta for his encouragement. I am highly grateful to my friend Amal Pushp (F.R.A.S, Fellow, Royal Astro. Soc. London, UK) for his supporting hand is very helpful and his opinion is the most important for me.

[1] 'FRANCIS A. JENKINS, HARVEY E. WHITE, Fundamentals of Optics, McGraw Hill Education (2013), **615, 711**.
[2] Dr. S.L G UPTA, Dr. V. KUMAR, Dr. H.V.SHARMA, Dr. R.C.SHARMA, Quantum Mechanics (1991), **2-3,6-7-8-9**.
[3] AMAL PUSHP, Possible new effects in Black Hole physics, Preprint May, 2018, DOI: 10.13140/RG.2.2.30778.90561, **1-5**.
[4] TIMM WRASE, Cosmology, and particle physic, lecture notes-06(2016).
[5] Statistic of gas and radiation, PH217: Aug-Dec 2003, **1-8**
[6] BAIDYANATH BASU, TANUKA CHATTOPADHYAY, SUDHINDRA NATH BISWAS, An introduction to Astrophysics (2018), **560-563.**
[7] STEVEN WEINBERG, Cosmology (Oxford University).
[8] Author 1, A.B.; Author 2, C.D.; Author 3, E.F. Title of Presentation. In Title of the Collected Work (if available), Proceedings of the Name of the Conference, Location of Conference, Country, Date of Conference; Editor 1, Editor 2, Eds. (if available); Publisher: City, Country, Year (if available); Abstract Number (optional), Pagination (optional).
[9] Author 1, A.B. Title of Thesis. Level of Thesis, Degree-Granting University, Location of University, Date of Completion.
[10] Title of Site. Available online: URL (accessed on Day Month Year).

© 2021 by the Apurba Samanta. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (http://creativecommons.org/licenses/by/4.0/).