# Entropy Renewing

# Recycling Universe

Em. Prof. Dr. Nuri Saryal

Middle East Technical University, Mech.Engr.Dpt.

Ankara, Turkey

## Abstract

Existence of galaxies starts with star formation from the great amount of hydrogen available in outer space. Stars spiral around the galaxy and end up in Black Holes. The universal law of conservation of total mass [1] requires that all matter entering Black Holes should be converted into hydrogen at a temperature close zero Kelvin[2]. This hypothesis is proved by using the Rydberg formula for hydrogen.

## İntroduction

Astronomer's observations indicate that three quarter of the matter existing in the universe is hydrogen. This hydrogen fulfills mainly two functions; produce new stars in galaxies and absorb or emit photons (energy) at its characteristic wavelengths. Depending on the size of the stars and supernova explosions, all known elements of the periodic table are produced, i.e. origin of all chemical elements is hydrogen. All this celestial material spirals around the galaxy and enters the central "Black Hole". The size of Black Holes is proportional to the size of the galaxy. This fact indicates that a Black Hole will evaporate, if accretion stops.

The question is what happened to all this celestial material, entering the central Black Holes of the 170 billion observable galaxies, during the past fourteen billion or more years after Big-Bang.

## Theory

It is a "Recycling Universe".

Matter leaving Black Holes is invisible and therefore called "Dark Matter". Postulating that, "hydrogen evaporates out from Dark Matter at a temperature close to zero[2] Kelvin" explains the reason of the existence of huge amounts of hydrogen in the universe. Stars originate from this hydrogen and elements of the periodic table from the stars. Celestial materials are converted in Black Holes into dark matter and the recycling, including "Entropy", is completed. This theory satisfies also the important universal law of; "conservation of total mass of the universe [1]".

## Hypothesis

The source of isotropic "Cosmic Microwave Background Radiation" (CMBR) is hydrogen, evaporating from Dark Matter at almost zero Kelvin[2] and while heating up, emitting photons at its characteristic wavelength and at the lowest possible temperature. The fact that CMBR is isotropic, supports the hypothesis that it is an "emission of hydrogen", reaching us from all directions

**Proof**

To prove the hypothesis, Rydberg formula for hydrogen will be used.

$$1/\lambda_{vac} = R_H\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right) \text{ where } (R_H = 1.097373 \times 10^7 \ [m^{-1}])$$

A few examples are given below:

| $n_1$ | $n_2$ | Name | Converge toward |
|---|---|---|---|
| 1 | $2 \to \infty$ | Lyman series | 91.13 nm (UV) |
| 2 | $3 \to \infty$ | Balmer series | 364.51 nm (Visible) |
| 3 | $4 \to \infty$ | Paschen series | 820.14 nm (IR) |
| 4 | $5 \to \infty$ | Brackett series | 1458.03 nm (Far IR) |
| 108 | $108 \to \infty$ | SARYAL series | **1.062902 [mm]**(FarIR) |

In a similar way, a new series with $n_1$ = 108 and $n_2 \to \infty$ gives a wavelength of:

$$\lambda_{vac} = 108^2/1.097373 \times 10^7$$

$$\lambda_{vac} = 1.0629024 \text{ [mm]}$$

This is a strong hydrogen emission line and has exactly the observed wavelength of CMBR. Using Wien's Displacement Law, the local temperature of the CMBR can be calculated:

**T = 2897.77 [μm.K]/1062.902 [μm] = 2.7263[K]**

This again, is exactly the observed local temperature, indicating a warm up from close to zero Kelvin.

**These results prove that there is a continuous hydrogen production all throughout the Universe, the hypothesis is right and it is a "Recycling and Entropy renewing Universe". Further, it explains why universe is perfectly flat and isotropic in all directions (Isotropy of CMBR).**

[1] **Total Mass of the Universe: $\sum M$ = m + E/c$^2$**

[2] **Lowest possible Temperature**: Wavelength (frequency) of microwaves can be measured with high precision. Therefore, the wavelength of CMBR has been compared with a possible Hydrogen emission wavelengths, which are also of high precision and a perfect match is found with $n_1$= 108. Further, to determine the local effective temperature (Blackbody Radiation) Wien's constant (2897.7721 [μm.K] is used and **$T_{108}$= 2.72628 [K]** determined. The next possible Hydrogen emission line ($n_1$= 109) gives**: $T_{109}$= 2.676489 [K]**will be used to define the lowest possible temperature:

$$\mathbf{T_0 = \frac{2.726283+2.676489}{2} \pm \frac{2.726283-2.676489}{2} = 2.701386 \pm 0.024897 \text{ [K]}}$$

# Two Components of Redshift

There are two sources that cause Redshift: **1-** Recession velocity (Hubble Constant). **2-** Energy loss of electromagnetic waves.

NASA, having the most accurate cosmological data, is the authority to calculate the Hubble "Constant". But there is a second fact, which cannot be neglected: The energy absorbed by the hydrogen, present all throughout the universe. Temperature dependence of this energy loss (Stefan-Boltzmann equation) is the cause of the illusion "accelerating universe?"

The following article handles the subject: "Light Losing Energy".

# Is Light Losing Energy?

Dr. N. Saryal

## Introduction

Einstein's general relativity theory predicts that light should lose energy when travelling away from strong gravitational fields. Radek Wojtak's group of the Niels Bohr Institute at the University of Copenhagen, collected data from 8000 galaxy clusters and found that the light coming from the cluster centers tended to be more red-shifted compared to the cluster edges, confirming the energy loss of light due to gravity.

A second and more important photon energy absorber is the great amount of hydrogen, ("hydrogen <u>absorption</u>" lines) present in outer space.

In the following paper, by using Max-Planks blackbody radiation equation and its redshift line, it will be proved that light loses energy as it travels through outer space. The resulting relations will also normalize at least four anomalies that occur due to accepting that redshift is <u>only</u> the result of Doppler Effect.

## Abstract

After stating the hypotheses that electromagnetic waves loose energy while traveling through outer space, the corresponding differential equations are developed. Using Max-Plank's Blackbody Radiation law and Wien's law, effective temperature drop of the wave is related to the increase in wavelength. Finally, luminosity- time relation is established and applied to the Stefan-Boltzmann radiation heat transfer equation. Using this and the "square of the distance" equation, luminosity values for Supernovae 1a are calculated. The results are in excellent agreement with the luminosities obtained by the two international teams of "Supernova Cosmology Project".

**Hypothesis**

As light (emitted electromagnetic waves) travels through outer space, loses energy in accordance with Max-Plank's Blackbody Radiation law. The effective temperature $T$ [K] of the wave will drop with time "t" [Gly] according to the relation:

$$\frac{dT}{dt} = -\gamma T \qquad (1)$$

The lost energy is absorbed by interplanetary hydrogen (photon absorption lines). It is a hydrogen recycling universe.

**Blackbody Radiation**

As proven lately, electromagnetic waves radiated from the surface of stars, obey Max-Plank's Blackbody Distribution Law. This law can be expressed as Spectral Emissive Power $P_{\lambda,b}$ [W/m$^2$·μm] in terms of wavelength λ [μm] and effective temperature T [K] (Fig.1).

$$P_{\lambda,b}(\lambda, T) = \frac{C_1}{\lambda^5 \left(e^{(C_2/\lambda T)} - 1\right)} \qquad (2) \cdot$$

$C_1 = 3.742 \cdot 10^8$ [W· μm$^4$/m$^2$] and $C_2 = 1.439 \cdot 10^4$ [μm·K]

Wien's displacement law: $\lambda_{max}$T = $C_3$ = 2897.6 [μm·K]
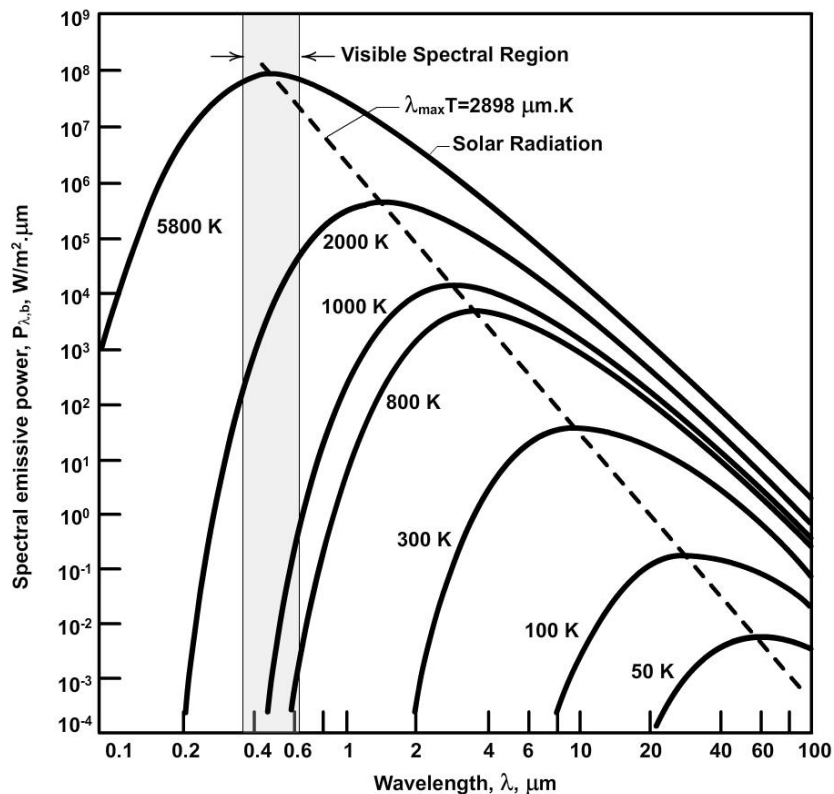


**Fig.1 Spectral blackbody emissive power**

**Dashed line, connecting all $P_m$ values (maximum emissive power) and effective temperature (T) indicates the "blackbody redshift line" (Eqn. 3 & 5).**
**(Figure** Adopted from: Fundamentals of Heat and Mass Transfer, Frank P. Incropera and David P. de Witt, John Wiley & Sons).

**Proof of the hypothesis**

Integrating (Eqn.1) between time limits "0" and "t" yields:

$$T_t = T_0\, e^{-\gamma t} \qquad\qquad (3)$$

According to Wien's law, at maximum emissive Power:

$$\lambda_{m0} T_0 = \lambda_{mt}\, T_t = C_3 = 2897.6\ [\mu m\cdot K] \qquad (4)$$

Combining the last two equations yields the redshift (z) equation for $\lambda_m$: (Fig.1)

$$\lambda_{mt} = \lambda_{m0} e^{\gamma t} \qquad\qquad (5)$$

As the effective temperature drops, the wave length increases as a function of time.

$$z = \frac{\lambda_t - \lambda_0}{\lambda_0} \qquad\qquad \frac{\lambda_{mt}}{\lambda_{m0}} = e^{\gamma t} = (z+1) \qquad\qquad (6)$$

And finally, equation for the "t –z" relation is obtained.

$$t = \frac{\ln(z+1)}{\gamma}\ [Gyr] \qquad\qquad (7)$$

Taking z = 8 (i.e. $\lambda_t/\lambda_0$ = 9) and t = 13.7 [Gyr] values as basis, gives **$\gamma$ = 0.1604 $[Gyr^{-1}]$.**

The "Supernova Cosmology Project" [1] gives a good opportunity to test the validity of the hypothesis. The luminosity decrease vs. redshift "μ vs. z" values for the two groups is given on (Fig.2 and Fig. 3). As luminosity drops, μ value increases.

**Calculation of the "μ vs. z" values**

There are two factors that reduce luminosity of the stars (SNe 1a) with distance: 1- The Square of the Distance law and 2- The Energy Dissipation law (Hypothesis).

1- First, the Square of the Distance "SD" law:

$$SD = \left(\frac{R}{t+R}\right)^2 = (1/(t/R) + 1)^2$$

Substituting [t = ln (z + 1) / ϒ] (Eqn. 7),

$$\mathbf{SD =} \left(\cfrac{\mathbf{1}}{\frac{\mathbf{\ln(z+1)}}{\mathbf{\gamma R}}\mathbf{+1}}\right)^{\mathbf{2}} \qquad\qquad (8)$$

Where ϒ = 0.1604 $[Gy^{-1}]$ proportionality constant. R = 1.6 E-3 $[ly]$ (*light years*) Radius of SNe 1a.

[1]    The "Supernova Cosmology Project" is an international project, run by two independent groups of astronomers. For approximately ten years, supernova 1a explosions were observed both in

north and south hemispheres. Valuable data, among others luminosities of the supernova were determined. Calculation results are compared with this data.

2- Energy Dissipation "ED" Law:

Since for luminosity measurements bolo meters are used, energy dissipation (ED) with distance (time) is formulated by using Stefan Boltzmann Law:

$$\text{ED} = \pi\, R^2\, \theta \left(\frac{T}{t}\right)^4 = \pi\, R^2 \theta \left(\frac{T}{\frac{ln(z+1)}{\Upsilon}}\right)^4 \text{ [W]} \qquad (9)$$

R = 1.5E13 $[m]$ Radius of SN 1a.     T = 3 E+10 [K] Surface temperature of SN 1ae

$\theta$ = 5.67 E-8 [W/$m^2$.($K/_{Gyr}$)$^4$]     t = ln (z + 1) / $\Upsilon$ [Gyr]   for (t≥ R = 1.6 E-3 $[ly]$

## Calculation and Results:

Both equations (8) and (9) are functions of "z". The result of the calculations is tabulated below:

First, SD and ED are calculated for each "z" value, starting with z = 0.1. Then "$\mu$" is calculated according to the following scheme:

$$\mu \text{ (SD)} = - \log \left((ln(z+1) \div (0.1604 \times 1.6E - 3 \times 1E\text{-}9)) + 1\right)^2$$

$$\mu \text{ (ED)} = \log\left((\pi \times 1.5\, E13^2 \times 5.67\, E\text{-}8 \times (3\, E10 \times 0.1604 \div ln(z+1))^4\right)$$

$$\Sigma\mu = [\text{ED (0.1)} - \text{SD (0.1)} + \text{ED (0.1)} - \text{ED (z)} + \text{SD (z)} - \text{SD (0.1)}$$

$$(\mu) \text{ value@ z=0,1} \qquad \Delta \text{ ED} \qquad \Delta \text{ SD}$$

$$\mu = 2x[\text{ ED(0.1)} - \text{SD (0.1)}] + \text{SD(z)} - \text{ED(z)}$$

($\mu$) Data From two Supernova Cosmology Project curves vs. Calculated Data

Table 1

| "z" Values | 0,01 | 0,1 | 0,2 | 0,4 | 0,6 | 0,8 | 1 | 1,2 | 1,4 | 1,6 | 1,8 | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SD Values | 21,18 | 23,1 | 23,7 | 24,2 | 24,5 | 24,7 | 24,9 | 25 | 25 | 25,1 | 25 | 25,3 |
| ED values | 66,34 | 62,4 | 61,3 | 60,2 | 59,6 | 59,3 | 59 | 58,8 | 58,6 | 58,4 | 58,3 | 58,2 |
| Saryal | 33,4 | 39,3 | 41 | 42,6 | 43,5 | 44 | 44,5 | 44,8 | 45 | 45,3 | 45,5 | 45,7 |
| Kowalski et al. | | 39,8 | 40,8 | 41,7 | 42,7 | 43,5 | 44,2 | 44,8 | 45 | 45,4 | 45.6 | 46 |
| Amanullah et al. | | 38,6 | 40,8 | 41,8 | 42,8 | 43,6 | 44,1 | 44,8 | 45 | | | |

Data for ($\mu$–z) values are taken from **Amanullah et al. and Kowalski et al. (Knop et al.).** **Fig. 2 and Fig. 3 below**

**Conclusion**

Calculated luminosity decrease data are in excellent agreement with the observed. This fact verifies the hypothesis. There are at least three more anomalies in astrophysics that verify the hypothesis and become normal.
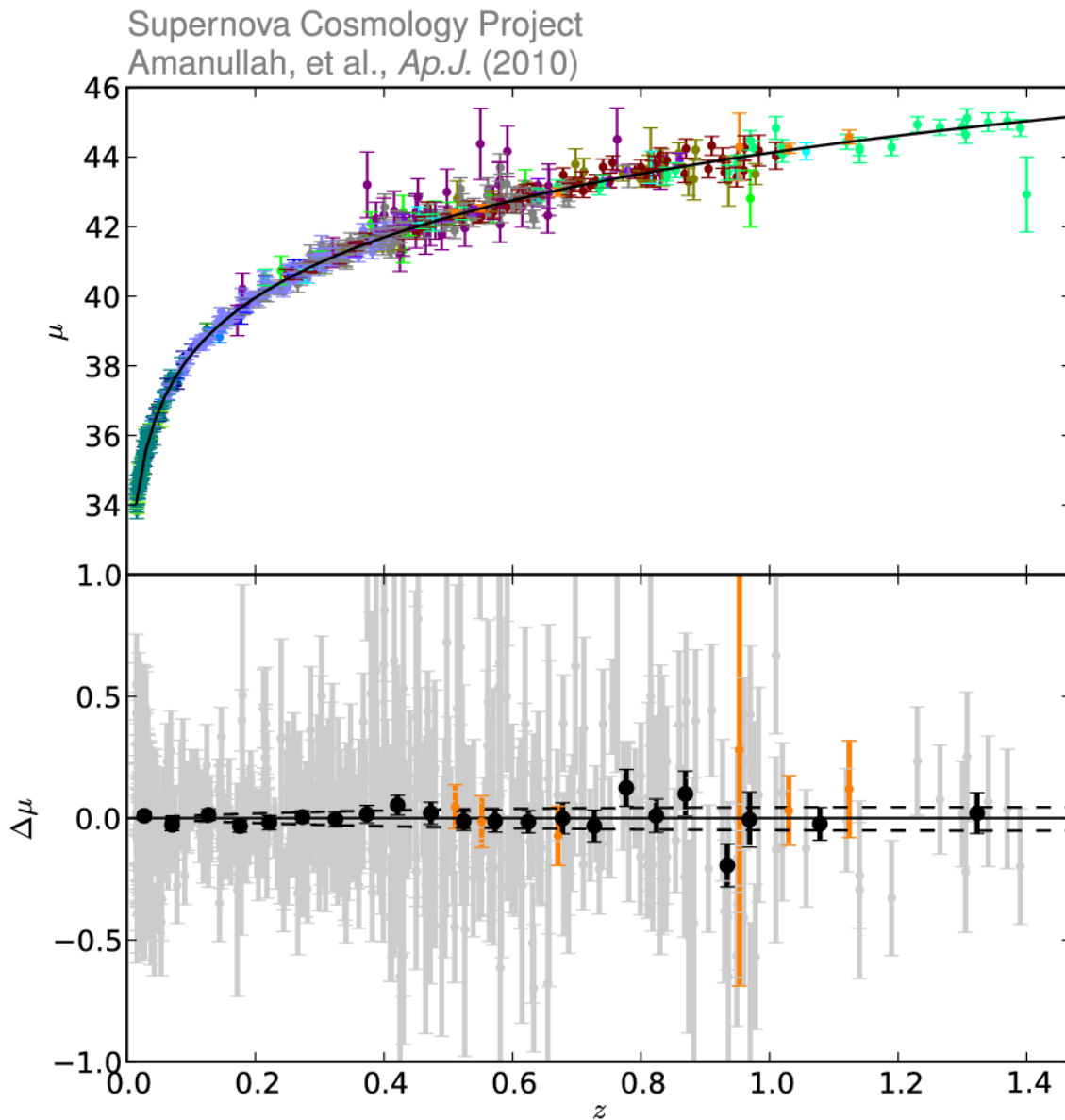


**Fig.2 Luminosity vs. redshift diagram of Amanullah group.**

The second group "Supernova Cosmology Project "Kowalski, et al., Ap. J. (2008)". This figure is available at the following internet address:

http://www.stsci.edu/institute/itsd/information/streaming/archive/SpringSymposium2008/SaulPerlmutter050508Hi_supporting/Perlmutter.pdf

The same figure is also available, as shown below. (Fig.3)
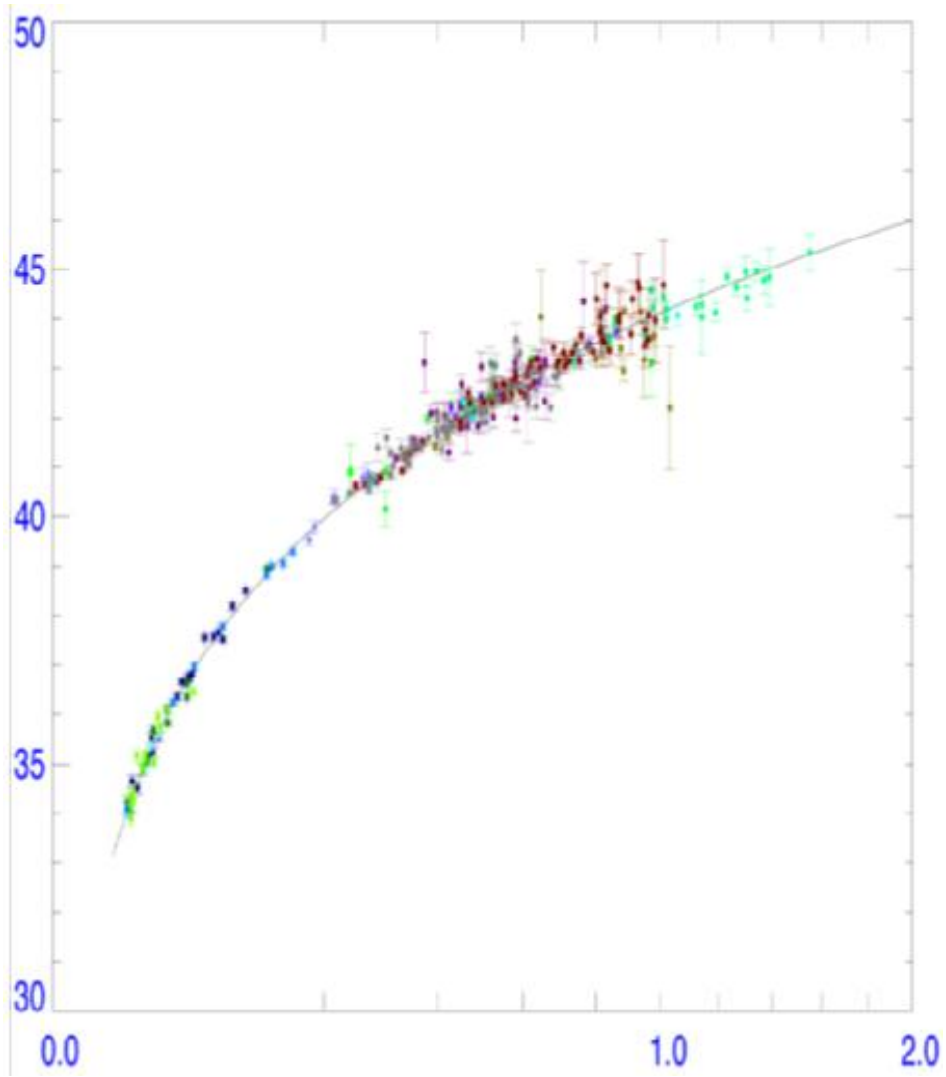
**Supernova Cosmology Project**

**Knop et al. (2003) (Fig. 3)**

Em.Prof.Dr. Nuri Saryal :   http://www.meu.edu.tr/~saryal

Mail: saryal@metu.edu.tr