Poisson Noise in Grb 150203A Light Curve

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ABSTRACT   *We present a timing study of Gamma Ray Bursts (GRBs) to propose a presence of Poisson noise generated by the quantum fluctuations in space which encompasses irreducible zero point energy quantum world in the process of detection of incoherent photons. In space there have been zero point energy photon field quanta which make the matter of all systems vibrant in all types of states of their existence. However its presence in any object does not bother the nature of the matter either particle or a wave but all get perturbed by these Cosmo Quantum Fluctuations (CQFs) to show Poisson errors in almost all measurements. Poisson errors have been detected in the data analysis of the GRBs light curves. We have studied GRB 150203A observed by Swift-Bat satellite on February 03, 2015. This GRB has been investigated invariably with average frequency of 5.68±0.04 Hz associated with almost all Light curves of GRB as spectral fluctuations during, before and after the main burst peak. CQF carries mass of 2.56±0.28 x 10-67 kg at temperature of 8.70±0.96 x 10-29 K in space and the observed frequency of 5.68±0.04 Hz is generated by a set of CQFs of 1.5 x 10+17 in their quantum space.*

INTRODUCTION:

In deep space, there occurs a big event called Gamma ray burst (GRBs) which are often of highest luminous flashes of gamma radiation of cosmic origin, lasting from ten milliseconds to several minutes, and their huge energy degrades in the form of afterglow for few days to several months [1-3]. The origin of GRB is attributed to the primal energy generation rather than dissipation mechanism. In 1967, GRBs were first observed by satellites during the monitoring of the nuclear test ban treaty and are now being observed regularly for astronomical goals [4]. Our understanding about the most proposed explanations implicate cataclysmic events, but there is still no generally accepted mechanism for GRBs.

Norris [5, 6] observed first time the timing and spectral evolution of GRB pulses. The general diagnostics nature observed in GRB pulses that: pulse peaks widen at lower energies at later times and tend to soften at each individual evolving pulse. Sometime GRB studies provided attestation of multipulses in analysis of large BATSE burst samples. Later Cheng [7] undermined cross correlation to demonstrate that soft emission had a time delay relative to high energy emission. The spectral analysis of bright bursts and afterglow with the higher resolution confirmed the tendency of softening as they progress [8-11].Based upon the pulse diagnostic anatomy, the intrinsic parameter in GRB studies is the lag which is the delay among energy bands[12,13]; it is primarily obtained through the application of the cross-correlation function (CCF). Norris [14,15] believed that lag is a signature for both GRB peak luminosity and time history morphology with short-lag variable bursts having greater luminosities than long-lag , smooth bursts [16]. Often the extreme

GRBs have been the most illuminating both literally and figuratively [17-19]. Ramaprakesh [20]; Odewahn [21]; and Kulkarni [22] emphatically demonstrated the need for collimation to bring the energy budget of reasonable values for the long GRB 971214 of huge isotropic-equivalent energy $E_{iso} = 3 \times 10^{53}$ erg with observed red shift z = 3.43. Under typical observations of the mag 9 optical flash of GRB 990123 (z = 1.61, $E_{iso} = 3.4 \times 10^{54}$ erg), Akerlof [23] and Kulkarni [24] precluded the utility of GRBs to probe the high-redshirt universe, ideally it would be easily detectable even at z > 6.This opportunity was first reconciled by GRB 050904 (z = 6.29, $E_{iso} = 1.2 \times 10^{54}$ erg; Kawai [25]; Sugita [26] which for three years remained the most luminous optical transient observed in universe [27]. The subsequent record has since been surpassed dramatically by GRB 080319B (z = 0.93, $E_{iso} = 1.3 \times 10^{54}$ erg); whose optical afterglow peaked at V ≈ 5 mag (Racusin [28]; Bloom [29]; Woźniak [30]). The remarkable current record for the enormous bolometric isotropic-equivalent energy is embraced by the Fermi burst GRB 080916C ($E_{iso} = 6.5 \times 10^{54}$ erg Abdo [31]; Greiner [32]).

Joining this list of record setters is GRB 080607 which was observed with red shift z = 3.03, (Prochaska [33]), and with isotropic energy $E_{iso} = 1.87 \times 10^{54}$ erg (Golenetskii [34]). This GRB is astounding not only for its generic properties, but also because of its unusual environment of cloud in host galaxy as detected by Prochaska[33]. A keck-spectrum obtained proclaims 20 minutes after the burst reveals that the slight-line penetrates a giant molecular cloud in the host galaxy, obscuring the rest-frame visible light by AV ≈ 3 mag of extinction (or ≈ 6 mag at 1600 Å, corresponding to observed R band) before it even traversed through intergalactic space. The small optical telescopes for over an hour were quite efficient to detect such bright GRB despite of its extreme attenuation. GRB 080607 has endowed the first observational evidences of molecular absorption bands toward any galaxy hosting a GRB [35]. GRB 080607 had highly extinguished (AV ≈ 3 mag) afterglow yielding spectroscopic absorption line due to enough brightness. Chen [9] discovered an error in the photometric measurements of the host galaxy in Spitzer IRAC images. The host galaxy was detected in the IRAC 3.5μm and 4.5μm channels with AB (3.5μ) = 22.9±0.2 and AB (4.5μ) = 22.7±0.2 mag.

The light curves of several studies of GRBs done in the past, exhibited almost all with full of backgrounds noise which not only existed in their part before and after the main burst but within the main bursts also, irrespective of either the burst is of

single peak or multipeak[36]. This specific feature has always been bothered by many authors but was ignored as statistical fluctuations generated in natural background noise in the spectrum of the GRBs. One strange thing which made it noticeably remarkable was the presence of same fluctuation in burst irrespective of height of peaks found for the short or long GRBs. We analyzed GRB150203A showing same features.

Experimental observations

In order to examine the remark made in the last paragraph of the preceding section we attempted timing study of GRB150203A (i.e.150203A means Gamma Ray Burst occurred on February 03, 2015). In figure-1, the light curve of long GRB with the usual quite thick back ground noise before and after the main burst is shown. The unusual what we observed is the presence of same background fluctuation in the main burst peak. The amplitude of fluctuations of background noise was found of almost same amplitudes in the part of the light curve before, after and in the main burst peak.
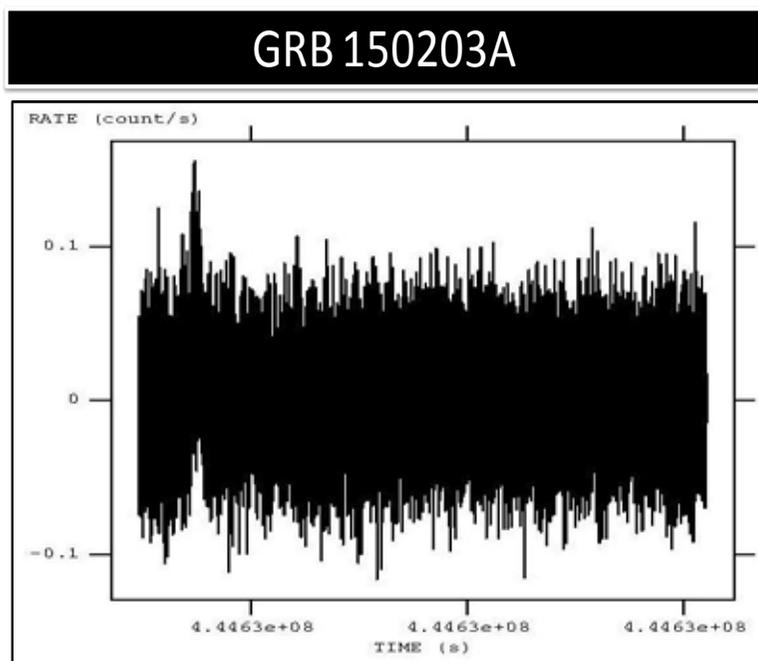

Figure-1: Light curve of GRB 150203A with main burst peak of amplitude of rate of 0.15 counts per seconds as shown in the initial part and thick background of 0.07 counts per seconds in rest part of the light curve.

The background noise present in the main peak of the GRB burst was brain storming and in order to understand its character, small part of main burst was expanded for GRB150203A as shown in figure-2. The multipeak main burst was composed of three peaks and the third peak was presented on the expanded time scale near $4.44629 \times 10^{+8}$ seconds with amplitude of rate of 0.13 counts per seconds. Poisson noise fluctuations dominate much more in third peak and as a result the peak gets diluted. This kind of effect on pulse indicates the presence of Poisson noise rather than instrumental noise. Usually instrumental noise dominates in the form of background and is found uniform before and after the main Gamma Ray Burst.

In literature Poisson noise is also known as Shot Noise and originates inherently during photon counting in optical devices where it is associated with the particle nature of light. Poisson noise exists because of the phenomenon of light consists of the movement of discrete (also called quantized) packets and corresponding electrons evolved in form of electric current in the instruments. The relative fluctuations for the small number of photons will be significant and it is referred as Poisson Noise.
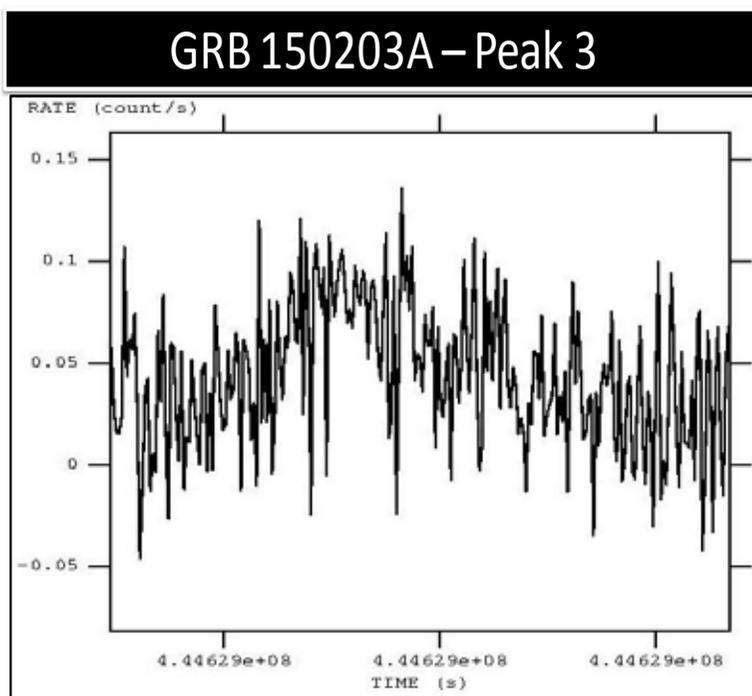

Figure-2: Expanded light curve of third peak of main multipeak burst of GRB 150203A on time scale near $4.44629 \times 10^{+8}$ seconds.

However Poisson noise dominates when small number of photons enters in an optical device and indeed if sufficiently small then develops the uncertainty due to Poisson distribution which describes the magnitude of the noise as a square root of the expected numbers of incoherent random photons. Only in exotic squeezed coherent state of finite number of photons can have fluctuations smaller than the square root of the expected number of photons counted in same period of time [37]. The Poisson noise of a coherent optical beam, having no other noise sources, is a fundamental physical phenomenon reflecting quantum fluctuations due to so called zero point energy. We analyzed the light curve of GRB 150203A for the data ID 00629578000 with starting observation time at 03:53:20 on third February 2015 for the duration period of 1195 seconds observed by Burst Alert Telescope onboard Swift. Main burst of GRB was identified with three peaks in the light curve of the multipeak GRB 150203A and we found the duration of the main burst by getting the time LT1 and LT2 corresponding to two lower deeps of the main burst recorded at two channels 1951 and 2474 respectively as given in **the table-1** below. The peak point of main burst was found at channel 2138 with time T = $4.446293692200 \times 10^8$ seconds. The (LT2) – (LT1) was estimated to be 31.38 seconds which revealed that GRB 150203A belongs to the class of long GRB and its origin happen to be the merger of galaxies. We tried to measure frequency of Poisson noise fluctuations 179 present in the GRBs 150203A which turned out to be on an average 5.70 ± 0.02 Hz within the range of the statistical error.

Table-1: Observed data of GRB 150203A have been shown with analyzed data of its three peaks.

GRB 150203A				
GRB	Observation ID	ver	Start Time	Duration(seconds)
150203A	006295780000	4	03:53:20	1195

Main peak of GRB	Channel No.	Time (seconds)	Rate (Counts/second)	Error (Counts/second)

LT$_1$	1951	$4.446293580000 \times 10^{+08}$	-7.42×10^{-02}	3.33×10^{-03}
T	2138	$4.446293692200 \times 10^{+08}$	1.55×10^{-01}	3.73×10^{-02}
LT$_2$	2474	$4.446293893800 \times 10^{+08}$	-6.39×10^{-02}	2.98×10^{-03}

Peak 1	Channel No.	Time(seconds)	Rate (Counts/second)	Error (Counts/second)
LT$_1$	2002	$4.446293610600 \times 10^{+08}$	-3.22×10^{-02}	3.35×10^{-03}
T	2052	$4.446293640600 \times 10^{+08}$	1.34×10^{-01}	3.80×10^{-02}
LT$_2$	2096	$4.446293667000 \times 10^{+08}$	-3.21×10^{-02}	3.39×10^{-03}

Peak 2	Channel No.	Time(seconds)	Rate (Counts/second)	Error (Counts/second)
LT$_1$	2108	$4.446293674200 \times 10^{+08}$	-3.43×10^{-02}	3.34×10^{-03}
T	2138	$4.446293692200 \times 10^{+08}$	1.55×10^{-01}	3.73×10^{-02}
LT$_2$	2173	$4.446293713200 \times 10^{+08}$	-2.51×10^{-02}	3.52×10^{-03}

Peak 3	Channel No.	Time (seconds)	Rate (Counts/second)	Error (Counts/second)

LT_1	2202	4.446293730 $600 \times 10^{+08}$	-4.55×10^{-02}	3.51×10^{-03}
T	2303	4.446293791 $200 \times 10^{+08}$	1.35×10^{-01}	3.48×10^{-02}
LT_2	2419	4.446293860 $800 \times 10^{+08}$	-4.14×10^{-02}	3.25×10^{-03}

With main burst, the data of three components peak1, peak2, and peak3 are also given in table-1 above and all components peaks have almost same amplitudes around counting rates of 0.15 counts per seconds with their time duration (LT2) – (LT1) of 5.64, 3.90, and 13.02 seconds respectively. Each peaks (LT2) – (LT1) is more than 2 seconds which reconciles further that GRB 150203A is long GRB burst. We also found 34, 22 and 75 Poisson noise fluctuations in these peaks and calculated corresponding Poisson noise frequencies as 6.02 ± 0.08Hz, 5.64 ± 0.04Hz and 5.76 ± 0.02 Hz respectively as tabulated in table-2 below. Values are significant under statistical errors for the GRB burst and have become worth to compare it with the Poisson noise frequency present in background noise of the light curve.

Table-2: Multipeak GRB has three peaks with almost same frequencies but with different time durations supporting long GRB character (time more than 2 seconds).

Table-3:GRB 150203A data			
Categories	Poisson noise fluctuations	$\Delta T = T_2 - T_1$ (seconds)	$f = Peaks/\Delta T$(Hz)
Main Burst	179	31.38	5.70 ± 0.02
Peak 1	34	5.64	6.02 ± 0.08
Peak 2	22	3.90	5.64 ± 0.04

Peak 3	75	13.02	5.76 ± 0.02
Before	15	3.00	5.00 ± 0.06
After	13	2.16	6.01 ± 0.07

The last two rows of table-2 represent the data of Poisson noise fluctuations observed 15 and 13 with time durations of 3.00 seconds and 2.16 seconds in background before and after the main peak of GRB 150203A respectively. We estimated frequencies 5.00 ± 0.06 Hz and 6.01 ± 0.07 Hz and the observed thick background with amplitudes of about counting rate of 1.248×10^{-1} counts per seconds (± 0.062 counts per second) uniformly in the part of the light curve before and after the main burst as evident in figure-1above. In figure-3 below, quit similar Poisson noise fluctuations become clear as was found in main burst of GRB when small part of light curve before the main burst were expanded on small time scale span.
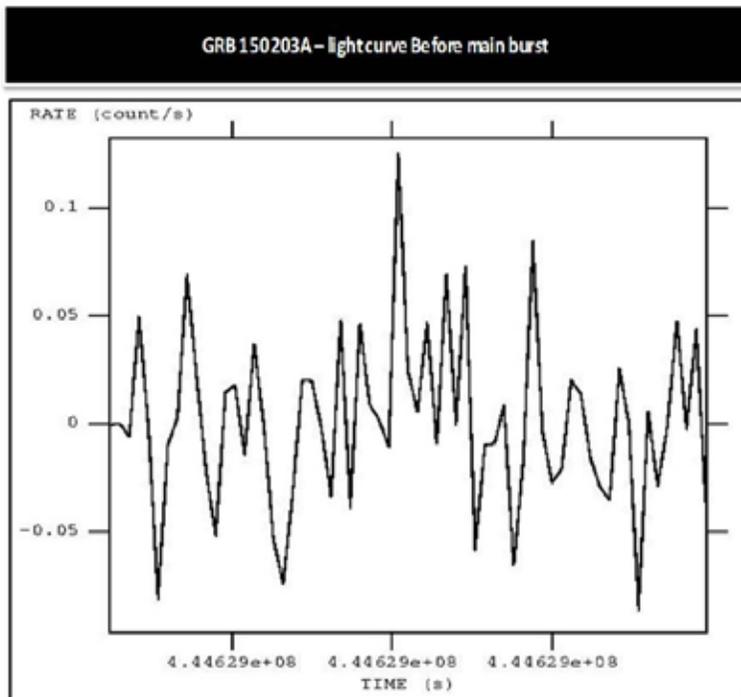

Figure-3: Expanded small part of light curve of GRB 150203A before the main burst on small time scale around 4.44629×10^{8} seconds depicts the observed Poisson noise fluctuations.

Before the main burst around small time scale 4.44629×10^8 seconds depicted the 15 dominant observed Poisson noise fluctuations with amplitude ± 0.06 counts per seconds of duration (LT2) – (LT1)= 3.0 seconds and showed fluctuation frequency of 5.00 ± 0.06 Hz. The table-3 below shows analyzed LT1 as $4.446292835400 \times 10^8$ seconds and LT2, $4.446292865400 \times 10^8$ seconds for the two deep points with amplitude rate of 1.2481×10^{-1} counts per seconds at channels 710 and 760 respectively.

Similarly the small part after the main burst of GRB was also expanded around 4.44629×10^8 second as shown in figure-4 below.
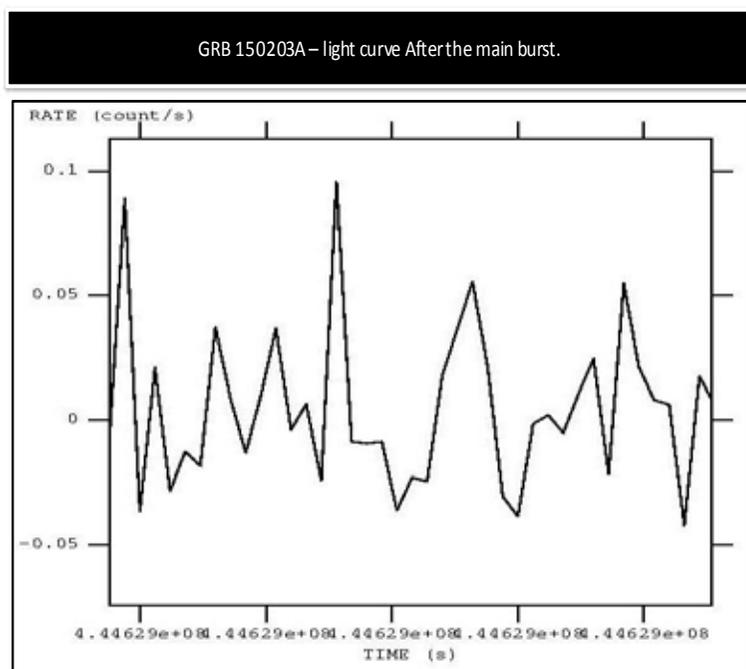

GRB 150203A – light curve After the main burst.

Figure-4: Expanded small part of light curve of GRB 150203A after the main burst on small time scale around 4.44629×10^8 seconds depicts the observed Poisson noise fluctuations.

The Poisson noise fluctuations in the small part of the light curve after the main burst were found to be 13 with average amplitude of +0.06 to – 0.035 counts per seconds (9.566×10^{-02} counts per seconds) of duration (LT2) – (LT1)= 2.16 seconds . It yielded Poisson noise fluctuation frequency of 6.01 ± 0.07 Hz. The analyzed data for the Poisson noise after the main peak are tabulated in table-3 as given below. The lowest deep point LT1 at channel number 3501 was found to be at 4.446294510000

$x10^8$ seconds and similar lowest deep point LT2 at channel 3537 with time at 4.446294531600 $x10^8$ seconds were detected with amplitude rate of -3.65 $x10^{-2}$ counts per seconds and -4.20x10^{-2} counts per seconds respectively.

Table-3 : Data of Poisson noise fluctuations in the small part of the light curve of the GRB

150203A   before and after the main burst.

GRB 150203A data of light curve before and after the main burst				
Before main peak	Channel No.	Time (seconds)	Rate (Counts/second)	Error (Counts/second)
LT$_1$	710	4.446292835400x10^{+08}	-8.10x10^{-02}	3.16x10^{-03}
T	735	4.446292850400x10^{+08}	1.24x10^{-01}	3.32x10^{-02}
LT$_2$	760	4.446292865400x10^{+08}	-8.62x10^{-02}	2.82x10^{-03}
After main peak	Channel No.	Time (seconds)	Rate (Counts/second)	Error (Counts/second)
LT$_1$	3501	4.446294510000x10^{+08}	-3.65$^{10-02}$	2.99x10^{-03}
T	3514	4.446294517800x10^{+08}	9.56x10^{-02}	3.05x10^{-03}
LT$_2$	3537	4.446294531600x10^{+08}	-4.20x10^{-02}	2.82x10^{-03}

Despite of the different time durations of each and the presence of different numbers of Poisson noise fluctuations, there were almost similar Poisson noise frequency within the statistical errors. It is found on an average 5.68±0.04 Hz and can be justified by considering the corresponding mass associated with it by relation

$$m = h\nu/c^2$$

in the subsequent section of discussion.

Discussion:

The central focus of the present piece of work is the Poisson background noise present in the light curve of the GRBs including in its main burst. Any unwanted component associated with the observable signal is categorized as noise and is usually classed as instrumental and essentially another as random [38]. Instrumental noise can be mitigated with active measures of signal, whereas random noise is independent of signal strength and statistical in origin (Poisson noise fluctuations) which however cannot be completely eliminated. In this case signal to noise ratio in figure of merit used to determine the quality of a measurement which is the inverse of the relative standard duration of the measured signal. The common thing between the two noises is the uniform presence of noise level irrespective of signal amplitude. This raises a question over the light curve of the observed GRBs as shown in figure-1 in the previous section. Amplitudes of background noise vary in light curve. Noise level is high (**1.2481 x10^{-1} counts per seconds**) before the burst as compared to the lower (**9.566 X 10^{-02} counts per seconds**) after the main burst of GRBs. This feature also matches with another well known "Flicker noise", whose magnitude is inversely proportional to the frequency of the signal and significant at frequencies lower than 100Hz but origin is not well understood [39]. We do not have any explanation for Poisson and Flicker noises fluctuations and may be attributed to some unknown effect yet to be investigated.

The common feature of overall analysis of background noise in GRB 150203A data is the average frequency 5.68 ± 0.04 Hz which prevails in entire light curve, should happen to be the inherent property of gamma burst and statistical in origin at quantum level. It may be attributed to the quantum fluctuations set up in Gamma Burst during evolution of Gamma rays due to merger of Black holes, Neutron stars, Galaxies or explosion of Supernova. The expected quantum mass for such quantum fluctuation of frequency 5.68 ± 0.04 Hz may be expressed as

$$m = \frac{h\nu}{c^2} = 3.97 \times 10^{-50} kg.$$

Also from Uncertainty Principle we have

$$\Delta m \geq \frac{\hbar \Delta \nu}{c^2} \geq \frac{1.05 \times 10^{-34} \times 5.36}{9 \times 10^{16}} = 6.18 \times 10^{-51} kg$$

However such extremely small value of m leads to believe that it may be attributed to quantum fluctuations prevailing in entire space and referred to Cosmo Quantum Fluctuations (CQFs).

In order to understand the connection of CQFs with Poisson noise fluctuations, we let N number of CQFs which collectively originate 5.68 ± 0.04 Hz oscillations and then corresponding energy associated with each CQF would be (hν/N) = E. Such diminishingly small energy E and mass $(h\nu/N)/C^2$ may be justified for the evolution of CQFs by the **Dirac large numbers hypothesis** (**LNH**) [40]. Paul Dirac in 1937 related ratios of size scales in the Universe to that of force scales in the present cosmological epoch. Dirac's hypotheses pointed towards the cosmology with some of the unusual features which emerged out of the apparent equivalence of these ratios and the following might not be mere coincidences:

(1) Gravitational constant G representing the strength of gravity is inversely proportional to the age of the universe $G \propto 1/t$

(2) The mass of the universe is proportional to the square of the universe's age: $M \propto t^2$.

A coincidence, however, may be defined optimally as an event that provides support for an alternative to a currently favored causal theory, but not necessarily enough support to accept that alternative in light of its low prior probability. Large number of coincidences that underpin it appears to have gained new impetus from failures in standard cosmology to account for anomalies such as the recent discovery that the universe might be expanding at an accelerated rate [41].

CQFs may be another coincidence to support the observed Poisson noise of 5.68 ± 0.04 Hz in the GRBs light curves in the context of the LNH as a Dirac's personal response to a set of large number of 'coincidences' that had intrigued other theorists. In order to connect CQFs with observed 5.68 ± 0.04 Hz, a formula

$$M = \frac{Hh^2}{\sigma b^4}$$

was derived on the basis of LNH employing Hubble Constant (H), Planks Constant (h), with oscillations phenomena of thermal radiation emission Stefan's Coefficient (σ), and spectral Wien's Constant (b). The presence of constants H and h in CQFs mass formula couples Cosmology and Quantum mechanics with the emission constants σ and b associated with phonons oscillations phenomena to reconcile the

existence of the CQFs. Thus in regards to significant issues present in LNH, the continuous creation of matter provides (1) an 'additive' creation (new matter is created uniformly throughout space) and (2) 'Multiplicative' creation (new matter is created where there are already concentrations of mass).

Both these scenarios argue for and against LNH are also made from astrophysical considerations. Various authors have introduced new sets of numbers into the original 'coincidence' considered by Dirac and his contemporaries, thus broadening or even departing from Dirac's own conclusions. In 1998, P. Zizzi [42] argued that there might be a modern mathematical interpretation of LNH in a Planck-scale setting in the context of quantum foam. One year before in 1997, Carneiro [43] arrived at an intermediate scaling factor 10^{20} when considering the possible quantization of cosmic structures and a rescaling of Planck's constant. Carl Friedrich von Weizsäcker identified 10^{120} with the ratio of the universe's volume to the volume of a typical nucleon bounded by its Compton wavelength, and he identified this ratio with the sum of elementary events or bits of information in the universe [44]. Sidharth [45] interpreted a typical electromagnetic particle such as the pion as a collection of 10^{40} Planck oscillators and the universe as a collection of 10^{120} Planck oscillators. The fact that a number like 10^{120} can be represented in a variety of ways which have been interpreted by Funkhouser [46] without departing from the standard model for cosmology.

Conclusion:

Matter either wave or particle can be visualized as a collection of Plank oscillations and in a similar vein, Carneiro and Marugan [47] claimed that the scaling relations in LNH can be explained entirely by basic principles of quantum oscillations. Thus on this ground CQFs may be concluded to be quantum oscillations prevailing in the entire universe. CQFs may be referred to quantum oscillations as described by Quantum Plank's law

$$\int_{\nu_1}^{\nu_2} \frac{2\pi h \nu^3 d\nu}{c^2 \left(e^{E/kT} - 1 \right)} = \frac{dQ}{dt} = \int_{\nu_1}^{\nu_2} \frac{2\pi h \nu^3 d\nu}{c^2 \left(e^{\frac{h\nu}{N}/kT} - 1 \right)} \quad \left(m^{-2} \frac{jouls}{sec} \right) \quad \dots\dots\dots\dots (1)$$

Where h, k represents Planck constant and Boltzmann constant respectively.

At given temperature T, the band of quantum fluctuation (CQFs) may be integrated between the frequencies range from ν_1 to ν_2 for total number of CQFs which are mostly represented by Stefan's Boltzmann formula as

$$\frac{dQ}{dt} = e_\lambda \sigma T^4 \quad \left(\frac{watt}{m^2}\right) \qquad \ldots\ldots\ldots\ldots (2)$$

Where e_λ is efficiency and σ is Stefan's constant.

From equations (1) and (2), we get

$$e_\lambda \sigma T^4 \; = \int_{v_1}^{v_2} \frac{2\pi h v^3 dv}{c^2\left(e^{\frac{hv}{N}/KT}-1\right)} \; \left(m^{-2}\frac{jouls}{sec}\right) \quad \ldots\ldots\ldots\ldots (3)$$

The maximum wavelength of evolved CQFs spectrum λ at temperature T is given by Weins- displacement law as

$$\lambda T =$$

b $\qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$

Terminating T from equations (3) and (4), we get

$$\sigma \, e_\lambda \left(\frac{b}{\lambda}\right)^4 \; = \int_{v_1}^{v_2} \frac{2\pi h v^3 dv}{c^2\left(e^{hv/NKT}-1\right)} \; \left(m^{-2}\frac{jouls}{sec}\right)$$

$$\sigma b^4 = \int_{v_1}^{v_2} \frac{2\pi h \lambda^4 v^3 dv}{c^2 e_\lambda \left(e^{hv/NKT}-1\right)} \qquad \ldots\ldots\ldots\ldots (5)$$

Let us put equation (5) in the cosmoquanta fluctuation's mass formula $\quad M = \frac{Hh^2}{\sigma b^4}$ to show that M is dependent of frequency v observed in light curve of GRBs.

$$M(v) = \frac{Hh^2}{\int_{v_1}^{v_2} \frac{2\pi h c^2 dv}{v \, e_\lambda \left(e^{hv/NKT}-1\right)}}$$

$$M(v) = \left(\frac{e_\lambda Hh}{2\pi c^2}\right)\left[\frac{1}{\int_{v_1}^{v_2} \frac{dv}{v\left(e^{hv/NKT}-1\right)}}\right] \quad \ldots\ldots\ldots\ldots (6)$$

$M(v)$ is frequency dependent because of the fact that CQFs collectively oscillate, lower the frequency, lower is the $M(v)$ and vice versa. Quantum states with higher quantum numbers (N) are required for the CQFs of more mass with higher frequency. N can be estimated by the ratio of $m_{observed} = \frac{hv}{c^2}$ and $m_{estimated} = \frac{Hh^2}{\sigma b^4}$ for the CQFs as

$$N = \frac{m_{observed}}{m_{estimated}} = \frac{3.90\times10^{-50} \, kg}{2.5\times10^{-67} kg} = 1.5 \times 10^{17}$$

These N number of Cosmo quanta fluctuations collectively responsible for *the observed frequency* 5.68 ± 0.04 Hz as a Noise background observed in light curve of GRB.

For further calculations we tried to determine the value of constant $\frac{h}{NKT} = 3.674$ as given in equation-6 using the values of N, K, h, and T *where* $T = 8.706 \times 10^{-29}$ *kelvin* which is obtained from the LNH formula, $T = \frac{H}{b}\sqrt{\frac{h}{\sigma}}$ for the proposed CQFs. The integration in denominator of the equation-6 can be solved separately as

$$integrtion = \int_{v_1=5.679999}^{v_2=5.6800003} \frac{dv}{v\left(e^{hv/NKT} - 1\right)}$$

$$= 2.6231 \times 10^{-19} \; or \; 8.3445 \times 10^{-19}$$

when $v = 5.68$ *Hz* is taken for CQFs. Also the constant of equation-6 can be determined as

$$\frac{Hh}{2\pi c^2} = 2.74 \times 10^{-69} \, kg$$

Putting the values, we get

$$M = (e_\lambda)\frac{2.74 \times 10^{-69} kg}{2.623 \times 10^{-19}} \cong (e_\lambda)10^{-50} kg \times 1.044 \cong 1.044 \times 10^{-50} kg (e_\lambda)$$

Where e_λ is always less than one (< 1). Also *when* $I = 8.3445 \times 10^{-19}$ gives
$$M = 2.937 \times 10^{-51} kg.$$

Mass of CQFs is in good agreement with the observed mass of Poisson noise fluctuation detected in GRB150203A and therefore it is concluded that origin of background in light curve is basically created by CQFs.

Acknowledge:

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