International Journal of Applied Sciences: Current and Future Research Trends
(IJASCFRT)
ISSN: 2790-3990
https://ijascfrtjournal.isrra.org/index.php/Applied_Sciences_Journal

Heart Sounds Generate the Fine Structure Constant

Ramzi A. Almohammadi MD*

Division of Cardiology, Department of Medicine,King Abdulaziz University,P.O. Box 80205, Jeddah 21589, Saudi Arabia

Email: atalmohammadi@kau.edu.sa

Abstract

Classical mechanics and quantum mechanics are two major fields of physics that describe reality through the structure of matter. Classical mechanics describes reality as deterministic, while quantum mechanics describes it as probabilistic. Since both describe reality by separate unrelated laws of physics, there is no theory fits both fields into a single framework that makes the two mathematically compatible in the context of the standard model of physics. During the advancement in both fields, a dimensionless number that has been incredibly mysterious and unbelievably important starts to appear everywhere in quantum physics. This number is called the fine structure constant. Here we show how the human heart plays an important physiological role in generating the numeric value of this mysterious number which turns out to be a port of entry to a new undiscovered dimension of time differs from the cosmological time. This finding led us to discover a mechanism in the universe that mirrors the physiological process of the heart to generate similar hidden dimension of time for the universe, which turns out to be the key that connects both classical mechanic & quantum mechanics in single framework.

Keywords: Heart sounds; Primary occipital region of the brain; Linear time dimension; Relativity of simultaneity; Fine structure constant; Neutrino; Quantum mechanic; Classical mechanic; Collapse of wave function.

1. Introduction

Heart sounds are created from blood flowing through heart chambers as the cardiac valves open and close during the cardiac cycle. Vibration of these structures from the blood flow create resonant frequencies that is audible by a stethoscope. Unlike the “voluntary” audible sounds produced by the lungs with varying intensity during normal respiration, the normal heart produces “involuntary” specific resonant frequencies at specific time interval. Furthermore, at any pathology that alters the frequency of heart sounds or interrupt the timing of heart sounds sequences, an additional heart sounds become prominent.

Received:*10/15/2023*
Accepted: *12/22/2023*
Published: *12/31/2023*

---

* Corresponding author.

This involuntary physiological process involving heart sounds must have a purpose & serves another important physiological process occurs in the human body yet to be discovered. This unknown physiological process must be connected to one of the fundamental mysteries in nature. There are several mysteries in nature, but the most mysterious one started in 1913, when Niels Bohr proposed an atomic structure model, describing an atom as a small positively charged nucleus surrounded by negatively charged electrons that travel in circular orbits around it, with attraction provided by electrostatic forces [(1)]

An electron emits or absorbs energy when it jumps from one orbit or energy level to another. When it jumps from a higher energy level to lower energy level it emits energy

The energy emitted is equal to the difference between the energies of the two energy levels (E1, E2) and is determined by Plank's equation.

$\Delta E = E2\text{-}E1 = h\nu$

Where, ΔE = energy absorbed or emitted, h= Plank's constant, ν = frequency of electromagnetic radiation emitted or absorbed. However, experimental measurement of energy emitted in this process is different than mathematical measurement from Plank's equation. This led to extension of Bohr model by Arnold Sommerfeld to include elliptical orbits (suborbital) that have relativistic dependence of mass on velocity. Sommerfeld found that the difference between the calculated emitted energy and the measurement of the same energy experimentally is equal to a ratio 1/137 (0.00279) He then introduced a term for the fine-structure constant (denoted as Greek letter alpha α) for that ratio or number in 1916 [(2).]

This constant was not seen as significant until Paul Dirac's linear relativistic wave equation introduced in 1928, which gave the exact fine structure formula with the value of 1/137. Richard Feynman is one of the most notable scientists in quantum mechanics and Nobel laureate in physics wrote in his book (the strange theory of light and matter) about the fine structure constant saying, "All good theoretical physicists put this number up on their wall and worry about it" [(3).] This number has been trying to tell us something very important in the universe yet to be discovered.

2. Heart sounds & cardiac cycle

In each cardiac cycle, there are heart sounds that can be audible by stethoscope. First heart sound is caused by the closure of the atrioventricular valve i.e., tricuspid and mitral, at the beginning of ventricular systole. Second heart sound is composed of two components A2 (aortic valve closure) and P2 (pulmonary valve closure). In normal heart, S1 & S2 are the only audible sounds by stethoscope. Additional heart sounds S3 & S4 can also be heard in certain pathologies that affect the heart, like murmur [(4)] . The third heart sound occurs at the beginning of ventricular diastole after S2 and is lower in pitch with lower resonant frequency than S1 or S2 as it is not of valvular origin, it becomes more audible in any condition that affect the resonant frequency or the timing of S2 like aortic regurgitation or severe left ventricular failure, therefore S3 seems to be a backup for S2 when it fails to produce specific sound frequency at specific timing interval. The fourth heart sound is produced when the blood is being forced into a stiff or hypertrophic ventricle or valvular disease like mitral stenosis, & it becomes

audible at the end of ventricular diastole before the occurrence of S1. Therefor S4 seems to be a backup for S1 when S1 fails to produce specific sound frequency at specific timing interval (Figure 1).

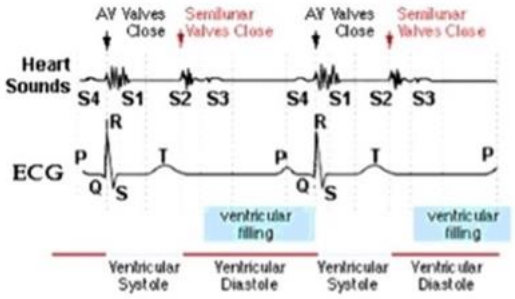

Figure 1: Timing events in cardiac cycle

This physiological process that generates two back up heart sounds S3 & S4 for S1 & S2 indicates there must be a reason why the heart should deliver resonant specific frequency at a specific time

It has been reported that the frequency of S1 & S2 is approximately 40 Hz of resonant frequency [5,6]. The cardiac cycle composed of two ventricular phases, systole & diastole (Figure 1). The duration of cardiac cycle can be calculated from the formula

60/HR

Since the average heart rate for men and women at various age is almost equal to 77 bpm [7,8,9], then the average cardiac cycle would be 0.779s. The ratio of duration of diastolic phase to systolic phase of a given cardiac cycle is equal the golden ration in mathematics 1.6. which means in an average cardiac cycle of 0.779 second, the ventricular diastolic duration is equal to 0.461 second followed by the first heart sound, leading to the beginning of ventricular systole that last for 0.318 second followed by the second heart sound [10,11]. The first heart sound of the subsequent cardiac cycle will occur after 0.461 second from the beginning of second cardiac cycle or 1.24 second from the beginning of the first cardiac cycle. Another way to know the timing of occurrence of the first heart sound in the subsequent cardiac cycle is through multiplying the duration of the previous cardiac cycle (0.779 s) by the golden ratio (1.6) which equal to 1.24 s. This pattern of specific sequence of occurrence of first and second heart sounds and its relation to the golden ratio must have an important physiological process that serves the human body yet to be discovered through a mathematical equation.

3. The heart and brain communication

Traditionally, the study of communication pathways between the head and brain has been approached from a rather one-sided perspective, with scientists focusing primarily on the heart's responses to the brain's commands. We have learned, however, that communication between the heart and brain is a dynamic, ongoing, two-way dialogue, with each organ continuously influencing the other's function.

Research has shown that the heart communicates to the brain in four major ways, one of them is neurologically (through the transmission of nerve impulses). The heart has a complex neural network that is sufficiently extensive to be characterized as a brain on the heart. These neural networks have a direct connection (bypassing the spinal cord) from the nucleus of tracus solitarius NTS to the amygdala, hypothalamus and thalamus [12,13]. This afferent pathway specifically from the heart must carry an important signal that need to be delivered to the brain that should not interrupted in case of spinal cord injury [Figure 2]

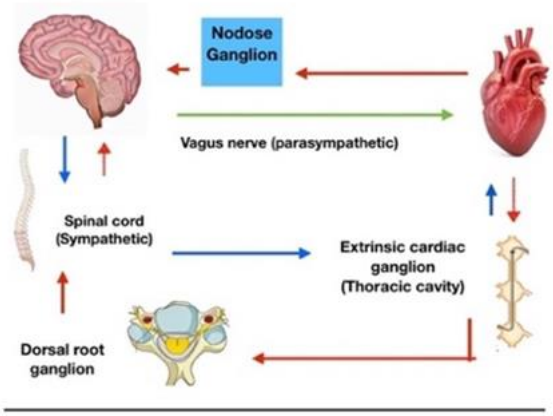

Figure 2: The neural communications pathways between the heart and the brain, the red arrow represents the afferent pathway, the green arrow represents parasympathetic pathway, and the blue arrow represents sympathetic pathway.

4. Gamma brain waves in primary occipital cortex

Brain waves are oscillating electrical voltages. There are five widely recognized brain waves, and the main frequencies of human EEG waves are listed in (Table 1) along with their characteristics

Various regions of the brain do not emit the same brain wave frequency simultaneously [14].

Table 1: Brain waves

Brain wave	Frequency (Hz)	Amplitude (microV)	Power (microV ^{2})
Theta	0.5-4	20-200	400-40000
Delta	4-8	2-100	4-10000
Alpha	8-13	20-60	400-3600
Beta	13-30	2-20	4-400
Gamma	>30	5-10	25-100

The neurons in the primary occipital region (V1) produces two distinctive brain waves. The first brain wave oscillates at gamma resonant frequency ~ 40 Hz, followed by oscillation at alpha brain wave frequency ~ 10 Hz.

One study shows that stimulation of the neurons in primary occipital region of the brain experimentally by visual flicker leads to gamma oscillation followed by alpha oscillations, however, it has been noted that the gamma oscillation occurs due to an endogenous source independent of experimental stimulus by visual flicker. Furthermore, this gamma oscillations in the resonant frequency range that occurs in primary occipital region has also been detected in deaf individuals [15], indicating a coexisting phenomenon that emphasizes its origin from endogenous source in the body that must occur before the oscillation in the range of alpha brain wave of the same neuron in primary occipital region (Figure 3-A). The neurons in primary occipital cortex exhibits certain oscillatory characteristics with each visual stimuli, the gamma oscillation occurs at 40ms (or 0.04s) from the visual stimuli and vanishes after 3 cycles followed by alpha oscillation in the same neuron that occurs at 0.2 s from viral stimuli and spans for 10 cycles at frequency of ~10 Hz before it vanishes, making the total duration of oscillations (gamma followed by alpha) lasts for 1.2 s (figure 3-A)[16,17]. gamma oscillation is localized to primary occipital cortex, whereas alpha oscillation propagates over the cortex which means it carries a specific coding information to the brain that is initiated by gamma oscillation in the primary occipital cortex [18]. Interestingly, the alpha oscillation in occipital region occurs in totally visual blind individuals when exposed to light. This process occurs through the stimulation of the retina via intrinsically photosensitive retinal ganglion cells (ipRGCs) [19]. This physiological process in the primary occipital cortex where gamma brain resonant oscillation occurs (even in deaf individuals) followed by alpha brain wave oscillation (even in totally blind individuals) points toward a hidden yet crucial physiological process that must occur in all individuals.

The duration of oscillations (gamma followed by alpha brain wave in primary occipital cortex (V1), which is 1.2 s, strongly correlates with the duration of cardiac cycle and the interval timing of occurrence of S1 & S2 within a given cardiac cycle. As mentioned earlier, in an average heart rate of 77 beats per minute, the duration of cardiac cycle is 0.779 s. The first heart sound occurs at the beginning of cardiac cycle produces a reason frequency in the gamma range 40 HZ, which makes the ganglion in the heart oscillates. This oscillation travels from the heart to the brain via afferent neural pathway that connect the heart to the brain (Figure 2). This gamma oscillation reaches the brain and activates the neuron in the primary occipital region to oscillate in gamma resonant range (the heart sounds is the endogenous source for gamma oscillation in primary occipital region) followed by alpha oscillation. As mentioned earlier, the oscillations (gamma followed by alpha) in primary occipital region lasts for 1.2 s and gamma oscillations start at 0.04 seconds which matches the timing of occurrence of S1 in the subsequent cardiac cycle (which is 1.24 s from the beginning of previous cardiac cycle) when the duration of cardiac cycle for average heart rate (77bpm) is 0.779 s (Figure 3-B). Furthermore, as the heart rate increases, meaning shorter duration of cardiac cycle, S2 (not S1) triggers the neuronal oscillations at gamma resonate range in primary occipital cortex. The occurrence of involuntary two sounds produced by the heart at specific precise interval makes it the only source for endogenous gamma wave that is detected in primary occipital region in all (including deaf) individuals.

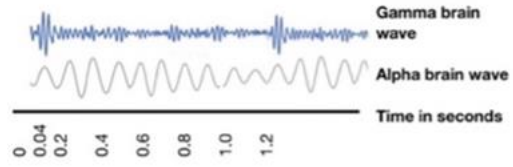

Figure 3-A

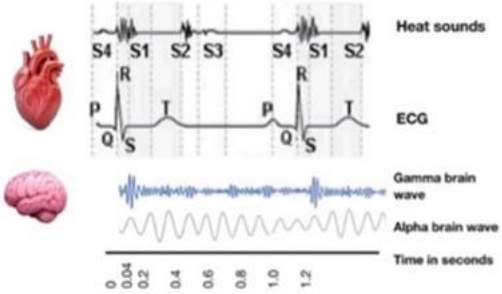

Figure 3-B

Figure 3-A: The relation between the onset of gamma and alpha brain wave to time in primary occipital region of the brain

Figure 3-B: The relation between the heart sounds in one cardiac cycle to the onset of oscillations of gamma brain waves in primary occipital region of the brain

5. Heart brain connection generates new & separate dimension of time

Time is energy, because one second in cosmological time is estimated from the radiation corresponds to the transition between two hyperfine levels of the ground state of the element Cesium-133 that vibrates 9192631770 times which makes the duration of second unit of time [(20)]. The energy produced here is fixed and does not change, which does not fulfill the concept of time in Einstein's theory of special relativity. For relativity of time to occur, there must be another form of energy that is variable & not fixed which in turns, interacts with dimension of time described in Einstein's theory of general relativity. This variability of energy which leads to relativity of time must result from an energy produced by a ratio between two energies in which one of these energies is variable and gains its variabilities through a specific parameters at specific cycle of time in the model of general relativity.

The neurons in the primary occipital area (V1) of human brain fulfill those criteria by generating an energy from a ratio of gamma brain wave to alpha brain wave oscillation at a specific time regulated by the duration of cardiac cycle.

The power of gamma brain wave is equal to 25-100 microV^2 while the power of alpha brain wave is variable and ranges from 400 to 3600 microV^2 (table1) which indicates that the energy produced in the neurons of primary occipital cortex (V1) from this ratio of gamma brain wave energy to alpha brain wave energy is variable and it depends on the power of gamma & alpha brain wave in primary occipital region of the brain when the

frequency of gamma brain wave is equal to 40 Hz spans for three cycles over 0.04 s and the frequency of alpha brain wave is 10 Hz spans for 10 cycles over one second. From these date (the ratio of energy of gamma to alpha brain waves in one cardiac cycle) the brain can generate a new non fixed time dimension that fulfill the concept of time relativity due to the variabilities of the power of gamma & alpha brain wave at specific time related to the duration of cardiac cycle.

The energy of brain wave is generally the function of amplitude and frequency, and it is proportional to the square of amplitude, whereas the power of the wave corresponds the energy produced during one time period related to the frequency of the wave [21]

Therefor the equation for energy production by oscillating brain wave is

$$E = \frac{\xi P}{f}$$

Where E is the energy, ξ is the number of wave cycle, P is wave's power, f is wave's frequency. Since a second is a unit of time represents the minimum value of unit in cosmological time, we must calculate the minimum value of this non fixed new time dimension that represents the beginning or the gate for the relativity of time. In order to do that, we will calculate the minimum energy produced by gamma brain wave oscillation to the minimum energy produced by alpha wave oscillation that occur in relation to the average longest cardiac cycle

The minimum energy produced by gamma brain wave when the power is 25 MicroV^2, the number of cycles is 3 and the frequency is 40 Hz is

$$E_\gamma = \frac{3\times25}{40} = 1.875\,J$$

The minimum energy produced by alpha brain wave when the power is 400 microV^2, the number of cycles is 10 and the frequency is 10 Hz is

$$E_\alpha = \frac{10\times400}{10} = 400\,J$$

The average duration of longest cardiac cycle can be calculated by two methods: The first method is multiplying the average cardiac cycle 0.779s by 2

$$0.779 \times 2 = 1.558s$$

The second method is the square of the product of multiplying the average cardiac cycle 0.779s by the golden ratio 1.6

$$(0.779 \times 1.6)^2 = 1.553s$$

Then we take the average of the two methods

$\frac{1.558+1.553}{2} = 1.5564s$

Therefore, the average longest cardiac cycle is 1.5564s which I will call it the constant of cardiac cycle.

Now we can calculate the minimum value of the time dimension generated by human brain from the following equation:

$\frac{\nabla E_\gamma}{\nabla E_\alpha} \times \delta$

∇E_γ is the minimum gamma brain wave energy

∇E_α is the minimum alpha brain wave energy

δ is the cardiac cycle constant

$\frac{1.875}{400} \times 1.5564 = 0.00729s$

0.00729s is the value of fine structure constant which is the point of entry to a hidden dimension of time, I will call it the linear time dimension, that interacts with cosmological time to generate time dilation described in the theory of special relativity.

The equation for fine structure constant for human is

$$\alpha = \frac{\nabla E_\gamma}{\nabla E_\alpha} \times \delta \qquad (1)$$

6. Direction of time in the context of theory of special relativity

As mentioned earlier in this article, in one cycle of energy interaction between gamma and alpha brain waves oscillations, gamma brain wave remains localized to the primary occipital cortex while alpha brain wave propagates and carries information. We can conclude that one cycle of energy produced by neuron in primary occipital cortex (we can call it the area of time in human brain) is regulated by the beginning of gamma brain wave oscillation governs by the heart sounds of specific timing related to the duration of cardiac cycle, followed by alpha brain wave oscillation that propagates carrying information to be stored as one frame of visual memory in the brain encoded with specific timing equal to the ratio between gamma to alpha brain waves energies at one cardia cycle, (Figure 4) which is followed by another cycle of this energy interaction generating subsequent frame of visual memory added to the prior one to make a forward new dimension of time and so on. That means this dimension of time generated by the primary occipital area of the brain moves forward in linear fashion by adding new frame of visual information after the prior one and so on.

Unlike the cosmological time which runs in repetitive cycles, this linear time dimension generated by human brain runs in forward linear direction only. The interaction between these two times dimensions makes the linear

time dimension pulls the cyclic time to move in repetitive forward direction that take helical shape, which determines the direction of forward movement of arrow of time. The equation that calculates the linear time dimension generated by the brain is derived from the minimum unit of time generated by the brain (which is the fine structure constant) multiplied by the change in the duration of cardiac cycle in addition to the variabilities in the power of gamma & alpha brain wave which is the relativity factor

$$t_h = \alpha^2 \left(\delta^2 - \frac{60}{HR}\right) + \sqrt[4]{\frac{E_\alpha}{E_\gamma}} \quad (2)$$

t_h is human linear time, δ is cardiac cycle constant

HR is the heart rate

Another important constant is the heart sound timing constant which is the duration of first or second heart sounds that is equal to timing of onset of gamma brain wave oscillation in primary occipital cortex 0.04s

$\beta = \sqrt{0.04} = 0.2s$

β is heart sound timing constant

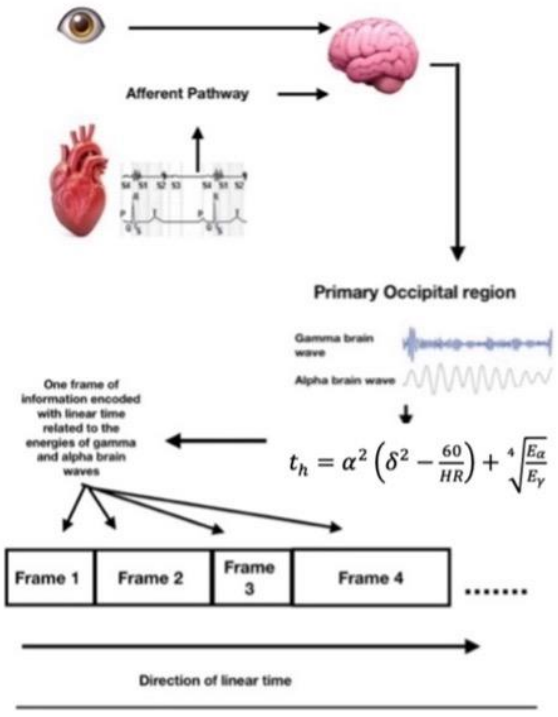

Figure 4: The scheme representing the process of interaction of the heart sounds transmitted via the afferent pathway with photon detected by the retina in the primary occipital region of the brain generating forward linear time dimension. Note that each frame of visual information has different time than other frames ranging between 2.7s to 6.62s in wakeful state depending on the energies of alpha and gamma brain waves

equation (2) predicts time dilation that is calculated by the Lorentz equation for time dilation for speeding object in relation to the speed of light.

$$t' = \frac{t}{\sqrt{1-\frac{v^2}{c^2}}}$$

The power of alpha wave is increased with radial motion, and this increase is maintained even with eye closed in pre adaptation of the eye to radial motion[22] leading to time dilation in the linear dimension , since the maximum power of alpha brain wave in primary occipital cortex is 3600 microV^2 and the minimum power of gamma brain wave is 25 microV^2 (table 1) the maximum linear time for humane brain that can experience in wakeful state is 6.62s to 1s of cyclic time dimension that is corresponds to what a person can experience when travel at 98% of speed of light based on Lorentz equation, however, the speed of the person relative to the speed of light is not the only factor responsible increasing linear time by increasing the power of alpha brain wave that human brain can experience, because there are other conditions that determines the power of alpha waves in primary occipital region. Everyone has their own linear time dimension different than other people, which depends on their heart rate, i.e., the duration of cardiac cycle and the value of alpha & gamma brain wave power that is determined by the surrounding circumstances for everyone. Nevertheless, everyone has the same moment in cyclic time during the day, this is how relativity of simultaneity occurs where past, present and future occur in the same moment in cyclic time (as indicated by the theory of special relativity), and that is due the variability of linear time dimension among individuals (Figure 5A-B).

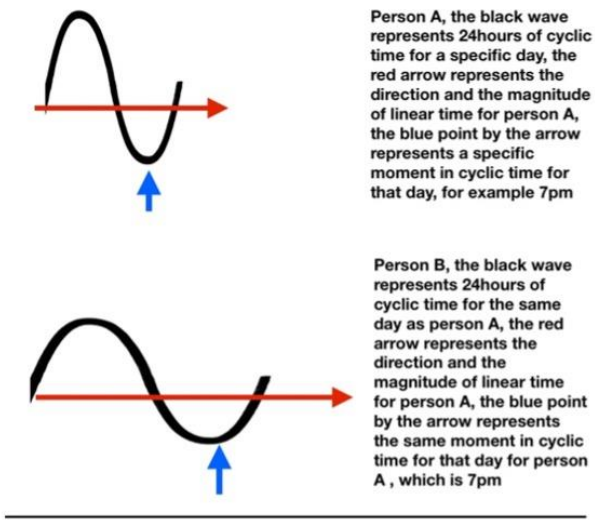

Figure 5: The interaction of linear time with cyclic time for each individual, variations in linear time between individuals create the phenomena of relativity of simultaneity, where past and future occur in the same moment of cyclic time. In the example, the specific moment of cyclic time which is 7pm in this diagram (the blue arrow) is considered the past for person A in the frame of reference of person B, and the future for person B in the frame of reference of person B

During the day and wakeful state, linear time in human brain is always ahead of cyclic time. During sleep, linear

time contraction occurs because the value of alpha brain power in the equation is equal to zero. Therefore, the linear time progress in a very slow rate relative to the progression of cyclic time if the heart is beating, in which gamma brain waves in primary occipital cortex continue to register time (at a rate of approximately 0.00005s for each 1s of cyclic time) with no memory in a very slow progression since alpha wave is absent. linear time contraction during sleep occurs to compensate for time dilation that had occurred during the day or wakeful state, in order to minimize the difference between the linear and cyclic time dimensions in one complete 24 hours for human being. Therefore, during wakeful state the linear time dimension of an individual vary from 2.7s (minimum energy of alpha brain wave to maximum energy in gamma brain wave calculated by equation 2) to 6.62s for each 1s of cyclic time dimension, while during sleep, the linear time calculated by the brain of sleeping person is approximately 0.00005s for each 1s of cyclic time. This phenomenon concludes that the age of individual depends on the calculation of linear time dimension in the brain and not on cosmological cyclic time.

So far, we conclude the following 1-the linear time dimension depends on the ratio between sound energy to light energy at a specific duration of cyclic time. 2-In wakeful state, the minimum linear time that human brain calculate is 2.7s and the maximum linear time is 6.62s for each 1s of cyclic time. 3-during sleep, the linear time for human runs in a very slow rate 0.00005s for each 1s of cyclic time.

7. Linear time dimension in physics

Human brain calculates linear time dimension through a physiological process based on the ratio between sounds energy to light energy at a given duration of cyclic time (cardiac cycle). The same principle is applied to the universe where linear time dimension is created through a process at subatomic level involving the ratio of sound to light energies from two particles at a given cyclic time. The first particle is a photon since it produces light energy. The second particle must produce variable value of sound energy (Through oscillations) in order to generate relativity in linear time dimension. Like the heart in human body which produces involuntary sound with specific frequency in which human has no control over it that eventually converted into energy through neuronal oscillations in primary occipital cortex, the second particle in physics that interact with the photon to generate linear time dimension responsible for relativity must possess the following criteria: 1- The particle does not carry charge, therefore, it cannot be accelerated by electric field. 2- The particle does not interact with Higgs field, therefor Higgs field does not determine their energy status 3- The particle must have variable form of oscillation, hence, variable energy (in order to generate relativity in time). The only particle that fulfills these criteria to generates liner time dimension in the universe is neutrino. Neutrino is an elementary particle with spin of 1 /2 that interacts via the weak interaction [(23)]. It was postulated first by Wolfgang Pauli in 1930 to explain how beta decay could conserve energy, momentum, and angular momentum (spin).

Weak interactions create neutrinos in one of three leptonic flavors: electron neutrinos (νe), muon neutrinos (νμ), or tau neutrinos (ντ), associated with the corresponding charged leptons, the electron (e−), muon (μ−), and tau (τ−), respectively [(24)] . Neutrino comes in three masses; each neutrino flavor state is a linear combination of the three discrete mass eigenstates [(25)]. Neutrino flavor eigenstates (creation and annihilation combinations) are not the same as the neutrino mass eigenstates. Neutrinos oscillate between different flavors, for example, an electron

neutrino produced in a beta decay reaction may interact in a distant detector as a muon or tau neutrino, as defined by the flavor of the charged lepton produced in the detector. This oscillation occurs because the three mass state components of the produced flavor travel at slightly different speeds, so that their quantum mechanical wave packets develop relative phase shifts that change how they combine to produce a varying superposition of three flavors. Each flavor component thereby oscillates as the neutrino travels, with the flavors varying in relative strengths. The relative flavor proportions when the neutrino interacts represent the relative probabilities for that flavor of interaction to produce the corresponding flavor of charged lepton [26,27] These are a great property of neutron that make it a particle in which its energy interacts with photon's energy to generate linear time dimension and relativistic effect in relation to cyclic time dimension.

One important note about neutrino is that almost 98% of energy released few seconds before the supernova occurs is in the form of neutrino [28]

8. Linear time dimension of the universe

Neutrino and photon generate the value of fine structure constant (which is the gate to linear time dimension in the universe) through subatomic particle interaction. Interaction of neutrino with photon resulted in formation of linear time dimension that pulls the cyclic time in one direction, I will call this process quantum initiation of linear time dimension QILTD, and this is how the universe was born. Interaction of neutrino with photon not only result in QILTD, but also in new force that counter the electromagnetic force, I will call this force oscillatory force and the carrier for this force is neutrino. The universe started from quantum field with high potential energy neutrino was added to the quantum filed triggering quantum initiation of linear time dimension QILTD. The value of fine structure constant was 1/127 at the birth of the universe [29] meaning that the maximum linear time "allowed" in the universe was 127 seconds. while the value of linear time was 85 seconds (proton decay must not exceed 1/85 in order for life to exist) [30] at the moment of the birth of the universe, all the constant in physics were set at from these two numbers (125 and 85) 125s is the maximum linear time "allowed" at the birth of the universe, and 85s is the actual linear time at the birth of the universe. These two numbers give an important constant in which all the constants in physics are derived from it, I will call it the constant of all constants denotated by the letter R

$$\mathcal{R} = \frac{t_l^{\rightarrow}}{\Lambda^{\leftarrow} t_u} \qquad (3)$$

$t_l^{\rightarrow}$ is the maximum linear time at the birth of the universe 85s

$\Lambda^{\leftarrow} t_u$ is the maximum linear time "allowed" at the birth of the universe 127s

$\mathcal{R} = \frac{127}{85} = 1.49411765s$

All the constants in the universe were set from the number 1.49411765s. since minimum length in the universe (mL)

$=1 \times 10^{-35} m$

And the minimum cyclic time in the universe (mT)

$=1 \times 10^{-44} s$

And the minimum mass in the universe (mM)

$=1 \times 10^{-8} kg$

And we know that the dimension of the unit of speed pf light is

$\frac{\text{Length}}{\text{time}}$

The speed of light value was set from the number R (the constant of all constants) from the following formula

$=\frac{mL}{mT} \times \left(R \times \frac{1}{R^4}\right) = \frac{1\times10^{-35}}{1\times10^{-44}} \times \left(1.49411765 \times \frac{1}{1.49411765^4}\right) \approx 2.998096529 \times 10^8\ m/s$

Planck constant was set from R through the following formula based on the dimensions of its SI unit

$\frac{M\times L^2}{T}$, therefore, Planck constant is equal to

$=\frac{mM\times mL^2}{mT} \times \left(2R^3 - \sqrt{\frac{1}{R^4}}\right) = \frac{1\times10^{-8}\times1\times10^{-70}}{1\times10^{-44}} \times 2 \times (1.49411765)^3 - \sqrt{\frac{1}{(1.4941765)^4}} = 6.62 \times 10^{-34}\ Jouls.second$

The gravitational constant was set from R through the following formula based on the dimensions of its SI unit

$\frac{L^3}{M\times T^2}$, therefore, Gravitational constant is equal to

$=\frac{mL^3}{mM\times mT^2} \times 2 \times R^3 = \frac{1\times10^{-105}}{1\times10^{-8}\times1\times10^{-88}} \times 2 \times 1.49411765^3 = 6.67 \times 10^{-11} m^3 Kg^{-1} s^{-2}$

All the other constant in physics were set from the number R, Even the cardiac cycle constant is related to R

$$\delta^2 = \mathcal{R}^2 + \beta \quad (4)$$

Therefore, equation (2) that calculate human linear time can be written to include R as follow

$$t_h = \alpha^2 \left[(\mathcal{R}^2 + \beta) - \frac{60}{HR}\right] + \sqrt[4]{\frac{E_\alpha}{E_\gamma}} \quad (5)$$

Even the maximum and the minimum values of linear time calculated by human brain are originated from R

$$\mathcal{R} = \sqrt{\frac{\wedge t_h}{\vee t_h} - \beta} \quad (6)$$

$\wedge t_h$ is the maximum human linear time in wakeful state 6.62s

$\vee t_h$ si the minimum human linear time in wakeful state 2.7s

β is the heart sound timing constant 0.04s

Or

$$\frac{\wedge t_h}{\vee t_h} = \mathcal{R}^2 + \frac{1}{\mathcal{R}^4} \quad (7)$$

The photon which interacted with neutrino lead to formation of oscillatory force but since the energy of neutrino at the birth of the universe was too low, oscillatory force was able to generate a magnetic moment only in the field in which the velocity of the particle was perpendicular to the magnetic force in the field, thus, the field moves in a circular trajectory motion, and everything in the field at the beginning was massless because Higgs field had zero potential. As the temperature of the universe started to decrease, Higgs field gained nonzero potential, and when the fundamental particles interacted with Higgs field, they gained masses, leading to slow inflation of two space dimensional field. As the temperature of the universe stated to decrease, and the energy of the neutrino started to increase, the oscillatory force increases. When the universe reaches to the stage of cosmic microwave background, the oscillatory force was able to generate an angular momentum creating a third space dimension. At this point the energy of neutrino was enough to convert the photon into a visible light. This explains why the cosmic microwave background is flat or 2 space dimensional field and we can not see any lights behind it. With formation of an angular momentum & 3 dimensions, the entire field moved in helical forward movement completing 4 circles (figure 6)

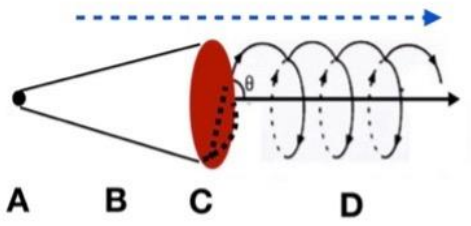

Figure 6: Stages of universe formation, A universe arises from quantum field, B slow inflation 2 dimensions universe, C cosmic microwave background, D 3 dimensions universe rotating around the axis of magnetic force

The interaction of neutrino and photon occurs at subatomic level leading to quantum initiation of linear time dimension. The atomic nucleus undergoes three types of decays, alpha, beta and gamma decay. Beta decay is a radioactive decay in which a proton in a nucleus is converted into a neutron (or vice-versa). In the process the nucleus emits a beta particle (either an electron or a positron) and quasi-massless particle, the neutrino. Gamma

decay is a third of radioactive decay that a nucleus can undergo, in which, a high energy form of electromagnetic radiation (a gamma ray photon) is released. Gamma ray releases also occur during the process of electron and positron annihilation[31,32,33,34] Annihilation of electron and positron at rest releases two gamma rays (two photons) with energy equal to 511KeV[35], while the energy of neutrino that is released from beta decay around 0.1 KeV[36]. The fine structure constant is generated from the interaction between neutrino and photon. Like the physiological process in human heart and brain, we take the minimum energy of neutrino 0.1KeV and photon as gamma rays 511 KeV and multiply by the constant of all constant in four circles as follow

$$\frac{\vee E_v}{\vee E_p} \times 8\pi\Re = \frac{0.1}{511} \times 8\pi \times 1.49411765 \approx 0.0073s$$

Therefore, the fine structure constant equation by the universe is

$$\alpha = \frac{\vee E_v}{\vee E_p} \times 8\pi\mathcal{R} \qquad (8)$$

$\vee E_v$ is minimum energy of neutrino 0.1KeV

$\vee E_p$ is minimum energy of photon 511KeV

Interaction of neutrino with gamma rays, leads to conversion gf gamma rays to visible light with specific energy, frequency and wavelengths. So, the total interaction of neutrino with gamma rays represents a frame one of visual information encoded with specific time related to the ratio of neutrino to photons energies at given cyclic time related to the constant of all constants. This process is followed by a second process similar in mechanism to generate frame two of visual information encoded with specific time frame related to the energies of neutrino and photon. Frame two is added to frame one to generate the linear time dimension, which continues by adding frame three, four and so on. Since neutrino comes in three flavors and three masses, each frame has different encoded linear time generating relativity that interacts with cyclic time dimension and pull it in forward direction only. The interaction of neutron with photon results in collapse of the wave function

$$[i\hbar\frac{\partial}{\partial t}\psi(x,t)]^2 = \psi(x,t)[-\frac{m_e}{2(\hbar\epsilon_0)^2}\frac{e^2}{\frac{\vee E_v}{\vee E_p}}\frac{1}{8\pi\mathcal{R}}]^2 \qquad (9)$$

ϵ_0 is electric constant, ψ is wave function, m_e is electron mass

$\hbar$ is reduced planck constant, e is elementry charge

Therefore, special relativity equation

$$E = mc^2$$

Is equal to Niels Bohr's equation

$$E = -\frac{m_e}{2\hbar^2}\left(\frac{e^2}{4\pi\epsilon_0}\right)^2\frac{1}{n^2}$$

when the electron is at its lowest energy level at the time of interaction of neutrino with photon that is released in the form of gamma ray from annihilation of electron and positron

$$(mc^2)^2 = \left[-\frac{m_e}{2(\hbar\epsilon_0)^2}\frac{e^2}{\frac{\vee E_v}{\vee E_p}}\frac{1}{8\pi\mathcal{R}}\right]^2 \qquad (10)$$

Collapse of the wave function result in quantum initiation of linear time dimension, this process leads to change in the status of the particle from probabilistic to deterministic, in which the particle is now governed by three space dimension and two time dimensions, the linear time dimension dictates that nothing can travel faster than the speed of light in the deterministic state.

Collapse of the wave function can also occur through measurement by human consciousness, the primary occipital region of human brain where the linear time is generated is also capable of change the particle status from probabilistic to deterministic state. This explains the mystery behind the double slit interferometer experiment (the most bizarre experiments in modern physics) by Thomas Young in 18th century[43], which demonstrates that light follows the concept of wave-particle duality. When photons are sent from a source through a double slits wall, an interference patten is detected on the screen behind the double slits wall. When the photons are observed before or after passing the double slits wall by human or measured by any tools that are eventually interrupted by human brain, the interference pattern disappear. This is because the primary occipital region of the brain has the capacity to convert status of the particle from probabilistic to deterministic through the ability of this region of human brain to calculate the fine structure constant . Therefore, observation of human brain to a particle in quantum status results in collapse of the wave function.

$$[i\hbar\frac{\partial}{\partial t}\psi(x,t)]^2 = \psi(x,t)\left[-\frac{m_e}{2(\hbar\epsilon_0)^2}\frac{e^2}{\frac{\vee E_v}{\vee E_p}}\frac{1}{8\pi\sqrt{\frac{\wedge t_h}{\vee t_h}-\beta}}\right]^2 \qquad (11)$$

$\wedge t_h$ is the maximum human linear time in wakeful state 6.62s

$\vee t_h$ si the minimum human linear time in wakeful state 2.7s

β is the heart sound timing constant 0.04s

The Interaction of neutrino with the photon seems not only results in collapse of wave function by generating a linear time dimension, but also in formation of new force that interacts with electromagnetic force, to weaken the electromagnetic bond by releasing the photon. This new hypothetical force could explain the magnetic moment anomalies of Muon subatomic particle that was discovered at Fermilab. This hypothetical force can be confirmed mathematically by including its mathematical formula in general relativity field equation, which means that gravity is a result of interaction between electromagnetic force with this new hypothetical force " I will call it oscillatory force". This will be discussed in detail in separate article.

9. Conclusion

Fine structure constant is generated by human primary occipital region and at subatomic particles in the universe through similar mechanism involving the ratio of sound energy to light energy at a given period of cyclic time. The primary occipital region of the brain is the area of time & the area responsible of converting the particle from quantum status " probabilistic" to deterministic. in human brain through the ability of calculating the fine the structure constant, the primary occipital lobe of human brain generates linear time dimension that is separate from the cyclic time dimension. This linear time dimension pulls the cyclic time dimension in forward direction only. The linear time dimension calculated by human primary occipital region depends on the ration between sounds energy (which is produced by heart) and light energy (which produced by stimulation of the retina) at a given cardiac cycle that generates one frame of image encoded with specific time duration related to that ratio. Relativity of simultaneity is the result of the variability in linear time dimension between individuals. Interaction of neutrino with photon at the level of subatomic particles leads to collapse of the wave function and generation of linear time dimension. Linear time dimension of the universe is the bridge that connect quantum mechanics with classical mechanics.

10. Future research

Linear time dimension of the universe solves several problems in modern physics including dark matter, dark energy, gravity and black hole. Theses area will be discussed in further detail in separate article including mathematical equations that explains dark matter, dark energy and gravity in one single mathematical formula that describes the entire universe. Furthermore, the interaction of human linear time dimension with the linear time dimension of the universe gives an accurate description of the true meaning of consciousness.

References

[1]. Lakhtakia, Akhlesh; Salpeter, Edwin E. (1996). "Models and Modelers of Hydrogen". *American Journal of Physics*. **65** (9): 933

[2]. Sommerfeld, Arnold (1919). *Atombau und Spektrallinien'*. Braunschweig: Friedrich Vieweg und Sohn

[3]. Richard Feynman, Quantum Electrodynamic, The book "The strange theory of light and matter" 1985

[4]. Warriner, D., Michaels, J. and Morris, P.D. orcid.org/0000-0002-3965-121X (2019) Cardiac auscultation: normal and abnormal. British Journal of Hospital Medicine, 80 (2). C28-C31

[5]. Semmlow JL. Improved Heart Sound Detection and Signal-to-Noise Estimation Using a Low-Mass Sensor. IEEE Transactions on Biomedical Engineering. 2016;63(3):647– 652.

[6]. Anumukonda M, Ramasahayam S, Prasada Raju LVR, Chowdhury SR. Detection of cardio auscultation using mems microphone. 9th International Conference on Sensing Technology (ICST) 2015, Auckland, New Zealand. 2015;173–177.

[7]. Kannel, W. B., Kannel, C., Paffenbarger, R. S. J. & Cupples, L. A. Heart rate and cardiovascular mortality: the Framingham Study. Am. Heart J. 113, 1489–1494(1987)

[8]. Gillum, R. F. Epidemiology of resting pulse rate of persons ages 25-74–data from NHANES 1971-74. Public Health Rep. 107, 193–201

[9]. Robert Avram. Real world heart rate norms the healthy heart study, npc Digital Medicine (2019) 58

[10]. Nishimura RA, Borlaug BA. Diastology for the clinician. J Cardiol. 2019 Jun;73(6):445-452

[11]. B. Coblentz, R. M. Harvey, M. I. Ferrer, A. Cournand, and D. W. Richards, Jr., "The relationship between electrical and mechanical events in the cardiac cycle of man," British Heart Journal, vol. 11, no. 1, pp. 1~22, January 1949.

[12]. Kukanova,B.and B. Marvec, complex intracardiac vervous system. Brastil Lek Listy, 2006. 107(3): p45-51

[13]. Armour,J.A., Peripheral autonomic neuronal interactions in cardiac regulations, in Neurocardiology, J.A. Armour and J.L. Ardell, Editors. 1994, Oxford University P. 219-244

[14]. Priyanka A. Abhang, Bharti W. Gawali, Suresh C. Mehrotra, Introduction to EEG and speech based emotion recognition 2016, Pages 19-50

[15]. Catherine, T-B. Olivier, B. Oscillatory gamma activity in humans and its role in object representation. Trends in cognitive sciences, Vol 3, issue 4, P151-162, 1999.

[16]. Gulbinaite R. Roozendaal DHM. VanRullen R .Attention differentially modulates the amplitude of resonance frequencies in the visual cortex. NeuroImage 2019;203:116146. doi: 10.1016/j.nueroimage.2019.116146

[17]. Alexander Zhigalov. Katharina Duecker. The visual cortex produces gamma band echo in response to broadband visual flicker. PLos Compute Bill. 2021 June; 17(6): e1009046. Doi: 10.1371/j.pcbi.1009046

[18]. Alamia A, Vanrullen R. Alpha Oscillations and traveling waves: Signatures of predictive coding? PLos Biology2019;17. Doi: 10.1371/Journal.pbio.3000487

[19]. Vandewalle, G., Van Ackeren, M.J., Daneault, V. Et al. Light modulates oscillatory alpha activity in the occipital cortex of totally visually blind individuals with intact non-image-forming photoreceptor. Sci Resp 8, 16968 (2018)

[20]. L.Essen, J.V.L. Parry (1955). "An atomic standard of frequency and time interval: A caesium resonator". Nature. 176(4476):280-282

[21]. Keith Motokawa. Energy of the brain waves & energetic of the brain, the tohotu Journal of experimental medicine, Vol 51, Nos 1&2, 1949

[22]. Wiremu, H. Blake, W.S, Derek, H.A, Occipital alpha band brain waves when eyesore closed are shaped by ongoing visual processes, Scientific reports, 12, 1194 (2022)

[23]. Jayawardhana, Ray (2015). *The Neutrino Hunters: The chase for the ghost particle and the secrets of the universe* (softcover ed.). Oneworld Publications.

[24]. Nakamura, Kengo; Petcov, Serguey Todorov (2016). "Neutrino mass, mixing, and oscillations" *Chinese Physics C*. **40**: 100001.

[25]. Capozzi, Francesco; Lisi, Eligio; Marrone, Antonio; Montanino, Daniele; Palazzo, Antonio (2016). "Neutrino masses and mixings: Status of known and unknown 3ν parameters". *Nuclear Physics B*. 908: 218–234Armour, J.A., *Anatomy and function of the intrathoracic neurons regulating the mammalian heart*, in *Reflex Control of the Circulation*, I.H. Zucker and J.P. Gilmore, Editors. 1991, CRC Press: Boca Raton. p. 1-37

[26]. Grossman, Yuval; Lipkin, Harry J. (1997). "Flavor oscillations from a spatially localized source — A simple general treatment". *Physical Review D*. **55** (5): 2760.

[27]. Bilenky, Samoil M. (2016). "Neutrino oscillations: From a historical perspective to the present status". *Nuclear Physics B*. 908: 2–13

[28]. Alfred K. (1997). *Shadow of a star: The neutrino story of Supernova 1987A*. W. H. Freeman.

[29]. Fritzsch, Harald (2002). "Fundamental Constants at higher energy". Fortschritte Der Physik 50(5-7): 518-524

[30]. Barrow, John D (2001). "Cosmology, life, and the anthropic principle". Annals of the New York academy of sciences. 950(1):139-153

[31]. Gregory Choppin (2013). *Radiochemistry and Nuclear Chemistry*; Elsevier; 4th Edition. pg; 88 - 99

[32]. Raymond L. Murray, Keith E. Hobbert, (2015). *An introduction to the concepts, systems and applications of nuclear processes*: Nuclear Energy. 4th edition; pg; 31 – 46

[33]. Walter D. Loveland, David J. Morrissey, Glenn T. Seaborg (2017). *Modern Nuclear Chemistry*. WILEY;2nd edition; pg 70-72

[34]. Kenneth S. Krane (1988). *Introductory Nuclear Physics:* WILEY; Oregon State University; pg; 272

[35]. J.Gregory Stacy, W.Thomas Vestrand, Encyclopedia of physical science and Technology, 3rd edition.

[36]. L. Baudis, A.Dietz, G. Heusser, V. Alexeev, A. Balysh, Limits on the Majorana neutrino mass in the 0.1 eV range, Pay.Rev.Lett.83:41-44, 1999

[37]. History of the principle of interference of light, Kipins, Naum S 1991