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What If Earth Is Shrinking Instead of the Universe Is Expanding

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[Abstract]
According to Hubble's Law, the universe is expanding and accelerating. But, where the driving force of the acceleration coming from and why the universe inflating remain mysteries. On the other hand, if earth is shrinking instead of the universe is expanding, then why and how earth is shrinking also remain unknown. Three possible answers to these questions are reviewed. (1) Acceleration Doppler Effect can be used for the explanation and deviation of Cosmological Redshift and Hubble's Law, but the downside is that it cannot explain the intrinsic expansion of the universe. (2) Einstein's General Relativity and Spacetime can also be used to explain the Cosmological Redshift, but the downsides again are that it cannot explain Hubble's Law and the intrinsic expansion of the universe. (3) Wu's Pairs (the building blocks of the universe) and Wu's Spacetime Shrinkage Theory are successfully used for the explanation and deviation of the Cosmological Redshift and Hubble's Law. Among them, Wu's Spacetime Shrinkage Theory makes much better sense than the other two simply because that there is no need of external force (dark energy) in the shrinkage process due to the internal conversion from potential energy to kinetic energy. In fact, the distances between the stars and earth didn't change. The intrinsic expansion of the stars observed on earth is only a hallucination (reverse expansion) which is actually caused by the shrinkage of Wu's Pairs on earth resulting from aging of the universe. This is named "Wu's Spacetime Reverse Expansion Theory". As a result, earth is shrinking instead of the universe is expanding.

[Keywords]
Universe Expansion, Dark Energy, Doppler Effect, Acceleration Doppler Redshift, Hubble's Law, Redshift, Cosmological Redshift, Doppler Redshift, Gravitational Redshift, Wu's Pairs, Yangton and Yington Theory, Wu's Spacetime Shrinkage Theory, Wu's Spacetime Equation, Principle of Parallelism.

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I. Introduction

Hubble's Law [1] is a result of observations, which shows that all the stars at a distance more than 5 billion light years away from earth are moving outward from earth at a speed proportional to their distances from earth. In other words, they are all moving away from earth in an accelerating speed. Although it is a great cosmological discovery, two puzzles kept unsolved: (1) what is the driving force of the acceleration? And (2) why all the stars move away from earth?

Based on the classical Newtonian Mechanics, acceleration is driven by the external force and the external force is generated by the external energy. But the questions are what this external energy is and where it comes from. Because there is absolutely nothing in the empty space, therefore, scientists call this mysterious energy the "Dark Energy" [2]. Even more, scientists believe that space is inflating and all stars are moving away from earth. As to why and how the universe is inflating, nobody really knows. Therefore, it is the purpose of this review to find a logical and sound answer to the above questions.

II. Cosmological Redshift and Intrinsic Expansion of the Universe

A Redshift occurs whenever a light source moves away from an observer (reference point) such as those in the spiral galaxies which is called Doppler Redshift [3]. Another kind of Redshift is the Cosmological Redshift [4], which is due to the expansion of the universe. Sufficiently distant light sources (generally more than a few billion light years away) show consistently the Redshift corresponding to the rate of increase in their distance from earth. It is an intrinsic expansion whereby the scale of space itself changes. Finally, the Gravitational Redshift [5] is a relativistic effect observed in electromagnetic radiation moving out of gravitational fields. In the early part of the twentieth century, Slipher [3], Hubble and others made the first measurements of the Redshifts and Blue Shifts of the galaxies beyond the Milky Way. They initially interpreted these Shifts due solely to the Doppler Effect. Later Hubble discovered a rough but consistent correlation between the increasing Redshifts and the increasing distance of galaxies a few billion light years away.

Theorists immediately realized that these observations could be explained by a different mechanism for producing Redshifts. Hubble's Law [1] of the correlation between Redshifts and distances is required by models of cosmology derived from general relativity that have a metric expansion of space. As a result, photons propagating through the expanding space are stretched, creating the cosmological Redshift. According to measurements, the universe's expansion rate was decelerating until about 5 billion years ago due to the gravitational attraction of the matter content of the universe. After that time, the expansion began accelerating.

III. Dark Energy

By fitting a theoretical model of the composition of the universe to the combined set of cosmological observations, scientists have come up with the composition of about 68% Dark Energy, 27% Dark Matter and 5% normal matter. Dark Matter doesn't emit photons. It is invisible and thus named as Dark Matter. Dark Matter works like glue. Its mass generates sufficient gravity to keep galaxies from drifting apart by spinning. On the other hand, Dark Energy is proposed by scientists to explain the energy needed for the acceleration and expansion of Universe. However, where is the Dark Energy coming from? Does Dark Energy really exist [6]? Or is it simply an imagination? So far, nobody has a clue. Therefore, it is named "Dark Energy".

IV. Hubble's Law

The discovery of the linear relationship between Redshift and distance for stars more than 5 billion years away, coupled with a supposed linear relation between recessional velocity and Redshift yields a straight forward mathematical expression for "Hubble's Law" (Fig. 1) [1]as follows:

$V = H_0D$

Where

- V is the recessional velocity, typically expressed in km/s.
- H_0 is Hubble constant and corresponds to the value of H (often termed the Hubble parameter a value that is time dependent and can be expressed in terms of the scale factor) in the Friedmann equations
- Taken at the time of observation denoted by the subscript "$_0$". This value is the same throughout the universe for a given comoving time.
- D is the proper distance (which can change over time, unlike the comoving distance, which is constant) from the galaxy to the observer (reference point), measured in mega parsecs (Mpc) the 3-space defined by given cosmological time. (Recession velocity is just V = dD/dt).

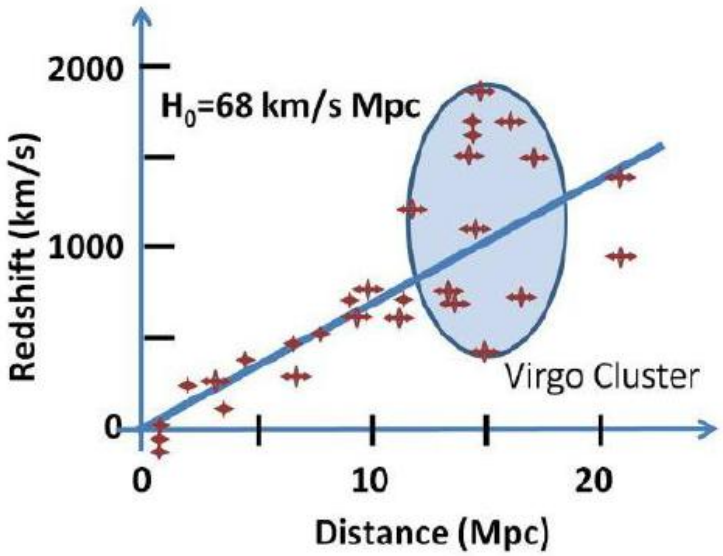

Fig. 1 Hubble's Law – the linear relationship between Redshift and distance.

V. Acceleration Doppler Effect

The Doppler Effect [7]can be proved easily in the Non-Inertia Transformation process with the signal source traveling at a constant speed either toward or away from the observer such as that of sound propagation. However, the photon emission from the light source is an Inertia Transformation process [8], both Redshift and

Blueshift occur only if the wavelength of light changes with the acceleration of the light source such as those found in spiral galaxies. This phenomenon is called "Acceleration Doppler Effect" [9].

Fig. 2 is an Absolute Space System at light origin (reference point). Because the star is far away from earth, both earth and light origin are literally stationary to each other, therefore earth can also be considered as a reference point for the same Absolute Space System. As a result, all the measurement observed on earth is the same as that observed at the light origin in the same Absolute Space System.

The light source (star) can either move toward or away from the observer on earth. Assuming it takes time t for a photon traveling from light origin to earth. V_o is the speed of the light source (star) at the beginning, V_t is the speed of the light source (star) at time t and a is the constant acceleration of the light source (star) in time t. S is the distance of the light source (star) traveling from the light origin in time t. P is the distance of the photon traveling from the light origin to earth at time t, $V_o t$ is the distance of the photon dragged by the light source (star) in time t and D is the distance between the light source (star) and the photon when the photon reaches earth at time t. Also λ_1 is the wavelength, ν_1 is the frequency and C_1 is the light speed of the photon observed on light origin and earth. With the above notations, Zeroshift, Blueshift and Redshift phenomena can be studied based on Acceleration Doppler Effect (Fig. 2).

First, the distance vectors between light origin, light source (star) and photon can be correlated to each others as follows:

OS = **S** = Distance vector from light origin to light source (star) = Movement of light source (star) away from light origin.

SP = **D** = Distance vector from light source (star) to photon = Vision of light observed from light source (star).

OP = **P** = Distance vector from light origin to photon = Vision of light observed from light origin and ground.

$$\mathbf{OP} = \mathbf{OS} + \mathbf{SP}$$
$$\mathbf{P} = \mathbf{S} + \mathbf{D}$$
$$\mathbf{D} = \mathbf{P} - \mathbf{S}$$

Also, according to Equation of Light Speed [8], when photon separate from the light source (star), the speed of photon observed at the light origin **C'** is equal to the vector summation of light speed observed at the light source (star) **C** (Absolute Light Speed $3x10^8$ m/s) and the speed of the light source (star) observed at the light origin $\mathbf{V_0}$. Therefore,

$$\mathbf{C'} = \mathbf{C} + \mathbf{V_0}$$

And

$$\mathbf{OP} = \mathbf{P} = \mathbf{C'}t = \mathbf{C}t + \mathbf{V_0}t = (Ct + V_0t)\mathbf{s} = P\mathbf{s}$$
$$\mathbf{OS} = \mathbf{S} = \mathbf{V_0}t + \tfrac{1}{2}\,\mathbf{a}t^2 = (V_0t + \tfrac{1}{2}\,at^2)\mathbf{s} = S\mathbf{s}$$
$$\mathbf{D} = \mathbf{P} - \mathbf{S} = (P - S)\mathbf{s}$$

Where **C'** is the light speed observed at the light origin, **C** is the Absolute Light Speed observed at the light source (star), $\mathbf{V_0}$ is the initial moving speed of light source (star) observed at the light origin and t is time, **s** is the positive unit vector toward earth.

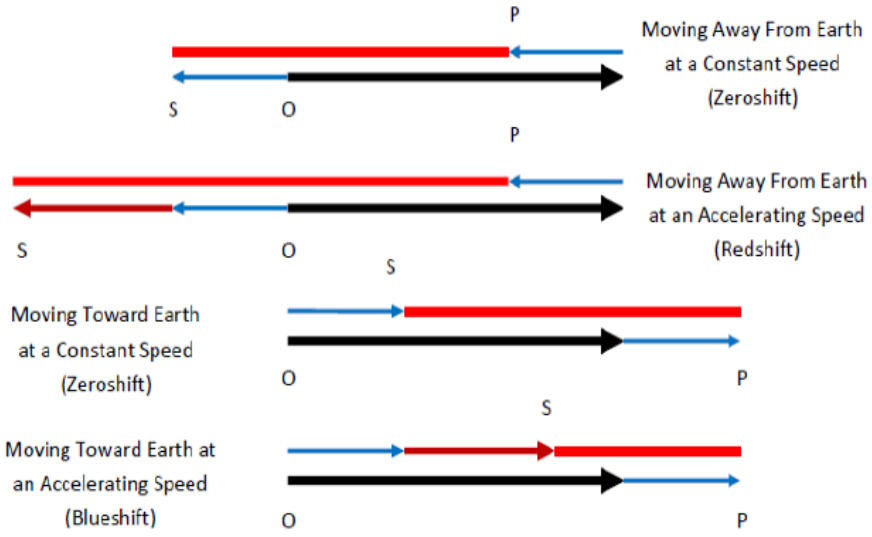

Fig. 2 Zeroshift, Redshift and Blueshift caused by Acceleration Doppler Effect.

A. Zeroshift

When the light source (star) either moves toward or away from the observer (reference point) on earth at a constant speed ($V_o = V_t$ and $a = 0$), Zeroshift can be observed.

1. In case the light source (star) moves away from earth (reference point),

$S = -V_o t$

$P = Ct - V_o t$

$D = P - S = Ct$

Therefore,

$\lambda_1 = D/\nu t = Ct/\nu t = C/\nu = \lambda$

$C_1 = P/t = (Ct - V_o t)/t = C - V_o < C$

$\nu_1 = C_1/\lambda_1 = (C - V_o)/\lambda < \nu$

When the light source (star) moves away from earth (reference point) at a constant speed, the wavelength maintains unchanged, but both frequency and light speed become smaller. Zeroshift can thus be observed. However, because the color of light is dominated by frequency instead of wavelength, therefore this case can also be considered as Redshift.

2. In case the light source (star) moves toward the observer (reference point) on earth,

$S = V_o t$

$P = Ct + V_o t$

$D = P - S = Ct$

Therefore,

$\lambda_1 = D/\nu t = Ct/\nu t = C/\nu = \lambda$

$C_1 = P/t = (Ct + V_o t)/t = C + V_o > C$

$\nu_1 = C_1/\lambda_1 = (C + V_o)/\lambda > \nu$

When the light source (star) moves toward earth (reference point) at a constant speed, the wavelength maintains unchanged, but both frequency and light speed become bigger. Zeroshift can thus be observed. However, because the color of light is dominated by frequency instead of wavelength, therefore this case can also be considered as Blueshift.

B. Blueshift

In case the light source (star) moving toward the observer (reference point) on earth at a constant acceleration speed,

$S = V_o t + \frac{1}{2} at^2$

$P = Ct + V_o t$

$D = P - S = Ct - \frac{1}{2} at^2$

Therefore,

$\lambda_1 = D/\nu t = (Ct - \frac{1}{2} at^2)/\nu t = (C - \frac{1}{2} at)/\nu < \lambda$

$C_1 = P/t = (Ct + V_o t)/t = C + V_o > C$

$\nu_1 = C_1/\lambda_1 = (C + V_o)/((C - \frac{1}{2} at)/\nu) > \nu$

When the light source (star) moves toward earth (reference point) at a constant acceleration speed, the wavelength becomes smaller, both the frequency and light speed become bigger, and thus Blueshift can be observed.

C. Redshift

In case the light source (star) moving away from the observer (reference point) on earth at a constant acceleration speed,

$S = -(V_o t + \frac{1}{2} at^2)$

$P = Ct - V_o t$

$D = P - S = Ct + \frac{1}{2} at^2$

Therefore,

$\lambda_1 = D/\nu t = (Ct + \frac{1}{2} at^2)/\nu t = (C + \frac{1}{2} at)/\nu > \lambda$

$C_1 = P/t = (Ct - V_o t)/t = C - V_o < C$

$\nu_1 = C_1/\lambda_1 = (C - V_o)/((C + \frac{1}{2} at)/\nu) < \nu$

When the light source (star) moves away from earth (reference point) at constant acceleration speed, the wavelength becomes bigger, both the frequency and light speed become smaller, and thus Redshift can be observed.

VI. Hubble's Law and Acceleration Doppler Effect

Although Hubble's Law is an experimental result, it can be proved by Acceleration Doppler Effect [10]. According to the mathematics in the derivation of Redshift in Acceleration Doppler Effect [10], where a star is moving away from earth at a constant acceleration speed a, D is the distance from the star (light source) to earth, P is the distance from light origin to earth, S is the distance from light origin to the star (light source). Then,

$D = P - S = Ct + \frac{1}{2} at^2 = (C + \frac{1}{2} at)\, t$

For stars more than 5 billion years away, the acceleration ½ at becomes much bigger than C (in other words, V is much bigger than C). Therefore,

$D/t = \frac{1}{2} at$

Because

$\lambda_1 = D/\nu t = (Ct + \frac{1}{2} at^2)/\nu t = (C + \frac{1}{2} at)/\nu = \lambda + \frac{1}{2} at/\nu$

$(\lambda_1 - \lambda)/\lambda = (\frac{1}{2} at)/C$

$(\lambda_1 - \lambda)/\lambda \propto at$

Therefore,

$$D/t \propto (\lambda_1 - \lambda)/\lambda$$

Also,

$V = V_0 + at$

$at \gg V_0$

$V = at$

Therefore,

$$V \propto (\lambda_1 - \lambda)/\lambda$$

Where λ_1 is the wavelength of the photon emitted from the star observed on earth and λ is the wavelength of the photon on earth, $(\lambda_1 - \lambda)/\lambda$ is the redshift, V is the velocity of the star moving away from earth and D/t is the proper distance.

Because both V and D/t are proportional to $(\lambda_1 - \lambda)/\lambda$

Therefore,

$$V = kD/t$$

Given

$$H_0 = k/t$$

Then

$$V = H_0 D$$

Where k is a constant and H_0 is Hubble Constant (a time-dependent constant).

For those stars they separated from earth at the same time, both t and $H_0 = k/t$ are constants and V-D curve becomes a straight line. Also, when the universe gets older, t is bigger, H_0 is smaller, and V-D curve becomes flat with a smaller slope [11]. Furthermore, for those stars more than 5 billion light years away, 1/t becomes smaller and eventually converges to a constant, as is H_0. As a result, Redshift is proportional to both D and V, which obeys Hubble's Law.

Based on Acceleration Doppler Effect, Cosmological Redshift and Hubble's Law can be derived [9] with a consequence that the universe is not only expanding but also accelerating. This is named "Universe

Expansion and Acceleration Theory". However, two downsides of this theory are: (1) what is the driving force (Dark Energy) of the acceleration? And (2) how to explain the intrinsic expansion of the universe?

VII. Wu's Pair – The Building Block of the Universe

According to Yangton and Yington Theory, with the external energy generated from Big Bang explosion, a Yangton and Yington circulating pair with an inter-attractive Force of Creation named "Wu's Pair" (Fig. 3)can be formed. These Wu's Pairs are the fundamental building blocks (God's Particles) of all the matters such as photons, quarks, electrons, positrons, neutrons, protons, etc. in the universe [12].

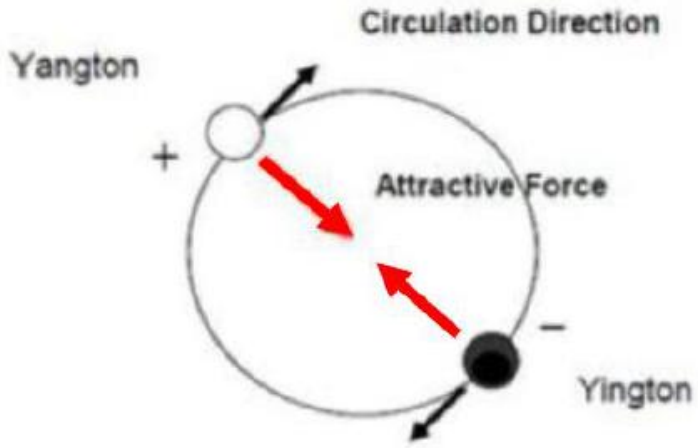

Fig. 3 Wu's Pair - a Yangton and Yington circulating pair.

VIII. Wu's Spacetime Equation

The circulation of Yangton and Yington Antimatter particles in Wu's Pairs is a revolution of Yangton and Yington particles around the normal axis of the circulation orbit. Fig. 4 is a schematic diagram of the circulation.

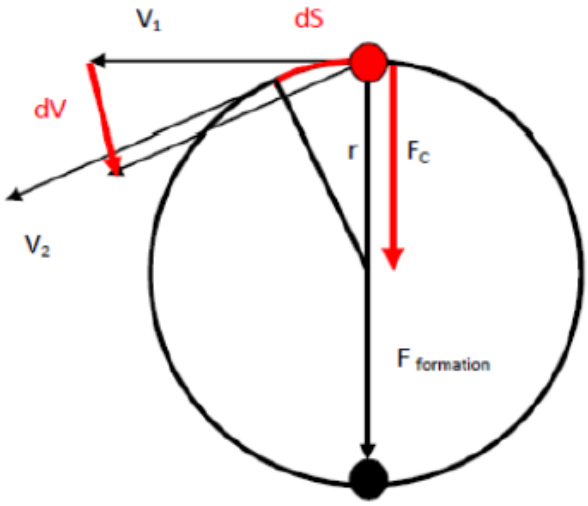

Fig. 4 Schematic diagram of a Wu's Pair.

Because of the circulation, the central acceleration (a_c) can be derived as follows:

$a_c = dV/dt = (VdS/r)/dt = V(dS/dt)/r = V^2/r$

And the center face can be represented as follows:

$F_c = ½\ m_{yy}\ a_c = ½\ m_{yy}\ V^2/r$

Where m_{yy} is the mass of a single Wu's Pair.

Also, because of Coulomb's Law of Electrical Force,

$F_{attraction} = k\ q_{yy}{}^2/(2r)^2$

Where k is Coulomb's Constant and q_{yy} is the charge of either a Yangton particle or a Yington particle (same charges).
And
$F_c = F_{attraction}$
Therefore,
$½\ m_{yy}\ V^2/r = k\ q_{yy}^2/(2r)^2$
$V^2r = ½\ k\ (q_{yy}^2/m_{yy})$
Given

$$K = ½\ k\ (q_{yy}^2/m_{yy})$$

Therefore,

$$V^2r = K$$

Where K is Wu Constant, V is the speed of circulation and r is the radius of the circulation orbit. This equation is named "Equation of Wu's Pair".
Furthermore, the period (t_{yy}) and the size (l_{yy}) of the circulation orbit of Wu's Pairs (Fig. 4) are correlated to each other as follows:
$T = 2\pi r/V$
$V^2r = K$
$T^2 = 4\pi^2r^2/V^2 = 4\pi^2r^3/V^2r = 4\pi^2r^3/K$
$T = 2\pi\ K^{-1/2}\ r^{3/2} = \pi\ (2K)^{-1/2}\ d^{3/2}$
Given
$\gamma = \pi\ (2K)^{-1/2}$
Because
$T = t_{yy}$
$d = l_{yy}$
Therefore,

$$t_{yy} = \gamma l_{yy}^{3/2}$$

Where K is Wu constant, t_{yy} is the circulation period (T) of Wu's Pairs, named "Wu's Unit Time", l_{yy} is the size of the circulation orbit (2r = d) of Wu's Pairs, named "Wu's Unit Length", and γ is Wu's Spacetime constant. This equation is named "Wu's Spacetime Equation" [13]. It is true for all objects and events.

IX. Three Principles of Subatomic Equilibrium

As an object or event moves slowly under subatomic equilibrium conditions at a constant temperature from one location to the other location (each location is at subatomic equilibrium with its local gravitational field and aging of the universe) , or two identical objects or events take place at two different locations (each location is at subatomic equilibrium with its local gravitational field and aging of the universe) at the same temperature, the amounts of each subatomic particle at each different quantum energy states remain unchanged no matter of the location (or the local gravitational field and aging of the universe). These objects or events are called "Corresponding Identical Object or Event".

According to Yangton and Yington Theory, all objects and events in the universe are composed of Wu's Pairs which obeys Wu's Spacetime Equation. In addition, their properties such as space (dimension), time (duration), velocity and acceleration are in subatomic equilibrium with the local gravitational field and aging of the universe, and obey Principle of Equilibrium, Principle of Correspondence and Principle of Parallelism [14] stated as follows:

- Principle of Equilibrium – As an object or event is in subatomic equilibrium at a temperature with the gravitational field and aging of the universe, each of its subatomic particles should have a fixed Wu's Unit Length and every property of the object or event should have a fixed value.
- Principle of Correspondence – Each under subatomic equilibrium at a constant temperature, the amount of unit quantity of the property of a corresponding identical object or event measured by the unit quantity of the same property of a reference corresponding identical subatomic particle at the same location and time (or at the same gravitational field and aging of the universe) remains unchanged no matter the location and time.
- Principle of Parallelism – Each under subatomic equilibrium at a constant temperature, the ratio between the quantities of the same property of two different corresponding identical object or event at the same location and time (or at the same gravitational field and aging of the universe) remains unchanged no matter the location and time.

X. Wu's Spacetime Shrinkage Theory

When the universe becomes older, according to Cosmic Microwave Background Radiation (CMB) [15] and Five Principles of the Universe [16], Wu's Unit Length (the diameter of Wu's Pair) is getting smaller through aging of the universe, and eventually Yangton will recombine with Yington to destroy each other such that everything will go back to Nothing. This phenomenon is named "Aging Affected Wu's Spacetime Shrinkage Theory" [13] which is in compliance with Cosmological Redshift.

On the other hand, because of the heavy graviton bombardment under large gravitational field in graviton radiation and contact reaction process, the speed of Yangton and Yington circulation is getting slower and Wu's Unit Length is getting bigger ($V^2r = K$). This phenomenon is named "Gravity Affected Wu's Spacetime Shrinkage Theory" [13] which is in compliance with Gravitational Redshift.

According to Aging Affected Wu's Spacetime Shrinkage Theory, the diameter of Wu's Pairs l_{yy} (Wu's Unit Length) and the period of the Wu's Pairs t_{yy} (Wu's Unit Time), on present earth are much smaller than that of the stars 5 billion years ago. Consequently, the wavelength of the photon generated from present earth is also much smaller than that of the stars 5 billion years ago. This is named "Earth Spacetime Shrinkage Theory".

Based on the Earth Spacetime Shrinkage Theory and Principle of Correspondence, although l_{yy} and t_{yy} on earth become smaller, as is the normal unit length (meter) and normal unit time (second), the amount of normal unit length and the amount of normal unit time remain unchanged. The speed, frequency and wavelength of the photon generated on earth is always measured the same by the stationary observers (reference points) on earth. But, the universe becomes bigger (reverse expansion) as measured by the shrinking normal unit length on earth. This is named "Wu's Spacetime Reverse Expansion Theory" [17]. In addition, because of Earth Spacetime Shrinkage Theory and Principle of Parallelism, the light coming from a star in the ancient universe, a few billion light years away, has a lower velocity (Absolute Light Speed C) and lower frequency but longer wavelength observed on earth. This phenomenon is called Cosmological Redshift.

XI. Hubble's Law and Wu's Spacetime Shrinkage Theory

Although Hubble's Law can be used to explain the expansion of the universe that is derived successfully from the Acceleration Doppler Effect, it is hard to believe that a star can move faster than light speed with an acceleration derived by a mysterious Dark Energy, also gathering in an intrinsic expansion that all stars are moving away from earth consistently at the same time. To avoid these problems, Wu's Spacetime Reverse Expansion Theory based on Wu's Spacetime Shrinkage Theory is proposed to interpret Hubble's Law.

According to Wu's Spacetime Shrinkage Theory, the shrinkage of the circulation period (t_{yy}) and orbital size (l_{yy}) of Wu's Pairs are caused by the aging of the universe. As a consequence, a photon emitted from a star more than 5 billion years ago has a larger wavelength than that on the present earth, which causes redshift and obeys Hubble's Law.

To derive Hubble's Law from Wu's Spacetime Shrinkage Theory [17], some important facts in the simulation model need to be addressed first:

1. The photons that causing redshift comes from a star emitted 5 billion years ago.
2. The initial stage is defined as that at 5 billion years ago on earth and the final stage is defined as that at present time on earth. The reference point is the present earth.
3. λ_i is the wave length of the photons generated from the same reference light sources on both the star and earth 5 billion years ago. Assuming both light sources have the same gravitational fields, such that the same λ_i can be assured in both light sources.
4. According to Wu's Spacetime shrinkage Theory, Wu's Unit Length (l_{yy}) on earth reduced from l_{yyi} (5 billion years ago) to l_{yyf} (present). Meanwhile the normal unit length used for measurement on earth reduced from L_i (meter of 5 billion years ago) to L_f (meter at present time).
5. The distance X between the star and the earth remains unchanged at all times.
6. The vision of star (the traveling distance of the star observed on earth) is D_E, the distance from M_iL_f to M_fL_f, where M_i and M_f are the amounts of normal unit length measured by L_i and L_f on earth respectively.
7. The velocity of the star observed on earth is LdM/dt.
8. According to Principle of Parallelism, the correlations between the quantities of the properties of different corresponding identical objects or events maintain unchanged no matter of the location (or the gravitational field and aging of the universe). For example, $L \infty l_{yy} \infty \lambda$, in which L is the normal unit length, l_{yy} is the Wu's Unit Length and λ is the wavelength of different corresponding identical objects or events at the same gravitational field and aging of the universe (or the same location and time).
9. According to Absolute Light Speed and Principle of Parallelism, Redshift is dependent on gravitational field and aging of the universe no matter of the light source [98]. Since the gravitational field

doesn't change on earth neither on stars, therefore Cosmological Redshift is only dependent on aging of the universe.

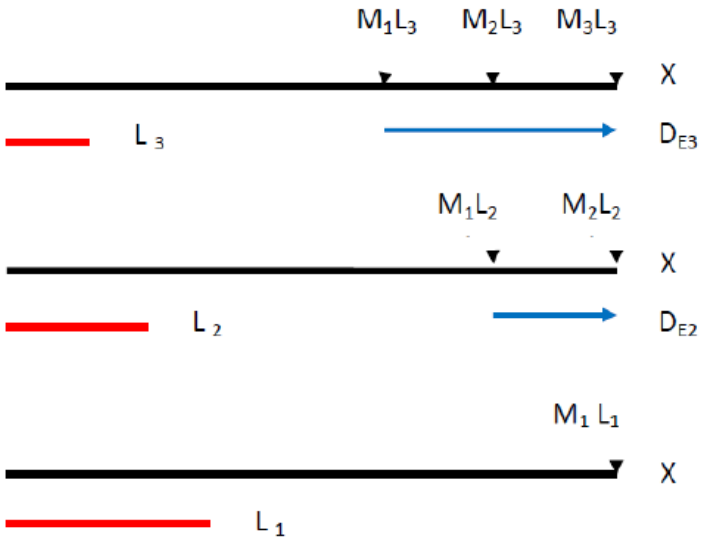

Fig. 5 The distance of a star measured by a shrinking ruler on earth.

Fig. 5 shows a schematic diagram of the visions of star on earth. In the initial stage (when photon is emitted from the star at 5 billion years ago), the distance X between the star and earth is the multiplication of the normal unit length L_i and the amount of normal unit length M_i measured on earth. At the final stage on the present earth (when the photon reaches earth), the distance of the star X becomes the multiplication of the normal unit length L_f and the amount of normal unit length M_f measured on earth. The distance of the star X stays the same, but the vision of the star D_E is changing which reflects the distance of the star moving virtually from initial distance M_iL_f to the final distance M_fL_f. Because M_fL_f is much bigger than M_iL_f, the vision of light at the final stage D_{Ef} is approximately equal to the distance X between the star and earth (Fig. 5).

Because

$D_E = ML - M_iL = X - M_iL$

$d(D_E) = d(X - M_iL)$

$$dD_E = - M_i dL$$

Also,

$X = ML$

$$dM = X\, dL^{-1}$$

Where X and M_i are constants associated to the star.

According to Principle of Parallelism, the correlations between the quantities of the properties of different corresponding identical objects or events at the same gravitational field and aging of the universe of a location and time maintain unchanged.

$$L \infty l_{yy} \infty \lambda$$

Where L is the normal unit length, l_{yy} is the Wu's Unit Length and λ is the wavelength of different corresponding identical objects or events of the same gravitational field and aging of the universe at a location and time.

Therefore,

$$dD_E = - k_1 M_i\, d\lambda$$
$$dM = k_2 X\, d\lambda^{-1}$$

Where k_1 and k_2 are constants.

Apply integration to dD_E,

$D_{Ef} - D_{Ei} = k_1 M_i (\lambda_i - \lambda_f)$

Because

$D_{Ei} = 0$

Therefore,

$$D_{Ef} = k_1 M_i (\lambda_i - \lambda_f)$$

Where D_{Ef} is the vision of the star, λ_f is the wavelength of the photon emitted from the light source at the final stage on the present earth and λ_i is the wavelength of the photon emitted from the same light source on earth (also on star) at the initial stage. M_i is the amount of normal unit length measured for distance X at the initial stage on earth.
D_{Ef} is dependent on M_i which is the amount of normal unit length measured for distance X at the initial stage on earth.
Given
$D = D_{Ef}$
Therefore,

$$D = k_1 M_i (\lambda_i - \lambda_f)$$

Apply integration to dM,
$M_f - M_i = k_2 X (1/\lambda_f - 1/\lambda_i)$
Therefore,

$$M_f - M_i = k_2 X (\lambda_i - \lambda_f)/\lambda_i \lambda_f$$

Where M_f is the amount of normal unit length measured for distance X on earth at the final stage on the present earth, M_i is the amount of normal unit length measured for distance X at the initial stage on earth, X is the distance between the star and earth, λ_f is the wavelength of the photon emitted from the light source at the final stage on the present earth and λ_i is the wavelength of the photon emitted from the light source at the initial stage on earth (also on star).
The visual traveling speed "V" of the star can be represented by:

$$V = (M_f - M_i) L_f/t$$

Where M_f is the amount of normal unit length at the final stage on the present earth, M_i is the amount of normal unit length measured for distance X at the initial stage on earth, L_f is the normal unit length at the final stage on the present earth, t is the visual traveling time of the star from initial stage to the final stage. V is dependent on M_i which is the amount of normal unit length measured for distance X at the initial stage on earth.
Because
$M_f - M_i = k_2 X (\lambda_i - \lambda_f)/\lambda_i \lambda_f$
$D = k_1 M_i (\lambda_i - \lambda_f)$
$X = M_i L_i$
Therefore,
$V = (k_2/k_1) (L_f L_i/\lambda_i \lambda_f) D/t$
Where k_1 and k_2 are constants, L_f is the normal unit length at the final stage on the present earth and λ_f is the wavelength of the photon emitted from the light source at the final stage on the present earth, L_i is the normal unit length at the initial stage on earth and λ_i is the wavelength of the photon emitted from the light source at initial stage on earth, V is the visual traveling speed of the star, D is the vision of the star (visual traveling distance of the star), t is the visual traveling time of the star from the initial stage to the final stage.
According to Principle of Parallelism, L_f/λ_f is equal to L_i/λ_i. Also, because L_f/λ_f is a constant (no matter of the stars and light sources),
Given
$k = (k_2/k_1) (L_f L_i/\lambda_i \lambda_f)$
Therefore,

$$V = kD/t$$

Given

$$H_0 = k/t$$

Therefore,

$$V = H_0 D$$

Where k is a constant, D is the vision of the star (visual traveling distance of the star) which is approximately equal to X the distance between the star and earth, "V" is the visual traveling speed of the star and H_0 is Hubble Constant which is dependent on time.
Instead of Acceleration Doppler Effect, Hubble's Law can also be derived from Wu's Spacetime Shrinkage Theory based on aging of the universe. The advantages of this new approach are that there is no need of external energy (Dark Energy), and also intrinsic expansion can be reflected by reverse expansion. As a result, the universe doesn't really expand, however the universe becomes bigger (reverse expansion) as observed on the shrinking earth. This is named "Wu's Spacetime Reverse Expansion Theory" [17].

XII. Wu's Spacetime Shrinkage Rate

According to Principle of Parallelism, L is the normal unit length of a corresponding identical object or event, l_{yy} is the Wu's Unit Length of a corresponding identical subatomic particle and λ is the wavelength of a corresponding identical photon from the same light source at two different locations (with respective gravitational field and aging of the universe).

$$L \infty l_{yy} \infty \lambda$$

Because

$$dD_E = - M_i dL$$
$$dD \infty -dL$$

Given
$D_E = D$
Therefore,

$$dD = k (-d\, l_{yy})$$
$$dD/dt = k (-d\, l_{yy}/dt)$$
$$V \infty - S$$

Where D is the vision of the star (visual traveling distance of the star), V is the visual traveling speed of star moving away from earth, S is the shrinkage rate of Wu's Unit Length l_{yy} of a reference subatomic particle on earth.

Because the star is visually moving away from earth in an acceleration speed ($dV/dt > 0$), therefore Wu's Unit Length shrinkage rate is also getting more faster ($dS/dt < 0$). However, people can't tell the differences because everything on earth is shrinking proportionally at the same time [17].

In theory, Wu's Spacetime shall shrink to a critical size before Yangton and Yington can recombine and destroy each other. Then, the whole universe will become None – no matter, energy, time and space. Although we know Wu's Spacetime is shrinking with acceleration, but we don't know how far it can go before the end of the universe. One possible answer can be found in Singularity where the critical density can trigger the destruction of everything in the black hole. It is believed that the recombination and Annihilation between Yangton and Yington in Wu's Pairs can also happen for the same reason.

XIII. Einstein's General Relativity and Spacetime versus Universe Expansion

Einstein's General Relativity [18] complying with Wu's Spacetime Shrinkage Theory [19], in which both the dimension and duration of an object or event become bigger in a massive gravitational field. The only difference is that Einstein's General Relativity has missed the similar effects caused by aging of the universe. Einstein's Spacetime like the duration (time) and dimension (space) is a property (such as the potential energy) of an object or event. Under subatomic equilibrium, Einstein's Spacetime reflecting the distribution of Wu's Unit Length of a reference object, as is the wave length of a photon of a reference light source, is a function of the local gravitational field, such that the photon generated from a massive star has a larger wavelength than that on earth which can cause Gravitational Redshit.

Because the wavelength of the photon generated 5 billion years ago from a massive star is much bigger than that on earth, they have different initial stages. Therefore, unlike Cosmological Redshift, Gravitational Redshift cannot be used for the deviation of Hubble's Law. Even more, Gravitational Redshift only occur on some massive stars, it cannot be used to explain the intrinsic expansion that happened to all the stars 5 billion light years away from earth. As a result, Einstein's General Relativity and Spacetime cannot interpret Hubble's Law and intrinsic expansion of the universe.

XIV. Earth Shrinkage versus Universe Expansion

During Wu's Spacetime shrinkage process, the potential energy of Yangton and Yington circulating pairs can be converted to their kinetic energy with no need of external energy. Also, despite the intrinsic expansion reflected by reverse expansion, the distance between the star and earth remains unchanged at all time. There is no such thing as that the star is accelerating by Dark Energy and moving away from earth at a speed faster than light speed. Because of these reasons, it is believed that in explanation of Cosmological Redshift and Hubble's Law, Wu's Spacetime Reverse Expansion Theory based on Wu's Spacetime Shrinkage Theory [17] and aging of the universe is more reasonable than Universe Expansion and Acceleration Theory based on Acceleration Doppler Effect [10]. In fact, the universe is not expanding, but earth is shrinking at all time.

XV. Conclusion

Why and how is the universe expanding and accelerating? Three possible answers are studied and discussed in this paper. (1) Acceleration Doppler Effect can be used for the explanation and deviation of Cosmological Redshift and Hubble's Law, but the downside is that it cannot explain the intrinsic expansion of the universe. (2) Einstein's General Relativity and Spacetime can also be used to explain the Cosmological Redshift, but the downsides again are that it cannot explain Hubble's Law and the intrinsic expansion of the universe. (3) Wu's Pairs (the building blocks of the universe) and Wu's Spacetime Shrinkage Theory are successfully used for the explanation and deviation of the Cosmological Redshift and Hubble's Law. Among them, Wu's Spacetime Shrinkage Theory makes much better sense than the other two simply because that there is no need of external force (dark energy) in the shrinkage process due to the internal conversion from potential energy to kinetic energy. In fact, the distances between the stars and earth didn't change. The intrinsic expansion of the stars observed on earth is only a hallucination (reverse expansion) which is actually caused by the shrinkage of Wu's Pairs on earth resulting from aging of the universe. This is named "Wu's Spacetime Reverse Expansion Theory". As a result, earth is shrinking instead of the universe is expanding.

[References]

[1]. Hubble, E. (1929). "A relation between distance and radial velocity among extra-galactic nebulae". Proceedings of the National Academy of Sciences.15(3): 168 -73. Bibcode:1929PNAS...15..168H. doi:10.1073/pnas.15.3.168. PMC 522427. PMID 16577160.

[2]. Frieman, Joshau A.; Turner, Michael S.; Huterer, Dragan. "Dark Energy and the Accelerating Universe" (PDF). Annu. Rev. Astron. Astrophys. arXiv: 0803.0982 v 1. Retrieved April 1, 2016.

[3]. Slipher, Vesto (1915). "Spectrographic Observations of Nebulae".Popular Astronomy 23:21-24.Bibcode:1915 PA.23.21 S.

[4]. Peebles, P. J. E. and Ratra, Bharat (2003). "The cosmological constant and dark energy". Reviews of Modern Physics 75 (2): 559-606. arXiv: astro-ph/0207347. Bibcode: 2003 RvMP.75.559 P. doi: 10.1103/RevModPhys.75.559.

[5]. Eddington, A. S. (1926). "Einstein Shift and Doppler Shift". Nature. 117 (2933):86. Bibcode:1926Natur.117...86E. doi:10.1038/117086a0. ISSN 1476-4687. S2CID 4092843.

[6]. Edward T. H. Wu. "Interpretation of Dark Matter, Dark Energy and Hubble's Law Based on Wu's Pairs and Yangton and Yington Theory." IOSR Journal of Applied Physics (IOSR-JAP), 12(2), 2020, pp. 54-65.

[7]. Edward T. H. Wu. "Light Speed in Vacuum is not a Constant and Time Doesn't Change with Velocity–Discrepancies Between Relativities and Yangton & Yington Theory". American Journal of Modern Physics. Vol. 4, No. 6, 2015, pp. 367-373. doi: 10.11648/j.ajmp.20150406.12.

[8]. Edward T. H. Wu. "Vision of Object, Vision of Light, Photon Inertia Transformation and Their Effects on Light Speed and Special Relativity." IOSR Journal of Applied Physics (IOSR-JAP), vol. 9, no. 5, 2017, pp. 49–54.

[9]. Edward T. H. Wu, Redshift Caused by Acceleration Doppler Effect and Hubble's Law Based on Wu's Spacetime Accelerating Shrinkage Theory, American Journal of Modern Physics. Vol. 6, No. 1, 2017, pp. 10-15. doi: 10.11648/j.ajmp.20170601.12.

[10]. Edward T. H. Wu "Hubble's Law Interpreted by Acceleration Doppler Effect and Wu's Spacetime Reverse Expansion Theory." IOSR Journal of Applied Physics (IOSR-JAP), vol. 10, no. 1, 2018, pp. 58-62.

[11]. EthanSiegelhttps://www.forbes.com/sites/startswithabang/2018/06/29/ surprise-the-hubble-constant-changes-over-time/#5e6406409c9a.

[12]. Edward T. H. Wu. "Subatomic Particle Structures and Unified Field Theory Based on Yangton and Yington Hypothetical Theory". American Journal of Modern Physics. Vol. 4, No. 4, 2015, pp. 165-171. doi: 10.11648/j.ajmp. 20150404.13.

[13]. Edward T. H. Wu. "Time, Space, Gravity and Spacetime Based on Yangton & Yington Theory, and Spacetime Shrinkage Versus Universe Expansion". American Journal of Modern Physics. Vol. 5, No. 4, 2016, pp. 58-64. doi: 10.11648/j.ajmp.20160504.13.

[14]. Edward T. H. Wu. "Principle of Equilibrium, Principle of Correspondence and Principle of Parallelism as the Foundations of Wu's Spacetime Theories." IOSR Journal of Applied Physics (IOSR-JAP), 12(4), 2020, pp. 50-57.

[15]. Penzias, A. A.; Wilson, R. W. (1965). "A Measurement of Excess Antenna Temperature at 4080 Mc/s". The Astrophysical Journal. 142 (1): 419–421. Bibcode: 1965ApJ… 142..419P. doi:10.1086/148307.

[16]. Edward T. H. Wu" Five Principles of the Universe and the Correlations of Wu's Pairs and Force of Creation to String Theory and Unified Field Theory." IOSR Journal of Applied Physics (IOSR-JAP), vol. 10, no. 4, 2018, pp. 17-21.

[17]. Edward T. H. Wu. "Hubble's Law Based on Wu's Spacetime Shrinkage Theory and Principle of Parallelism." IOSR Journal of Applied Physics (IOSR-JAP), 12(6), 2020, pp. 18-22.

[18]. Einstein, Albert (1920). "On the Idea of Time in Physics". Relativity: The Special and General Theory. Henri Holt. ISBN 1-58734-092-5. And also in sections 9–12.

[19]. Edward T. H. Wu. "Einstein's Spacetime and Einstein's Field Equations Versus Wu's Spacetime and Wu's Spacetime Field Equations." IOSR Journal of Applied Physics (IOSR-JAP), vol. 11, no. 2, 2019, pp. 13-18.

Edward T. H. Wu. "What If Earth Is Shrinking Instead of the Universe Is Expanding." *IOSR Journal of Applied Physics (IOSR-JAP)*, 13(6), 2021, pp. 70-81.