Momentum and Negative Energy of Radiation as an Explanation for Dark Energy According to Inverse Relativity

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ABSTRACT: When taking into consideration the particle nature of the light emitted from the surfaces of stars instead of the wave nature in the relativistic Doppler effect, we find that the distribution of the momentum of the photons on the surface of the star in the direction of motion is not symmetrical with the opposite direction, but decreases by the amount of negative space momentum according to the inverse relativity model, Which makes us have a difference in the radiation impulse forces (action forces) and radiation pressure (reaction forces) on the surfaces of stars, this difference or the resultant force leads to pushing the star or galaxy with increasing acceleration, The characteristics of the negative radiation of stars and galaxies are consistent with the properties of dark energy, as it has momentum and produces impulse forces and radiation pressure on the surfaces of stars or galaxies, It works on the motion of galaxies according to the Hubble-Lematter law, It represents a source of energy lost in the redshift,

Keywords: Relativistic Doppler effect - Inverse Relativity - radiation of stars - Negative radiation - dark energy - space-time expansion - negative space-time - momentum of photon- redshift of light - Michael Girgis paradoxes

1 INTRODUCTION

The explanation of general relativity for the phenomenon of dark energy [1] through the cosmological constant is the explanation available to us so far, despite the inconsistency of the calculations between the cosmological constant and the vacuum energy [2] and the violation of general relativity to the law of conservation of energy in the redshift of light as a result of the expansion of the fabric of space-time [3], On the other hand, we find that special relativity violates the law of energy conservation with the relativistic Doppler effect [4], As time dilation also loses an amount of energy in another redshift of wavelengths, considering the light as a continuous electromagnetic wave, that is, according to the wave nature of the light, This means that the special theory of relativity ignored the particle nature of the light emitted from stars and galaxies, but we find in the new inverse relativity model shown in the second, third and fourth paper [5] [7] [6] depends mainly on the particle nature of light, and therefore we can take into account the relativistic particle nature or relativistic momentum of light emitted by stars and galaxies, Does the momentum of photons affect the motion of stars or galaxies and gives them motion according to the conditions described in the paradox of cosmic space expansion shown in the ninth paper [8] or in other words according to the Hubble-Lemaître law?, Do we get the same phenomenon of red and blue shift of wavelengths and light loss of energy Although light here are particles, And we get uniformity of the redshift in the special and general case?, Does the inverse relativity model outperform special and general relativity in not violating the law of conservation of energy for light?, Can we get another explanation for dark energy?.

2 METHODS

2-1 Stars and Galaxies within Reference Frames System

We assume that we have two reference frames S and S' from orthogonal coordinate systems [11], We also assume that we have an observer at the origin O of the reference frame S and a star at the origin O' of the reference frame S', and that the frame S' is moving at a uniform velocity V_S relative to the S frame in the positive direction of the x-axis, as shown in the following figure

$S \rightarrow \; x \;\; y \;\; z \;\; t \qquad S` \rightarrow \; x` \, y` \, z` \, t`$

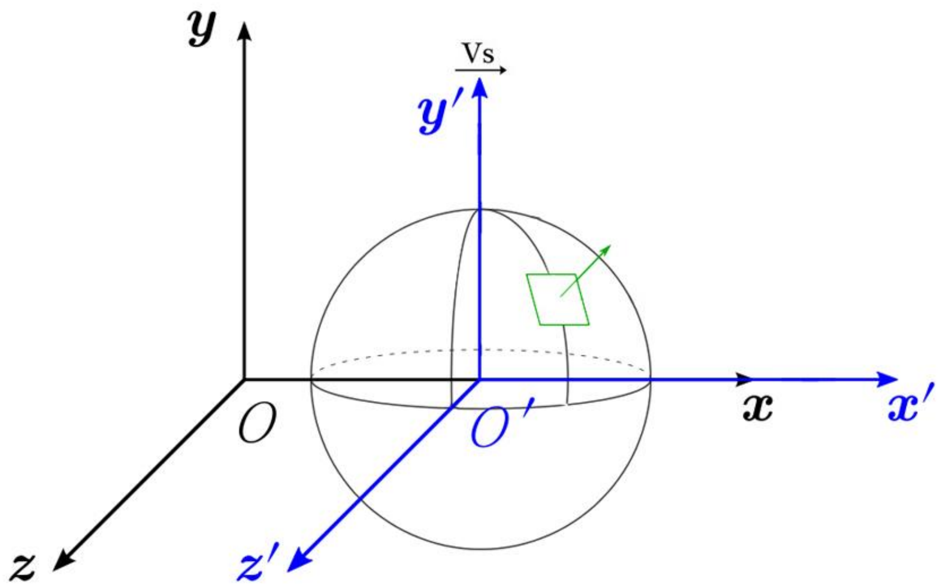

Figure 1: 11

2-2 Distribution of the Momentum and Forces of Photons on the Surface of the Star in the Reference Frame S'

The surface of the star emits a huge number of photons, and those photons have momentum according to quantum mechanics [11], and therefore the continuous emission of photons on the surface of the star leads to the generation of photon impulse or radiation impulse forces, by studying the distribution of the momentum of photons on the surface of the star, we can also obtain a distribution of the photon impulse forces or the electromagnetic radiation impulse on the star surface, where we describe the momentum of a photon emanating from a point on the surface of the star relative to the reference frame S' in the first observation conditions, i.e. on the vector $\overrightarrow{\alpha`}_0$ According to the inverse relativity model shown in third paper with the following equation

$$\overrightarrow{p`}_{\alpha_0} = m`_{\alpha_0}\overrightarrow{V`}_{\alpha_0} \qquad \overrightarrow{V`}_{\alpha_0} = c \tag{1.11}$$

Where $\overrightarrow{p`}_{\alpha_0}$ the photon momentum at a point on the surface of the star, $m`_{\alpha_0}$the mass equivalent of the photon energy, $\overrightarrow{V`}_{\alpha_0}$ the velocity of the photon in vacuum which is equal to the speed of light c , because the speed of light is a constant, so the change in photon momentum at a point on the surface of the star depends on the change in the photon mass as a result of the number of photons emitted at that point, in other words the change in the radiation mass at that point

$$d\overrightarrow{p`}_{\alpha_0} = dm`_{\alpha_0}c \tag{2.11}$$

As a result of a change in the photon momentum at this point, the forces of photon impulse or radiation impulse are created according to Newton's second law [12].

$$A\overrightarrow{F`}_{\alpha_0} = \frac{d\overrightarrow{p`}_{\alpha_0}}{dt_{\alpha_0}} = \frac{1}{dt_{\alpha_0}}\left(dm`_{\alpha_0}c\right) \tag{3.11}$$

$$A\overrightarrow{F`}_{\alpha_0} = \dot{m}`_{\alpha_0}c \tag{4.11}$$

Where $\dot{m}`_{\alpha_0}$ the radiation mass flux from a point on the surface of the star, $A\overrightarrow{F`}_{\alpha_0}$ the radiation impulse at a point, because all points on the surface of the star are identical in releasing the same radiation mass $dm`_{\alpha_0}$ and also the radiation mass flux $\dot{m}`_{\alpha_0}$ for every second, i.e. there is no preference for one direction over another, just as the speed of light in vacuum is constant in all directions of vacuum relative to the reference frame S' according to the second postulate of special relativity [3], Therefore, the sum of the components of the momentum of the photons or the forces of radiation impulse on the surface of the star in the opposite directions of space is equal (see Figure 11:2) and equal to half the sum on each axis, so that the resultant on each axis is equal to zero

$$\frac{1}{2}\sum \overrightarrow{p`}_{x_{\alpha_0}} = -\frac{1}{2}\sum \overrightarrow{p`}_{x_{\alpha_0}} \qquad \frac{1}{2}\sum \overrightarrow{AF`}_{x_{\alpha_0}} = -\frac{1}{2}\sum \overrightarrow{AF`}_{x_{\alpha_0}} \tag{5.11}$$

$$\frac{1}{2}\sum \overrightarrow{p`}_{y_{\alpha_0}} = -\frac{1}{2}\sum \overrightarrow{p`}_{y_{\alpha_0}} \qquad \frac{1}{2}\sum \overrightarrow{AF`}_{y_{\alpha_0}} = -\frac{1}{2}\sum \overrightarrow{AF`}_{y_{\alpha_0}} \tag{6.11}$$

$$\frac{1}{2}\sum \overrightarrow{p`}_{z_{\alpha_0}} = -\frac{1}{2}\sum \overrightarrow{p`}_{z_{\alpha_0}} \qquad \frac{1}{2}\sum \overrightarrow{AF`}_{z_{\alpha_0}} = -\frac{1}{2}\sum \overrightarrow{AF`}_{z_{\alpha_0}} \tag{7.11}$$

According to Newton's third law [12], the radiation impulse forces represent action forces that result in reaction forces on the particles of the surface of the star, or in other words, radiation pressure forces on the surface of the star inward, and because the reaction forces are equal to the action forces, and therefore the reaction forces distribution on the particles of the surface of the star in opposite directions is also equal and annihilate each other, and this means that the star is here in a state of equilibrium or stability relative to the frame of reference S' under the influence of the radiation pressure forces inside caused by the radiation impulse forces, which is an obvious result because the frame of reference S' here represents the frame of the star, see Figure 2:11

$$\overrightarrow{AF`}_{\alpha_0} = -\overrightarrow{RF`}_{\alpha_0} \tag{8.11}$$

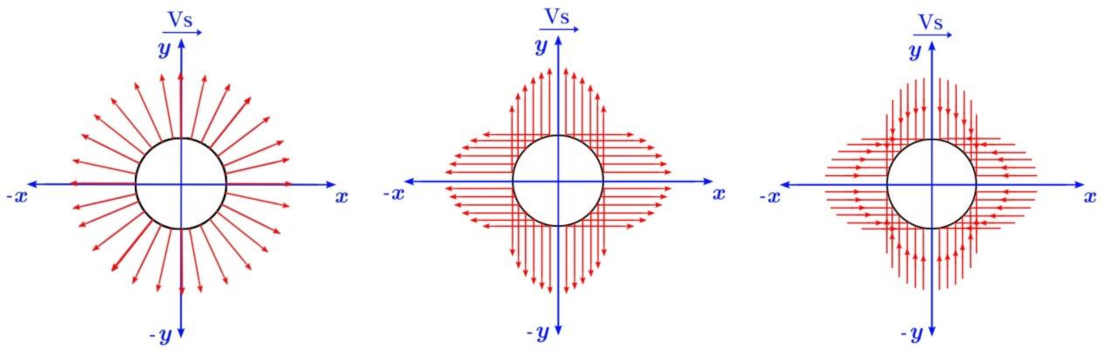

Figure 2:11

2-3 Distribution of the Momentum and Forces of Photons on the Surface of the Star in the Reference Frame S

As for the distribution of momentum components, radiation impulse forces, and radiation pressure on the surface of the star relative to the reference frame S in the first observation conditions, i.e. on the vector $\overrightarrow{\alpha}$, the situation here is a little different, as according to the inverse relativity model, the vector $\overrightarrow{\alpha}$ is a resultant vector resulting from vectors $\overrightarrow{\varphi}$, $\overrightarrow{\beta}$

$$\overrightarrow{\alpha`} = \overrightarrow{\beta`} + \overrightarrow{\varphi`} \quad (9.11)$$

Therefore, we must first obtain the distribution of momentum components, impulse forces, and radiation pressure on the surface of the star for each of the vectors $\overrightarrow{\varphi`}, \overrightarrow{\beta`}$ We can obtain the distribution of the momentum and forces components of the vector $\overrightarrow{\beta`}$ the positive space vector from the modified Lorentz transformations of positive space and the momentum transformations also according to the inverse relativity model [5] [6], Where we find the modified Lorentz transformations characterized by spatial symmetry, and the momentum in positive space is a preserved quantity, thus we get here the same distribution of momentum and radiation impulse forces on the surface of the star, see Figure 3:11

$$\overrightarrow{p_\beta} = \overrightarrow{p`}_{\alpha_0} \qquad d\,\overrightarrow{p_\beta} = d\overrightarrow{p`}_{\alpha_0} \quad (10.11)$$

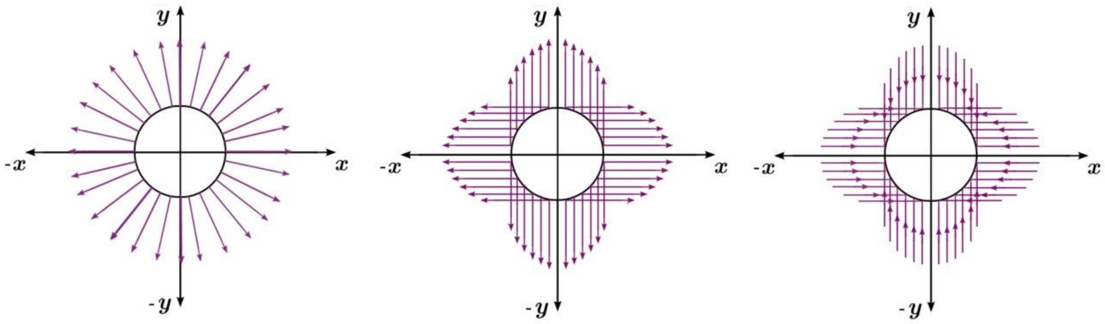

Figure 3:11

$$\frac{1}{2}\sum \vec{p}_{x_\beta} = -\frac{1}{2}\sum \vec{p}_{x_\beta} \qquad \frac{1}{2}\sum A\vec{F}_{x_\beta} = -\frac{1}{2}\sum A\vec{F}_{x_\beta} \quad (11.11)$$

$$\frac{1}{2}\sum \vec{p}_{y_\beta} = -\frac{1}{2}\sum \vec{p}_{y_\beta} \qquad \frac{1}{2}\sum A\vec{F}_{y_\beta} = -\frac{1}{2}\sum A\vec{F}_{y_\beta} \quad (12.11)$$

$$\frac{1}{2}\sum \vec{p}_{z_\beta} = -\frac{1}{2}\sum \vec{p}_{z_\beta} \qquad \frac{1}{2}\sum A\vec{F}_{z_\beta} = -\frac{1}{2}\sum A\vec{F}_{z_\beta} \quad (13.11)$$

Because of the relativistic momentum [4] and the relativistic impulse forces of radiation in the positive space of the causal space, therefore, the radiation impulse forces are represented here as action forces that also result in reaction forces or positive radiation pressure forces on the surface of the star. We find here that the star remains in equilibrium under the effect of the distribution of momentum components and the positive radiation impulse forces or the positive radiation pressure forces on the surface of the star in opposite directions.

As for the distribution of the momentum components, impulse forces and radiation pressure of the vector $\overrightarrow{\varphi}$ the negative space vector, it is according to the transformations of the coordinates of space and time and the momentum transformations of the vector $\overrightarrow{\varphi}$ which are also shown in the second and third papers [5] [6], Where we find that the photon momentum on the vector $\overrightarrow{\varphi}$ It represents the momentum of the radiation parallel to the motion of the star or the negative space momentum, and therefore it appears on the x-axis only

$$\vec{p}_{x_\varphi} = m_\alpha \vec{V}_{x_\varphi} \qquad \vec{V}_{x_\varphi} = \vec{V}_S \tag{14.11}$$

$$\vec{p}_{y_\varphi} = 0 \tag{15.11}$$

$$\vec{p}_{z_\varphi} = 0 \tag{16.11}$$

And because the radiation mass here changes at the constant speed of the star (the reference frame), therefore we have a change in the radiation momentum on this vector as well, and as a result of the change in momentum, here we also have the sum of the radiation forces, equal to

$$\tfrac{1}{2}\sum \vec{p}_{x_\varphi} = \tfrac{1}{2}\sum m_\alpha \vec{V}_{x_\varphi} \qquad \tfrac{1}{2}\sum A\vec{F}_{x_\varphi} = \tfrac{1}{2}\sum \frac{dm_\alpha}{dt_\varphi}\vec{V}_{x_\varphi} \tag{17.11}$$

$$\tfrac{1}{2}\sum \vec{p}_{y_\varphi} = 0 \qquad \tfrac{1}{2}\sum A\vec{F}_{y_\varphi} = 0 \tag{18.11}$$

$$\tfrac{1}{2}\sum \vec{p}_{z_\varphi} = 0 \qquad \tfrac{1}{2}\sum A\vec{F}_{z_\varphi} = 0 \tag{19.11}$$

And because the relativistic momentum and the relativistic radiation impulse are in negative space or the non-causal space, therefore we find here the negative radiation impulse forces that are causally separated from the surface of the star, i.e. they do not represent action forces and result in reaction forces, Therefore, we do not have here the radiation pressure forces on the surface of the star

By collecting the similar radiation momentum components of the two vectors $\overrightarrow{\varphi}, \overrightarrow{\beta}$ on each of the three axes, we get the distribution of the radiation momentum components of the vector $\overrightarrow{\alpha}$ on those axes, When collecting similar compounds on the y and z axes, we find that the distribution of the radiation momentum of the vector $\overrightarrow{\alpha}$ is equal to the distribution of the radiation momentum of the vector $\overrightarrow{\beta}$, because the values of the momentum components of the vector $\overrightarrow{\varphi}$ on these axes are equal to zero, as shown in equations 16.11. 15.11, Therefore, the sum of the components of the impulse forces and radiation pressure on the surface of the star in the opposite directions of the y and z axes is equal, fading away from each other.

$$\frac{1}{2}\sum \vec{p}_{y_\alpha} = \frac{1}{2}\sum \vec{p}_{y_\beta} + 0 \qquad \frac{1}{2}\sum \vec{p}_{y_\alpha} = -\frac{1}{2}\sum \vec{p}_{y_\alpha} \tag{20.11}$$

$$\frac{1}{2}\sum \vec{p}_{z_\alpha} = \frac{1}{2}\sum \vec{p}_{z_\beta} + 0 \qquad \frac{1}{2}\sum \vec{p}_{z_\alpha} = -\frac{1}{2}\sum \vec{p}_{z_\alpha} \tag{21.11}$$

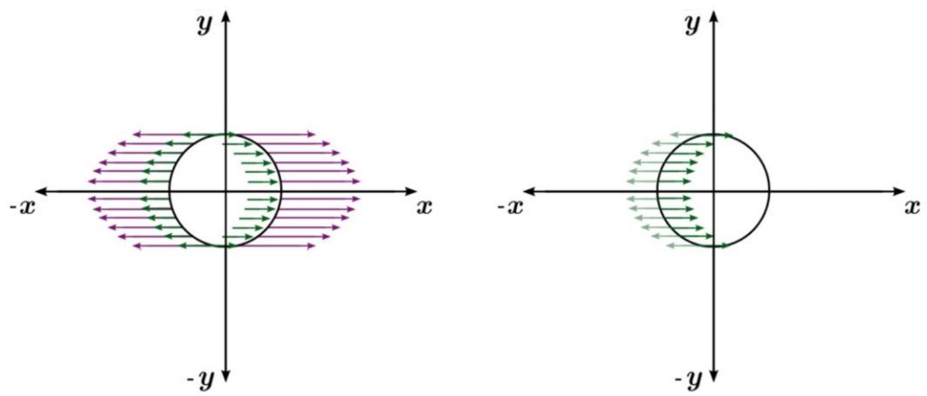

Figure 4:11

But on the x-axis, we cannot say that the momentum components and the radiation impulse forces resulting from the vector $\overrightarrow{\alpha}$ on the surface of the star in the positive and negative directions are equal or similar, as in the previous cases, because the star is moving on this axis in the positive direction at a speed V_S and this motion is affected the distribution of the momentum components of photons in both directions

Where we find the speed of the star in the positive direction reduces the speed of photons moving away from the surface of the star in this direction, Therefore, the amount of total momentum in the positive direction $\frac{1}{2}\sum \vec{p}_{x_a}$ decreases by the amount of the star's velocity, i.e. decreases by the amount of the parallel relativistic momentum $\frac{1}{2}\sum \vec{p}_{x_\varphi}$, So the momentum of the photons moving away from the surface of the star in the direction of the star's motion here is the relativistic momentum $\frac{1}{2}\sum \overrightarrow{p}_{x_\beta}$ Look at Figure 4:11, This means that the magnitude $\frac{1}{2}\sum \vec{p}_{x_\varphi}$ appears here as negative space momentum and the magnitude $\frac{1}{2}\sum \overrightarrow{p}_{x_\beta}$ appears as positive space momentum according to the model visualization Inverse relativity

$$\frac{1}{2}\sum \vec{p}_{x_a} = \frac{1}{2}\sum \vec{p}_{x_\beta} \qquad (22.11)$$

But in the negative direction of the x-axis, we find that the speed of the star increases the speed of the photons moving away from its surface in this direction, where we find that the amount of momentum with which the photons move away from the surface of the star in the opposite direction of motion $-\frac{1}{2}\sum \vec{p}_{x_a}$ greater than the previous value by the amount of the speed of the star, that is, it increases by $-\frac{1}{2}\sum \vec{p}_{x_\varphi}$, see also Figure 4:11

$$-\frac{1}{2}\sum \vec{p}_{x_a} = -\frac{1}{2}\sum \vec{p}_{x_\beta} - \frac{1}{2}\sum \vec{p}_{x_\varphi} \qquad (23.11)$$

As a result of the asymmetric distribution of the relativistic momentum components of the radiation in the positive and negative directions on the x-axis, the total sum of the momentum components on the x-axis is not equal to zero.

$$\sum \vec{p}_{x_a} = \frac{1}{2}\sum \vec{p}_{x_a} + \left(-\frac{1}{2}\sum \vec{p}_{x_a}\right) \qquad (24.11)$$

Substitute from 22.11, 23.11 into 24.11

$$\sum \vec{p}_{x_a} = -\frac{1}{2}\sum \vec{p}_{x_\varphi} \qquad (25.11)$$

Because the amount $\frac{1}{2}\sum \vec{p}_{x_\beta}$ in the positive and negative directions is equal, therefore the net momentum is equal to $-\frac{1}{2}\sum \vec{p}_{x_\varphi}$ and the net momentum results in net impulse forces in the negative direction of the x-axis and net radiation pressure forces in the opposite direction on the surface of the star, i.e. in the positive direction of the x-axis

$$\sum A\vec{F}_{x_\alpha} = -\frac{1}{2}\sum A\vec{F}_{x_\varphi} \qquad (26.11)$$

$$\sum R\vec{F}_{x_\alpha} = -\frac{1}{2}\sum A\vec{F}_{x_\varphi} \qquad (27.11)$$

$$\sum R\vec{F}_{x_\alpha} = -\frac{1}{2}\sum \frac{dm_\alpha}{dt_\varphi}\vec{V}_{x_\varphi} \qquad (28.11)$$

The resultant radiation pressure forces in the positive direction of the x-axis accelerates the total relativistic mass of the star M_α (the mass with respect to the reference frame S) by $\vec{a}_S$ (the acceleration of the reference frame S') in the same direction, which is the direction of the star's motion

$$\sum R\vec{F}_{x_\alpha} = M_a\,\vec{a}_S \tag{29.11}$$

$$\vec{a}_S = -\,\frac{\vec{V}_{x_\varphi}}{2M_a}\sum\frac{dm_\alpha}{dt_\varphi} \tag{30.11}$$

Because the sum of the relativistic mass of radiation from all points of the surface of the star $\sum dm_\alpha$ represents the change in the relativistic total mass [4] of the star dM_a, also $\vec{V}_{x_\varphi} = V_S$, so we can write the equation in the following form

$$\vec{a}_S = -\,\frac{V_S}{2M_a}\frac{dM_a}{dt_\varphi} \tag{31.11}$$

Equation 31.11 is called the star acceleration equation, and it shows that the star's acceleration depends on both the star's mass and the change in the star's mass as a result of the radiation mass flux, Therefore, when the star dies or stops radiating, the star stops accelerating as well. We can generalize this equation to galaxies, where every star in the galaxy is a radiation propulsion engine. As a result of the huge number of stars, the galaxy cannot stop accelerating.

$$\frac{dV_S}{dt_\varphi} = -\,\frac{V_S}{2M_a}\frac{dM_a}{dt_\varphi} \tag{32.11}$$

$$\int_{V_i}^{V_f} dV_S = -\,\frac{V_S}{2}\int_{M_i}^{M_f}\frac{dM_a}{M_a} \tag{33.11}$$

$$\Delta V_S = -\,\frac{V_S}{2}\,\ln\left(\frac{M_i}{M_f}\right)_a \tag{34.11}$$

We conclude from equation 31.11 that the acceleration is very small because the rate of loss or loss in the mass of galaxy due to radiation is much less than the mass of the galaxy, The same thing is in equation 34.11, where the change in the velocity of galaxy (the reference frame) is inversely proportional to the final mass of the galaxy, and because the decrease in the final mass is very slight per second, and therefore the change in velocity is infinitely small, We also find in 31.11 that the acceleration of the galaxy increases the speed of the galaxy, and the speed of the galaxy increases the rate of acceleration of the galaxy again, and so on continuously., which causes the galaxy to move in higher orders of the derivative of distance with respect to time and this type of motion achieves the Hubble-Lemaître law formula [4] according to the paradox Expansion of cosmic space described in the ninth paper [8]

2-4 Blueshift of Wavelengths

Just as the distribution of momentum components, impulse forces and radiation pressure differs in the direction of the star's motion from the opposite direction of motion relative to the reference frame S in the first observation conditions, The energy distribution of the photons in the front half of the star is also different from the back half, From Figure 5:11, we conclude that the relativistic total energy of any photon on the vector $\overrightarrow{\alpha}^{+}$ leaving the surface of the star in the front half is the sum of the energy on both vectors $\overrightarrow{\beta}$ and $\overrightarrow{\varphi}$

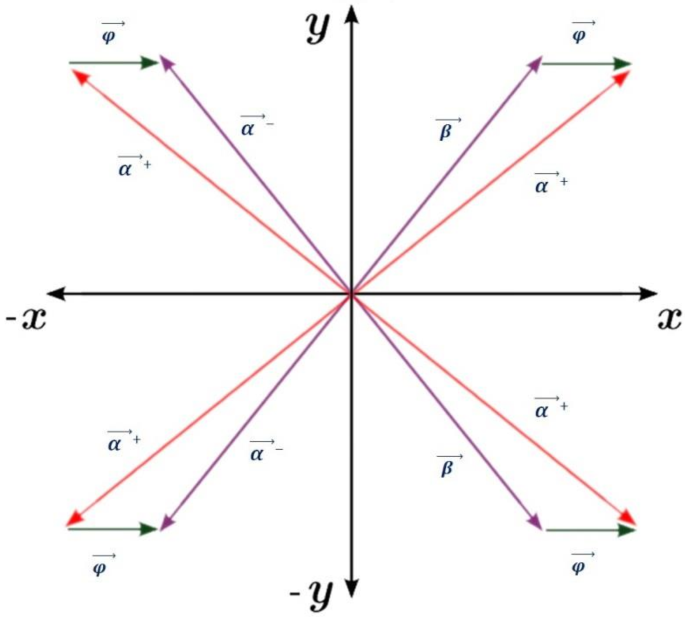

Figure 5:11

$$E_{\alpha}^{+} = E_{\beta} + E_{\varphi} \tag{35.11}$$

Substitute for each value of $\boldsymbol{E_{\beta}}$, $\boldsymbol{E_{\varphi}}$ according to the inverse relativity model. Third paper Equations **11.3, 15,3**

$$E_{\alpha}^{+} = \grave{E}_{\alpha_0}\, \gamma^{-1} + \left[\grave{E}_{\alpha_0} \left(\gamma - \frac{1}{\gamma} \right) \right] \tag{36.11}$$

$$E_{\alpha}^{+} = \grave{E}_{\alpha_0}\, \gamma^{-1} + \grave{E}_{\alpha_0} \gamma - \grave{E}_{\alpha_0}\, \gamma^{-1} \tag{37.11}$$

$$E_{\alpha}^{+} = \grave{E}_{\alpha_0}\, \gamma \tag{38.11}$$

Substitute also the energy of the photon [11] into each side of the equation

$$h\,\nu_{\alpha}^{+} = h\,\nu`_{\alpha_0}\;\gamma \tag{39.11}$$

$$\nu_{\alpha}^{+} = \nu`_{\alpha_0}\;\gamma \tag{40.11}$$

Substituting in the value of the Lorentz factor

$$\gamma = \frac{1}{\sqrt{1-\frac{V_S^2}{c^2}}} \tag{5.2}$$

$$\nu_{\alpha}^{+} = \frac{\nu`_{\alpha_0}}{\sqrt{1-\frac{V_S^2}{c^2}}} \tag{41.11}$$

Equation 41.11 shows us that the frequency of the photon in the front half of the star in the first observation conditions increases with the increase in the radial velocity of the star (the velocity of the reference frame), due to the relativistic work done on the mass of the photon according to the inverse relativity model, And because the frequency is inversely proportional to the wavelength at the constant speed of light, where the speed of light is constant in both reference frames above for the second postulate in special relativity

$$\lambda_{\alpha}^{+} = \lambda`_{\alpha_0}\;\sqrt{1-\frac{V_S^2}{c^2}} \tag{42.11}$$

Consequently, the wavelength in the front half of the star decreases with the increase in the radial velocity of the star, that is, there is a shift of the wavelength towards the blue wavelength of the photons that are emitted in all possible directions of the front half of the star.

2-5 Redshift of Wavelengths

In the back half, the energy of the photons varies, as it loses part of its energy in pushing the star. From Figure 5:11, we conclude that the relativistic total energy of any photon on the vector $\overrightarrow{\alpha}^{-}$ leaving the surface of the star in the back half is equal to the energy on the vector $\overrightarrow{\alpha}^{+}$ minus the energy on the vector $\overrightarrow{\varphi}$ which is used to push the star

$$E_{\alpha}^{-} = E_{\alpha}^{+} - E_{\varphi} \tag{43.11}$$

Substituting in the value of E_α^+ , and E_φ shown in equations 15.3, 11. 38

$$E_\alpha^- = E_\beta + E_\varphi - E_\varphi \tag{44.11}$$

$$E_\alpha^- = E_\beta \tag{45.11}$$

Substitute from 11.3, 23.11 into 45.11

$$E_\alpha^- = E_{\alpha_0}^{`} \gamma^{-1} \tag{46.11}$$

Substitute the energy of the photon into each side of the equation

$$h\,\nu_\alpha^- = h\,\nu`_{\alpha_0}\ \gamma^{-1} \tag{47.11}$$

$$\nu_\alpha^- = \nu`_{\alpha_0}\ \gamma^{-1} \tag{48.11}$$

Substitute in the value for the Lorentz factor

$$\nu_\alpha^- = \nu_{\alpha_0}^{`} \sqrt{1 - \frac{V_S^2}{c^2}} \tag{49.11}$$

Equation 49.11 shows us that the frequency of the photon in the back half of the star in the first observation conditions decreases with the increase in the radial velocity of the star (the velocity of the reference frame), due to the relativistic work that the photon exerts on the mass of the star, and because the frequency is inversely proportional to the wavelength, as we mentioned earlier

$$\lambda_\alpha^- = \frac{\lambda`_{\alpha_0}}{\sqrt{1 - \frac{V_S^2}{c^2}}} \tag{50.11}$$

Thus, we find that the wavelength of the photon in the back half of the star in the first observation conditions increases with the increase in the radial velocity of the star, i.e. a redshift occurs for the wavelength of the photons that are emitted in all possible directions in the back half of the star. From equations 50.11, 49.11, 42.11, 41.11, we find that the particle nature of light according to the inverse relativity model also leads to the same phenomenon of red and blue shifts of the frequencies and wavelengths of light, as the equations agree with the transverse relativistic Doppler effect [4], but it differs from the longitudinal relativistic Doppler effect

2-6 Negative Space Radiation Fluxes from Stars and Galaxies As an Explanation for Dark Energy

We can calculate the rate of work done by photons on the mass of a star or galaxy at each moment, where, according to classical mechanics, the rate of mechanical work exerted on a particle is equal to the effective force, which is here the radiation pressure force multiplied by the instantaneous velocity of the particle, which here represents the velocity of the reference frame V_s

$$\frac{dW_s}{dt_\varphi} = \sum R\vec{F}_{x_\alpha} \, V_s \tag{51.11}$$

Substitute from 28.11, 14.11 into 51.11

$$\frac{dW_s}{dt_\varphi} = -\tfrac{1}{2} \sum \frac{dm_\alpha}{dt_\varphi} \, V_\varphi^2 \tag{52.11}$$

By substituting the value of the velocity on the vector $\vec{\varphi}$ in terms of the velocity on the two vectors $\vec{\alpha}, \vec{\beta}$, Where, when the two vectors $\vec{\varphi}, \vec{\beta}$ are perpendicular in Figure 1-2 shown in the second paper, we apply the Pythagorean theorem to the three vectors

$$\frac{dW_s}{dt_\varphi} = -\tfrac{1}{2} \sum \frac{dm_\alpha}{dt_\varphi} \left(V_\alpha^2 - V_\beta^2\right) \tag{53.11}$$

From the inverse relativity theory, the second paper, we obtain the value of the speed on the two vectors $\vec{\alpha}, \vec{\beta}$ by of the speed of light, and from the third paper, we obtain the value of the relativistic total mass of the photon by the relativistic total energy

$$\frac{dW_s}{dt_\varphi} = -\tfrac{1}{2} \sum \frac{dE_\alpha}{dt_\varphi \, c^2} \, \left(c^2 - c^2 \, \gamma^{-2}\right) \tag{54.11}$$

$$\frac{dW_s}{dt_\varphi} = -\tfrac{1}{2} \sum \frac{1}{dt_\varphi} (dE_\alpha - dE_\alpha \, \gamma^{-2}) \tag{55.11}$$

And from the third paper also we get the value $dE_\alpha \, \gamma^{-2}$

$$\frac{dW_s}{dt_\varphi} = -\tfrac{1}{2} \sum \frac{1}{dt_\varphi} \left(dE_\alpha - dE_\beta\right) \tag{56.11}$$

$$\frac{dW_s}{dt_\varphi} = -\tfrac{1}{2} \sum \frac{dE_\varphi}{dt_\varphi} \tag{57.11}$$

So the rate of work done by photons on a star or galaxy is equal to the flux rate of the total relativistic energy of photons on the vector $\overrightarrow{\varphi}$, which is the total negative energy of photons or radiation energy in negative space according to the inverse relativity model, and by substituting the value of E_{φ} we get the equation of radiation flux and work rate

$$\frac{dW_s}{dt_{\varphi}} = -\frac{1}{2}\sum \frac{d\grave{E}_{\alpha_0}}{dt_{\varphi}}\left(\gamma - \frac{1}{\gamma}\right) \tag{58.11}$$

Here we can deduce the negative radiation properties or negative space radiation of stars and galaxies through the star acceleration equations, and the equation of radiation flux and work rate

Because negative radiation is the radiation of negative space or space devoid of causality, Thus it is a dark radiation, which cannot be observed because it moves parallel to the motion of the star, and at the moment of its emission it is consumed by the accelerating speed of the star or the galaxy that is moving away from us, and thus it is lost from the radiation coming to the observer in a phenomenon redshift

The rate of the negative energy flow of radiation decreases with time as a result of the decrease in the masses of stars and galaxies, due to the existence of a relation between the mass of the star or galaxy and radiation, where the rate of radiation flow is proportional to the fourth power of the mass of the star or galaxy according to the average relation between mass and radiation shown in the tenth paper [14] [13]

The rate of negative energy flow of radiation varies from one galaxy to another as a result of the previous relation between mass and radiation, where galaxies with large masses that have a greater gravitational force also have a larger radiation energy flow, and thus greater radiation pressure forces, see equation 34.11, where the change in velocity increases with increasing the initial mass also

Negative radiation causes galaxies to accelerate at a very small rate, as we mentioned above, and this results in an extremely small expansion rate in the metric of space, according to the model shown in the cosmic space expansion paradox. Negative radiation also acts on the motion of galaxies according to Hubble-Leumetre’s law, as we mentioned above, although the rate of flow of negative radiation energy decreases with time

From the previous properties of negative radiation, we find that it coincides with the properties of dark energy in the universe, where the forces of negative radiation are directly proportional to the force of gravity, The forces of negative radiation work on the motion of galaxies according to Hubble-Lemaître's law, The forces of negative radiation also work on the very slow acceleration of galaxies. Rather, the properties of negative radiation also reveal to us the many properties of dark energy where we find it

Dark energy does not exist in the space between stars and galaxies or in the atomic void according to the concept of the cosmological constant in general relativity. Rather, it exists only inside stars, as it represents the negative energy of radiation emitted from stars. It does not work on the expansion of the fabric of space-time, but rather it works on the motion of galaxies within the fabric of space-time in a way that leads to an apparent expansion of the fabric of space-time.

The rate of dark energy flow is decreasing over time, and when the universe reaches the age of black holes, dark energy disappears from the universe, and the universe stops expanding

The type of force that dark energy represents is the electromagnetic force, as it represents negative electromagnetic pressure on the surfaces of the stars of galaxy, and thus it belongs to one of the fundamental force in the universe and does not represent a new type of force.

Dark energy does not appear In the initial stages of the universe, as it is born in the stage of the birth of stars and the formation of galaxies, but in In the initial stages of the universe, the cosmic expansion depends on the energy of the Big Bang only, and therefore we have different rates of expansion of the cosmic space through the stages of the universe [15]

3 RESULTS

As a result of applying the inverse relativity model, which depends on the particle nature of light, to the light emitted by stars, instead of the special relativity model, which depends on the wave nature of light in the relativistic Doppler effect, We find that the motion of the star reduces the distribution of the momentum components of the photons on the surface of the star in the direction of motion from the opposite direction of motion by the amount of negative space momentum. And we have a difference in the forces of radiation impulse (the forces of action) and the forces of radiation pressure (the forces of reaction) on the surface of the stars. This difference or the sum of the forces leads to pushing the star or the galaxy at an extremely small rate of acceleration, but it is constantly changing with time, which makes the galaxy move at the higher order derived distance with respect to time, The properties of negative radiation agree with the properties of dark energy, where the forces of negative radiation are directly proportional to the force of gravity. The forces of negative radiation work on the motion of galaxies according to the Hubble-Leumetre law or to an apparent expansion of the space-time fabric at a very small expansion rate in the space-time metric, the negative radiation also reveals more properties, where the forces of dark energy are negative electromagnetic pressure on the surfaces of the stars of the galaxies. The type of dark energy is the negative energy of the radiation emanating from the stars. Despite the particle nature of light in inverse relativity, we also get a blue and red shift for wavelengths that is exactly the same as the transverse Doppler shift in special relativity, but without violating the law of conservation of energy, where the lost energy of light represents a source of dark energy, and Thus, inverse relativity combined the redshift in the special and general cases into one shift.

4 DISUSSIONS

Inverse relativity is used in calculating the acceleration of the reference frame (for the star or galaxy) energy and momentum transformations of the radiation in the special case that is characterized by the constant velocity of the reference frame [10], which represents a clear contradiction, but the acceleration here is very small as we mentioned previously, where a noticeable change in the speed of the reference frame of the star or galaxy requires a very long period of time, but in small time periods we can neglect this acceleration

We find here the red and blue shift of wavelengths in inverse relativity, which corresponds perfectly with the transversal relativistic Doppler effect in special relativity. This means that inverse relativity did not reach anything new, but on the other hand, we find inverse relativity is superior to special relativity in not violating the law of conservation of energy in the redshift and in uniting the redshift resulting from the dilation of time and the expansion of the fabric of space-time in only one type. It also outperformed general relativity in revealing the nature and properties of dark energy.

As for the longitudinal relativistic Doppler effect [4], we find that inverse relativity does not agree with special relativity. This is due to the fact that inverse relativity deals with light as photons of or a package of electromagnetic waves separated from each other, Therefore, the expansion of the distance between the crests of the waves is not necessarily an expansion in the wavelength, but rather an expansion in the distances between those photons.

The equations for the acceleration of the star or galaxy depend on the existence of an initial velocity, so if the velocity of the galaxy is zero, the acceleration is also zero, and this means that the negative radiation cannot accelerate the galaxy from rest. This also represents a contradiction in the acceleration equations, but we can say that the initial velocity of the galaxy is due to the forces of the Big Bang

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