The negative Mass and Positive Luminosity As an Explanation for Dark Matter According to Inverse Relativity

Michael Girgis

PO box 11000, Gamal Abu Al-Rish str. Tallah, Menia, Egypt

E-mail: michael.grgs@yahoo.com

Mar 26, 2023

ABSTRACT: The luminosity of stars and galaxies is relativistic luminosity because it is affected by the motion and gravity of stars and galaxies. It is called positive relativistic luminosity because it is related to the positive relativistic mass assumed by the inverse relativity model. The difference between the positive relativistic mass in positive space-time and the total relativistic mass that bends the fabric of space-time, according to the inverse relativity model is the negative relativistic mass or mass in negative space-time, the properties and distribution of negative relativistic mass in the universe are consistent with the properties and distribution of dark matter, as it does not emit radiation, does not interact with light, does not consist of a specific elementary particle, does not interact with electric and magnetic fields, and interacts only with gravity, as it appears only on the cosmic level in Stars, galaxies and galaxy clusters

Keywords: Relativistic Thermodynamics - Inverse Relativity - luminosity of stars and galaxies - Negative mass - Dark matter - Relativistic luminosity - Negative space-time - Michael Gerges paradoxes

1 INTRODUCTION

The hypothesis of dark matter [1] appeared to explain the missing mass or the discrepancy between the mass of galaxies and galaxy clusters calculated through gravity and calculated through the luminosity, as a result of the research carried out by Fritz Zwicky in 1937 [2] and then Vera Rubin, Kent Ford and Ken Freeman in the 1960s and 1970s [3] [4], In other words, this hypothesis appeared as a result of different observations of the masses of galaxies and clusters of galaxies, But the observation process of the mass through the luminosity or through the relation between mass and luminosity ignored relativistic thermodynamics, perhaps because there is no single model agreed upon by physicists for relativistic thermodynamics[5], But after establishing the theory of inverse relativity described in the second, third and fourth papers [7] [6] [8], and establishing only one model of relativistic thermodynamics shown in the seventh and eighth papers according to inverse relativity [10] [9], We can now include relativistic effects in astronomical observations of temperature and luminosity of stars, galaxies and clusters of galaxies. Will this lead to the same relation between luminosity and mass, or to a new relation? Can the new relativistic thermodynamics model explain the reason for the variation in the masses of galaxies and clusters through different observations? Is the concept of negative mass assumed by the inverse relativity model compatible in terms of properties and distribution with the hypothesis of dark matter in the universe?.

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], each reference frame has an observer at the origin point O and O', 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, and we also assume that the frame of reference S' contains a star with its center passing through the x'-axis, at a distance of d' relative to the observer O', so that the effect of the star's gravity here is negligible for both observers, as shown in the following figure

$S \rightarrow \ x \ y \ z \ t$

$S` \rightarrow \ x` y` z` t`$

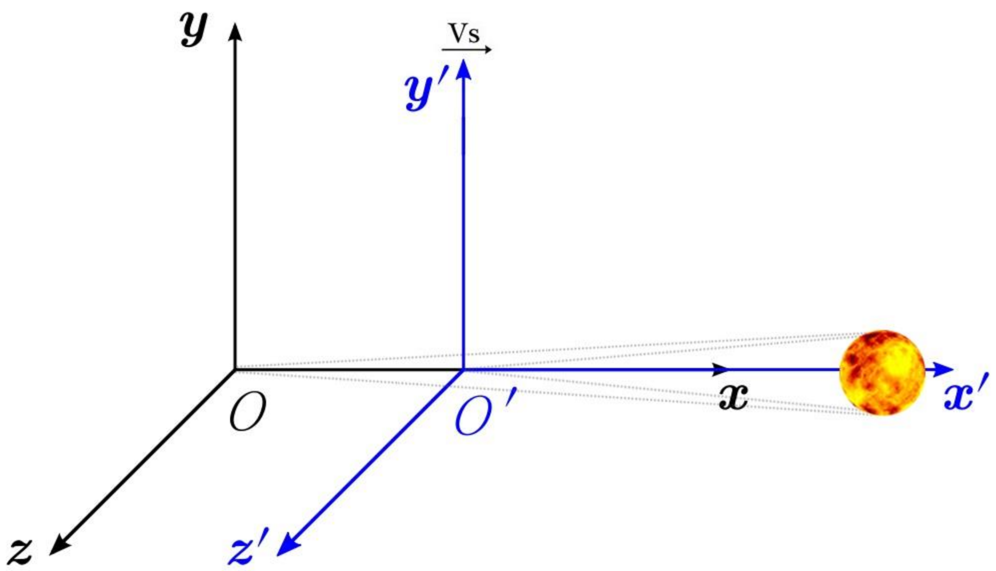

Figure 1: 10

2-2 The transformation of the Luminosity of Stars and Galaxies in Special and General Cases

Because the star is a distance of d', so the observer O' first observes the apparent brightness and the apparent surface area of the star, then calculates both the actual surface area of the star and the actual (absolute) luminosity of the star [12], and through the law of Stephan - Boltzmann [13] we get the relation between The star's absolute temperature and absolute luminosity with respect to the reference frame S', according to the first observation conditions

$$L`_{\boldsymbol{\alpha_0}} = \sigma \ A`_{\alpha_0} \, T`^4_{\alpha_0} \tag{1.10}$$

where σ is a constant, $A`_{\alpha_0}$ the actual surface area of the star, $T`_{\alpha_0}$ the absolute temperature of the star, $L`_{\alpha_0}$ the luminosity, and using the same mathematical formula, the observer O obtains the relation between the luminosity of the star and the temperature in the reference frame S, but in the second observation conditions or in the positive space according to the principle of inverse relativity explained in the second paper [6]

$$L_\beta \ = \ \sigma \ A_\beta \, T^4_\beta \tag{2.10}$$

Where A_β is the relativistic surface area of the star, T_β is the relativistic temperature of the star, and L_β is the relativistic luminosity of the star, because the radiation coming from the star is the result of the temperature in the second observation conditions. In other words, the radiation coming from the star results from the kinetic energy of the gas particles on the vector $\overrightarrow{\beta}$ the causal space vector or the collision between the gas particles. Therefore, we can consider the relativistic luminosity that the observer O observes directly as a positive luminosity without the need to analyze the intensity of the radiation coming from the star. To the vectors $\overrightarrow{\varphi}$, $\overrightarrow{\beta}$ in order to obtain the luminosity in the observer's second conditions or to the vector $\overrightarrow{\beta}$

Thus, we can say that the relativistic luminosity in the second observation conditions assumed by inverse relativity is the same as the relativistic luminosity in the first observation conditions, i.e. here it represents a real observation and not an imaginary observation as a result of a mathematical analysis, from equations 1.10, 2.10 We find that the star's luminosity transformation from one frame of reference to another In the second observation conditions, it depends on the transformation of both the temperature and the surface area of the star in the same observation conditions, where the temperature conversion was previously obtained in the seventh paper [9] Equation No. 13.7

$$T_{\beta} = T`_{\alpha_0} \ \gamma^{-1} \tag{13.7}$$

Where γ is the Lorentz coefficient

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

Make both sides of equation 13.7 raised to the power of 4

$$T_{\beta}^4 = T`^4_{\alpha_0} \gamma^{-4} \tag{3.10}$$

As for the conversion of the surface area of the star in the second observation conditions, it depends on the inverse modified Lorentz transformations from the second paper [6], and because it is characterized by spatial symmetry, and therefore the conversion of the surface area of the star is as follows

$$A_{\beta} = A`_{\alpha_0} \tag{4.10}$$

Substitute from 3.10, 4.10 into 2.10

$$L_{\beta} = L`_{\boldsymbol{\alpha_0}} \ \gamma^{-4} \tag{5.10}$$

Equation 5.10 shows that the observer O observes the relativistic luminosity of the star or the positive relativistic luminosity decreases with the increase in the velocity of the reference frame Vs, As a result of the temperature decrease resulting from the reduction of the time dilation of the kinetic energy of the gas particles on the vector $\overrightarrow{\beta}$ or from positive space in general according to inverse relativity

When the velocity Vs reaches the speed of light theoretically, and by substituting for that in the previous equation, we find that the positive relativistic luminosity reaches zero

$$L_{\beta} = 0 \qquad\qquad V_S = c \tag{6.10}$$

Here we can write the previous equations in terms of time dilation directly from the inverse theory of relativity. The second paper, we obtain the time transformation equation in the second observation conditions.

$$T_\beta = T`_{\alpha_0} \ \ \gamma^{-1} \tag{13.7}$$

$$\frac{t_\beta}{t`_{\alpha_0}} = \gamma = \frac{t_\alpha}{\tau`_{\alpha_0}} \tag{7.10}$$

Where we find here the time transformation equation in the second observation conditions similar to the proper Time transformation equation [13] in special relativity, with the assumption here that the proper time is equal to one second

$$t_\alpha = \gamma \qquad\qquad \tau`_{\alpha_0} = 1 \tag{8.10}$$

We find here the value of the Lorentz coefficient, which represents the amount of expansion per unit time t_α, by substituting from 8.10 in the previous equations 13.7 5.10

$$T_\beta = T`_{\alpha_0} \ \ {t_\alpha}^{-1} \tag{9.10}$$

$$L_\beta = L`_{\boldsymbol{\alpha_0}} \ {t_\alpha}^{-4} \tag{10.10}$$

Here we get a decrease in the relativistic temperature of the star and a decrease in the relativistic luminosity of the star in terms of time dilation directly, as time dilation in the special case affects the relativistic temperature and relativistic luminosity of the star, gravitational time dilation in the general case also affects both the relativistic temperature and relativistic luminosity. And because the luminosity of the star is related to the temperature on the surface of the star only, therefore, not all values of time dilation affect, but the values located on the surface of the star only, and they are similar values on the surface of the star. Therefore, we can use the same formula as the previous equations, where t_α represents in this case the amount of total expansion per unit time resulting from the special case and the general case on the surface of the star

$$t_\alpha = \frac{1}{\sqrt{1 - \frac{V_S^2}{c^2}}} + \frac{1}{\sqrt{1 - \frac{2MG}{rc^2}}} \tag{11.10}$$

Where M is the relativistic total mass of the star that bends the fabric of real or total space-time, G is the gravitational constant, r is the radius of the star, V_S is the velocity of the star

2-3 The theoretical Relation Between Mass and Luminosity

The stars follow a relation between the mass of M, and the luminosity L, as a result of a theoretical study that depends on the star's permeability to radiation, and also a practical study based on astronomical observations, according to the following formula [14] [15]

$$L \propto M^{n} \tag{12.10}$$

Where the value of n varies according to the mass of the star and takes the following values $1 < n < 6$, so that the average value $\bar{n}$ is in the range of 3.5, but as a result of the effect of both motion and gravity on the luminosity of the star in reverse, the actual luminosity of the stars that are subject to the average value is greater a little, Therefore, the accepted average value between the actual mass and the actual luminosity is not correct. To obtain the correct average relation between the actual mass and the actual (absolute) luminosity, we write the relation between them that the observer O' observes with respect to the reference frame S' in the following form

$$M^{\bar{n}`}_{\boldsymbol{\alpha_0}} = L`_{\boldsymbol{\alpha_0}} \tag{13.10}$$

Where $M`_{\alpha_0}$ the actual mass of the star, $L`_{\alpha_0}$ the absolute luminosity of the star, $\bar{n}$ the average value is not predetermined, using the same mathematical formula the observer O obtains the relation between the star's luminosity and the mass in the reference frame S But in the second observation conditions, that is, between the positive relativistic luminosity and the positive relativistic mass according to the principle of inverse relativity

$$M^{\bar{n}}_{\beta} = L_{\beta} \tag{14.10}$$

Take the fourth root of both sides of the equation

$$\sqrt[4]{L_{\beta}} = \sqrt[4]{L`_{\boldsymbol{\alpha_0}}\ \gamma^{-4}} \tag{15.10}$$

$$\sqrt[4]{L_{\beta}} = \sqrt[4]{L`_{\boldsymbol{\alpha_0}}}\ \gamma^{-1} \tag{16.10}$$

Substitute from 13.10, 14.10 into 16.10

$$\sqrt[4]{M^{\bar{n}}_{\beta}} = \sqrt[4]{M^{\bar{n}`}_{\boldsymbol{\alpha_0}}}\ \gamma^{-1} \tag{17.10}$$

But from the inverse theory of relativity, the third paper's equation 18.4, we obtain the mass transformation in the second observation conditions

$$M_{\beta} = \grave{M}_{\alpha_0} \ \gamma^{-1} \tag{18.4}$$

For Equation 17.10 to correspond with Equation 18.4, the average value must be equal to $\bar{n} = 4$, This means that introducing the effect of motion and gravity on the luminosity of the star leads to shifting the average value of $\bar{n}$ by 0.5, by substituting in equations 13.10 and 14.10 we obtain the theoretically correct average relation between the actual mass and the actual (absolute) luminosity and also between the positive relativistic mass and the positive relativistic luminosity, thus we can generalize This relation on galaxies and galaxy clusters

$$M_{\alpha_0}^4 = L\grave{}_{\boldsymbol{\alpha_0}} \qquad\qquad M_{\beta}^4 = L_{\beta} \tag{18.10}$$

2-4 The negative Mass of Stars and Galaxies As an Explanation for Dark Matter

If the relativistic luminosity of stars and galaxies is a positive relativistic luminosity and is related to the positive relativistic mass [7] [8] in the positive space-time, Therefore, it does not express the total relativistic mass [13] [11] that bends the fabric of the total (real) space-time or, in other words, the mass that is observed through gravity. As a result, the observer O gets a difference in the mass of the star or galaxy when observing through luminosity and observing through gravity, which is the difference between the positive relativistic mass and the total relativistic mass of the star or galaxy, according to the inverse relativity model. The fourth paper, the difference is the negative relativistic mass [8], Write in the special case in the following form

$$M_{\varphi} = \grave{M}_{\alpha_0} \left(\gamma - \frac{1}{\gamma}\right) \tag{21.4}$$

We can also write it in terms of total time dilation or the general form

$$M_{\varphi} = \grave{M}_{\alpha_0} \left(t_{\alpha} - \frac{1}{t_{\alpha}}\right) \tag{19.10}$$

Substitute from 18.4 into 19.10

$$M_{\varphi} = M_{\beta} \left(t_{\alpha}^2 - 1\right) \tag{20.10}$$

The last equation shows the negative relativistic mass in terms of the positive relativistic mass observed through the luminosity and the total time dilation. It increases with the increase of the positive relativistic mass or with the increase of the total relativistic mass or the velocity of galaxies, And because negative relativistic mass is a mass in negative space-time, i.e. space-time devoid of causality according to inverse relativity, where there are no collisions between particles, we previously explained this in the second paper, and therefore we can here deduce the properties of the negative mass of stars and galaxies, as it is characterized by properties accordingly

The negative mass is a dark mass, that is, it does not emit radiation, as there is no concept of temperature, pressure, gas, or heat transfer in the negative space-time. We previously explained this also in the seventh paper, and therefore there is no luminosity for the negative mass, and this means that it cannot be observed through luminosity.

The negative mass also does not interact with the light falling on it, such as absorbing some frequencies - reflection or refraction of light, because light particles or photons in negative space-time do not collide with the negative mass of star matter or any other matter, and therefore cannot be observed through interaction with light.

Negative mass also does not interact with particles with an electric charge, for the same reason that there are no collisions of charged particles with negative mass in negative space-time, and therefore it cannot be observed through interaction with electric and magnetic fields, and because all elementary particles have negative mass, therefore It does not consist of a specific or special elementary particle

But the negative mass interacts with gravity, because it is part of the total relativistic mass of a star or galaxy that bends the fabric of real space-time, which appears as the strongest gravity, and therefore it greatly increases the attraction of the star because it represents a large part of the total relativistic mass, so it can be observed through Gravity only

We cannot consider the negative mass as just the amount of mass missing between the different observations of the observer O, as we have already explained in the eighth paper [10] that negative space-time has entropy, and this entropy is the result of a modified version of the microscopic and macroscopic information of any thermodynamic system, so we can deal here with The negative mass of the star as a matter, but a matter of information and not a real matter, because it is devoid of the concept of causation and also all kinds of basic forces in nature except for the forces of gravity

Through the negative mass equations, we can obtain the distribution of this mass in the universe, where the negative mass appears in stars, galaxies and galaxy clusters, because it is the cosmic bodies that are observed through different methods of observation such as luminosity and gravity As for its amount, it depends on the amount of total time dilation or time dilation In the special case and the general case, So the areas with the highest value of negative mass in the universe are as follows

Black holes, neutron stars, and white dwarfs have high densities

Distant galaxies where the velocity are high

The edges of galaxies are where the curvature of space-time is greatest

Galaxy cluster, where the mass is greater

Through the properties of the negative mass of stars and galaxies and the distribution of negative mass in the universe, we find that it is in great agreement with the properties and distribution of dark matter in the universe, and therefore it represents the most logical explanation for the hypothesis of dark matter or to explain the missing mass

3 RESULTS

As a result of the application of relativistic thermodynamics according to the inverse relativity model, the luminosity of stars and galaxies is a positive relativistic luminosity, that is affected by the motion and gravity of the star or galaxy, and the positive relativistic luminosity represents an observation of the positive relativistic mass of the star or galaxy in the positive space-time, when taking into account that the average relation between luminosity and mass The luminosity is proportional to the mass raised to the 4th power, Thus, the relativistic luminosity does not represent an observation of the total relativistic mass that bends the fabric of the total space-time or that is observed through gravity. Because it is the mass in negative space-time or space-time without causality, i.e. non-causal, therefore this mass is characterized by the following characteristics: it does not emit radiation, it does not interact with light, it does not consist of a specific elementary particle, it does not interact with electric and magnetic fields, but it interacts with gravity only as part of the total relativistic mass that bends the fabric of space-time, As a result of possessing negative entropy space-time, the negative mass is a matter of information. The negative mass of stars, galaxies and clusters of galaxies appears, that is, on the cosmic level only as a result of the different observations (luminosity - gravity) of those cosmic bodies.

4 DISUSSIONS

The relation between mass and luminosity imposed by the inverse relativity model $n = 4$ does not correspond to all types of stars because the value of n varies from one star to another depending on the permeability of the star and take the values $1 < n < 6$, But on the other hand, the relation between luminosity and mass that corresponds to the conversion of mass according to the inverse relativity model represents the average relation between luminosity and mass for all possible relationships in stars, and therefore it can be taken as a measure of the relation between mass and luminosity for galaxies and clusters of galaxies, which is the measure at which dark matter appears in a large way

We also find here that the average relation between luminosity and mass assumed by the inverse relativity model is assumed theoretically and not experimentally, But we can achieve it experimentally, as this requires re-observing the mass of the star through gravity, then introducing the effect of the total time dilation of the star on the observed relativistic luminosity to obtain the actual luminosity of the star, and through the actual mass and actual luminosity of the star, we get the value of n for the star with repeating the matter for a varied number From the stars, we obtain an experimental average value of n and compare it with the theoretical value imposed by inverse relativity. In the case of obtaining agreement between the experimental and theoretical value, this is experimental evidence in favor of the inverse relativity model, as well as relativistic thermodynamics according to the new model.

Related Links:

The inverse theory of relativity

Michael Girgis (2022)." The Energy-Time Paradox Limits of Special Relativity in Practice " viXra:2202.0150

Michael Girgis (2022)." Modified Lorentz Transforms and Minkowski Space Splits in Inverse Relativity " viXra:2206.0017

Michael Girgis (2022)." Positive and Negative Energy in Inverse Relativity " viXra:2207.0137

Michael Girgis (2022)." Relativistic Variables: Length, Time, Simultaneity, Mass, Energy and Momentum in Inverse Relativity " viXra:2208.0153

Michael Girgis (2022)." Dimensional Photon Accelerator and Inverse Relativity Test " viXra:2209.0130

Thermal theory of relativity

Michael Girgis (2022)." Lorentz Volumes Paradox: Limits of Special Relativity in Application " viXra:2211.0034

Michael Girgis (2022)." Relativistic Thermodynamics Transformations According to Inverse Relativity " viXra:2211.0151

Michael Girgis (2022)." Relativistic Thermodynamics Laws According to Inverse Relativity " viXra:2212.0207

5 References

[1] Drees, M.; Gerbier, G. (2015). "*Dark Matter" (PDF). Chin. Phys*. C. 38:

[2] Zwicky, F. (1937). "*On the Masses of Nebulae and of Clusters of Nebulae*". The Astrophysical Journal. **86**: 217–246.

[3] Freeman, K.C. (June 1970). "*On the Disks of Spiral and S0 Galaxies*". The Astrophysical Journal. **160**: 811–830

[4] Rubin, Vera C.; Ford, W. Kent Jr. (February 1970). "*Rotation of the Andromeda Nebula from a Spectroscopic Survey of Emission Regions*". *The Astrophysical Journal*. **159**: 379–403

[5] Tadas K. Nakamura. (November 2012). "*Three Views of a Secret in Relativistic Thermodynamics*.

[6] Michael Girgis (2022)." *Modified Lorentz Transforms and Minkowski Space Splits in Inverse Relativity* " viXra:2206.0017

[7] Michael Girgis (2022)." *Positive and Negative Energy in Inverse Relativity* " viXra:2207.0137

[8] Michael Girgis (2022)." *Relativistic Variables: Length, Time, Simultaneity, Mass, Energy and Momentum in Inverse Relativity* " viXra:2208.0153

[9] Michael Girgis (2022)." *Relativistic Thermodynamics Transformations According to Inverse Relativity* " viXra:2211.0151

[10] Michael Girgis (2022)." *Relativistic Thermodynamics Laws According to Inverse Relativity* " viXra:2212.0207

[11] Albert Einstein (2001). *Relativity: The Special and the General Theory* (Reprint of 1920 translation by Robert W. Lawson), p. 5, 35

[12] Luciuk, M., *Astronomical Magnitudes* (PDF), p. 8, retrieved 11 January 2019

[13] R.C. Tolman (1934), *Relativity, Thermodynamics, and Cosmology*, Oxford: Clarendon Press, Reissued (1987), New York: Dover, p. 33, 43, 139

[14] Salaris, Maurizio; Santi Cassisi (2005). *Evolution of stars and stellar populations*. John Wiley & Sons. pp. 138–140

[15] Cuntz, M.; Wang, Z. (2018). "*The Mass–Luminosity Relation for a Refined Set of Late-K/M Dwarfs*". Research Notes of the American Astronomical Society