Dimensional Photon Accelerator and Inverse Relativity Test

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ABSTRACT : We can design a photon accelerator that accelerates the photons even though the photons have no rest mass in order to do mechanical work on them, they have no electric charge to interact with the electric or magnetic field, they move at the maximum speed in a vacuum, which is the speed of light, i.e. No more speed, but through a new hypothesis called the dimensional rest mass hypothesis, we can find solutions to the three reasons that prevent us from accelerating photons and design an accelerator of photons called the dimensional photon accelerator works with a new principle that is not used in particle physics, which is the acceleration between the dimensions of spatial space, The work of the accelerator is a test of the dimensional rest mass hypothesis, Therefore, it is also a test of the inverse relativity theory, which relied mainly on that hypothesis, This is the main purpose of designing this accelerator.

Key words: photon accelerator, dimensional rest mass, super-time, modified Lorentz transformations, Minkowski space splitting, negative space, inverse relativity, energy-time paradox, Girgis paradoxes.

1 INTRODUCTION

In particle physics, only charged particles such as protons and electrons are accelerated in linear or circular accelerators [1] by electric and magnetic fields, this method is considered to be the working principle of accelerators known so far to accelerate particles, according to this working principle, we cannot accelerate particles such as photons because we face three reasons that prevent us from accelerating photons, like the acceleration of protons inside those accelerators, the first reason is the rest mass of photons according to quantum mechanics, the rest mass of photons is zero[1], In other words, photons have no rest mass, Therefore, we cannot do mechanical work on photons, because work is the amount of energy needed to move a particle of rest mass m_0 according to the law $w = \frac{1}{2} m_0 V^2$ [4] If the rest mass is zero, the amount of energy needed to move the particle becomes zero, The second reason is that the electric charge

of photons is also equal to zero according to quantum mechanics, and this means that photons are not affected by an electric field or magnetic field and therefore cannot be accelerated by electric fields, The third reason is the speed of photons in a vacuum, which is equal to the speed of light, and according to the second postulate of special relativity[2], No energy or signal can move at a speed greater than the speed of light, This means that we cannot accelerate the photons because this will lead to their speed being faster than the speed of light, but the inverse theory of relativity revealed to us a new hypothesis, which is the dimensional rest mass hypothesis of the photon, can we then find solutions through this hypothesis to the three reasons that prevent us from accelerating photons? Can we design an accelerator that works with a new working principle that is not used in particle physics?

2 METHODS

2-1 The working Principle of The dimensional Photon Accelerator

The working principle of the dimensional photon accelerator is based on the dimensional rest mass hypothesis [5] of the photons, which was put in the inverse theory of relativity, we will try here, through this hypothesis, to find solutions to the three reasons that prevent us from accelerating photons, mentioned in the introduction clause.

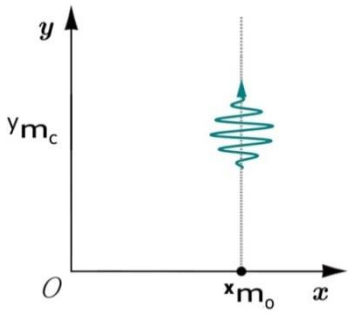

Figure: 1-3

The first problem is that photons have no rest mass [8] [7], the solution to the problem is the dimensional rest mass, Where according to the dimensional rest mass hypothesis, if the photons move at full speed in only one or two dimensions Y, Z of the three dimensions of spatial space, It becomes stationary on the third spatial dimension which is the X-dimension, we call it the dimension of rest and Y the dimension of motion, Thus, the mass, which is equivalent to the initial energy [3] for each photon E_i, appears in the rest dimension as a dimensional rest mass

m_0^x, and in this case we have the possibility to do mechanical work on the photons to move in the rest dimension, In other words, if the inertial mass according to classical mechanics is the particle's resistance to motion, then the dimensional rest mass according to inverse relativity is the particle's resistance to transferring energy from the dimension of motion to the dimension of rest , So we need to do mechanical work to transfer that energy

$$E_i = m_0^x c^2 \qquad m_0^x = \frac{E_i}{c^2} \qquad weher \qquad E_i = h\nu_i \tag{1.5}$$

According to quantum mechanics, the energy of a photon is the product of Planck's constant h times ν_i the initial frequency of the photon [1] i.e. the photon's frequency before work is done

The second problem is that the electric and magnetic fields do not affect the photons [6], The solution to the problem is to design a photon accelerator does not work with the acceleration mechanism of the electric field, but it works with a new acceleration mechanism, which is the elastic collision, where we allow unfree electrons to move at a uniform velocity V_x in the positive direction of dimension X (electrons bound to the surface of a large-mass object moving at V_x), at the moment of collision between stationary photons in the X-dimension and the moving electrons in the X-dimension, the unfree electrons do mechanical work w_x on the dimensional rest mass of each photon m_0^x in order to move in the X-dimension at the same velocity as the electrons, and because work is the amount of energy needed to move the particle (photon) as we mentioned above [4], then the photons have a kinetic energy in the X dimension equal to

$$w_x = \frac{1}{2} m_0^x {V_x}^2 \tag{2.5}$$

The mechanical work or the kinetic energy of a photon in the X-dimension represents an increase in the total energy of each photon, or in other words it is the difference between the initial energy E_i of the photon before work is done and the final energy after doing work E_f

$$\Delta E = w_x \tag{3.5}$$

$$\Delta E = E_f - E_i \tag{4.5}$$

$$\Delta E = h\nu_f - h\nu_i \tag{5.5}$$

$$\Delta E = h(\nu_f - \nu_i) \tag{6.5}$$

Substitute from 2.5, 6.5 into 3.5

$$h(\nu_f - \nu_i) = \frac{1}{2} m_0^x {V_x}^2 \tag{7.5}$$

Substitute from 1.5 into 7.5

$$h(\nu_f - \nu_i) = \frac{1}{2} \frac{h\nu_i}{c^2} {V_x}^2 \tag{8.5}$$

$$\nu_f - \nu_i = \frac{1}{2} \frac{\nu_i}{c^2} {V_x}^2 \tag{9.5}$$

$$\nu_f = \frac{1}{2} \frac{\nu_i}{c^2} {V_x}^2 + \nu_i \tag{10.5}$$

$$\nu_f = \nu_i \left(\frac{{V_x}^2}{2c^2} + 1 \right) \tag{11.5}$$

But the frequency of the photon is

$$c = \nu \lambda \qquad \nu = \frac{c}{\lambda} \tag{12.5}$$

Where c is the speed of light, which is the speed of photons in a vacuum and λ is the wavelength of the photons, by substituting from 12.5 to 11.5, Assuming that the speed of photons is constant before and after doing mechanical work

$$\frac{c}{\lambda_f} = \frac{c}{\lambda_i} \left(\frac{{V_x}^2}{2c^2} + 1 \right) \tag{13.5}$$

$$\frac{1}{\lambda_f} = \frac{1}{\lambda_i} \left(\frac{{V_x}^2}{2c^2} + \frac{2c^2}{2c^2} \right) \tag{14.5}$$

Taking out $2c^2$ as a common factor

$$\frac{1}{\lambda_f} = \frac{1}{\lambda_i} \left(\frac{{V_x}^2 + 2c^2}{2c^2} \right) \tag{15.5}$$

$$\lambda_f = \lambda_i \left(\frac{2c^2}{{V_x}^2 + 2c^2} \right) \tag{16.5}$$

The last equation represents the relation between the wavelength of photons before and after doing mechanical work, and it shows us that the final wavelength decreases with the increase in the velocity of the photon in the X dimension.

The third problem is the maximum speed of the photons, The solution to the problem is the dimensional acceleration of the photons, As we were able to do mechanical work on the photons in the positive direction of dimension X, according to the hypothesis of the dimensional rest mass, Thus, we can obtain a positive (increasing) acceleration for photons in this dimension, i.e. in the positive direction of the X dimension, on the other hand, a negative (decreasing) acceleration on the y-dimension, So that the sum of the square of the velocity components of each photon on the X and y axes at each moment is equal to the square of the speed of light, See Figure 1-3

$$c^2 = {V_x}^2 + {V_y}^2 \tag{17.5}$$

We write the previous equation in differential form and then divide both sides of the equation by the amount dt^2 to get the square of the photon acceleration in each dimension

$$\frac{dc^2}{dt^2} = \frac{d{V_x}^2}{dt^2} + \frac{d{V_y}^2}{dt^2} \tag{18.5}$$

We assume here that the square of the positive acceleration in the X-dimension is equal to the square of the negative acceleration in the y-dimension

$$\frac{d{V_x}^2}{dt^2} = -\frac{d{V_y}^2}{dt^2} \tag{19.5}$$

Substitute from 19.5 into 18.5

$$\frac{dc^2}{dt^2} = 0 \qquad \frac{dc}{dt} = 0 \qquad c = const \tag{20.5}$$

This means that the resultant velocity is always constant and equal to the speed of light, so that there is no violation of the second postulate of special relativity [2] [3], and this result agrees with the assumption mentioned above in Equation 13.5

2-2 Dimensional Photon Accelerator Design

In the previous item, We introduced the working principle of the new particle accelerator, which includes theoretical solutions to the three problems that prevent us from accelerating photons, We can now propose a design for a photon accelerator that fulfills this principle, as the following

figure shows a design for a photon accelerator called a Dimensional Photon Accelerator, This design consists of five basic parts, which are as follows

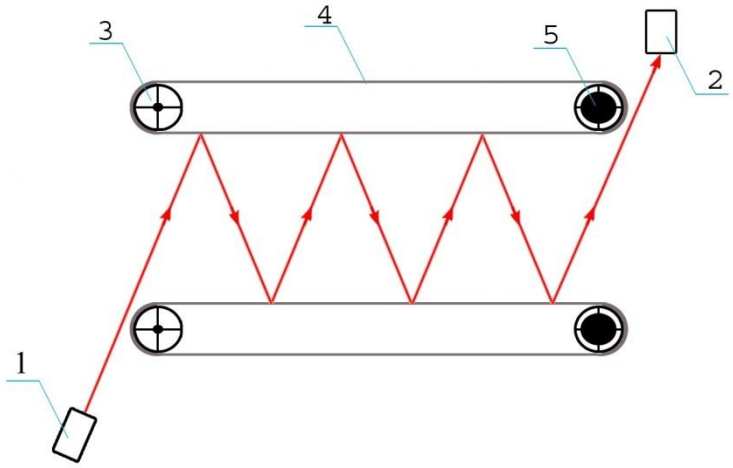

Figure: 1-5

1- A laser device, which is a particle source, the function is to emit photons of uniform wavelength and frequency and drop them at a small inclination angle on a reflective belt surface

2- Spectrophotometer or photodetector, the function of the spectrometer works to measure the wavelength of the photons before and after the accelerator is turned on to monitor the change in wavelength and energy of the photons, and the function of the photodetector works to determine the position of the photons before and after the accelerator is turned on to monitor the change in position

3- Cylindrical rollers of equal diameter, the function each two rollers move the belt at a high speed without vibration in the belt motion

4- The reflective belt, which is a belt with a flat reflective surface like a mirror that can be tilted with the pulleys at different angles, the function, it works on the continuous reflection of the laser beam inside the accelerator, controlling the angle of exit of the laser beam from the accelerator and doing mechanical work on the photons

5- Fast electric motor, the function, it works to move each driving pulley in each belt at high speed, the electric motors move in opposite directions to make the motion of the belts from the inside in the same direction

2-3 Test of Inverse Relativity

To understand how the previous design works according to the dimensional rest mass hypothesis, we represent the accelerator in an orthogonal quartz coordinate system XY, Where the direction of motion of both belts from the inside is in the positive direction of the X-axis, which is the direction of acceleration, the observer gradually tilts one or both of the reflective belts on the X-axis until the tilt angle between the laser beam and the X-axis reaches 90° at the exit point F, Thus, the laser beam coming out of the accelerator becomes exactly parallel to the y-axis at point F, See Figure 2-5, in this case all the photons are stuck in the y-dimension and are achieved here previous hypothesis

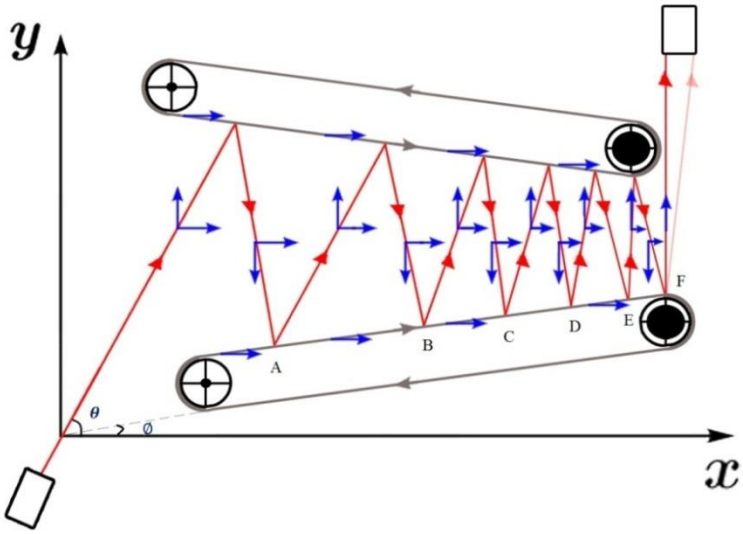

Figure: 2-5

Before running on the accelerator

As a result of the inclination of the laser beam inside the accelerator at an angle θ on the X-axis, The velocity of the photons is analyzed on the two axes X and Y, and thus, the photons have velocity components V_X, Vy, Look at Figure 2-5, and because the angle of inclination of the laser beam on the X-axis is constantly increasing inside the accelerator until it reaches 90° at the exit point F, Therefore, the velocity component V_X in the positive direction is constantly decreasing until it reaches zero, That is, the photons move inside the accelerator with decreasing acceleration a_X in the positive direction of the X-axis, before the accelerator is turned on, the observer measures the wavelength and energy of the photons leaving the accelerator before the accelerator is turned on by a spectrophotometer and records the energy and wavelength values, or uses a

photodetector instead of a spectrophotometer to determine the position of the photons or the path of the laser beam.

After running on the accelerator

When the accelerator is run by electric motors, the belts move at a constant speed V_b, The result of the inclination of the belts here also is on the X axis, but at a constant angle of ∅, the belt velocity must be analyzed on the X and Y axes, so that each belt has a constant velocity V_{bx} and V_{by} , While the photons are moving with a decreasing acceleration a_X in the same direction, So the belts would appear to move with increasing acceleration relative to the photons at each collision moment.

At positions A, B, and C, the values of the angle of inclination of the laser beam are small, so the values of V_X are much larger than the values of V_{bx}, This means that the photons in the first positions inside the accelerator do not gain work from the belts because their velocity is higher than the velocity of belts in the same direction, but the D, E, F positions, the values of the angle of inclination of the laser beam are large, and therefore the values of V_X are less than the values of V_{bx} until it reach zero, and this means that the photons in the last positions inside the accelerator gain work from the belts until the value of V_X reaches the value of V_{bx} at exit point, as a result, we get

The path of the laser beam at the exit point after running on (the faint path on the drawing) is deviated from the path before running on with a very small angle that the observer cannot observe with the naked eye, but by using the photodetector, the position of the photons can be determined before and after the accelerator is turned on, In the case of obtaining a difference in measurements from the detector, this is evidence of the deflection of the beam parallel to the y-axis and the acceleration of photons in the X-dimension

The energy of the photons leaving the accelerator increases by the amount of work done by the belts on the dimensional rest mass of the photons in the positive direction of the X-dimension, and this is detected by measuring the wavelength of the photons leaving the accelerator after running on by a spectrophotometer and comparing it with the wavelength of the photons that were measured by a spectrophotometer before running on, in the case of obtaining a difference in the measurements according to equation 16.5, this is evidence that the photons gain the work done in the X-dimension and therefore have a dimensional rest mass.

3 RESULTS

We can design a photon accelerator, the working principle of the accelerator is based on the hypothesis of dimensional rest mass and acceleration between the dimensions of spatial space, so it is called a dimensional photon accelerator, The accelerator consists of the following parts (laser device - electric motor - rollers - flat reflective belts - spectrophotometer or photodetector), And it is represented in the XY coordinate system, Where photons of the same frequency and wavelength are produced by the laser device, and then they are made to move at full speed in the y-dimension, Thus it has a rest mass on the X-dimension according to the previous hypothesis, As a result of having a dimensional rest mass on the X-dimension, we can do mechanical work on the photons in the positive direction of the same dimension and increase their energy through an elastic collision between stationary photons on the X-dimension and the surfaces of the belts moving at a velocity of V_{bx} , As a result of the work done in the X-dimension, we get a positive (increasing) acceleration of the photons in this dimension, in exchange for a negative (decreasing) acceleration in the y-dimension, So that the net velocity is always the same and equal to the speed of light, The spectrophotometer monitors the work done by changing the wavelength of the photons before and after the accelerator is turned on, and the photodetector monitors the acceleration of photons in the X-dimension by changing their position on the detector before and after the accelerator is turned on, Therefore, the function of the accelerator is a test of the hypothesis of the dimensional rest mass of photons, and therefore also a test of the inverse relativity theory, which relied mainly on that hypothesis, and this is the main purpose of designing this type of accelerators.

4 DISUSSIONS

The dimensional photon accelerator works with very small energy compared to the conventional accelerators used in particle physics, but this does not represent a defect in the design of the accelerator, because it is not the purpose of accelerating photons collide with other particles as in conventional accelerators, but the purpose here is to test the existence of the dimensional rest mass of the photons, and this can be achieved with a small amount of energy

Although one of the results of this experiment is the detection of the photodetector changing the position of the photons as a result of the deviation of the laser beam parallel to the y-axis, but we cannot consider this deviation as conclusive evidence that work is being done on the photons

in the X-dimension, where this deviation in the previous design can be caused by vibration in the belt motion, so the most reliable evidence is the change in energy and wavelength of the photons

We have previously mentioned that the inverse theory of relativity is more a mathematical model than a physical one, and therefore there is no possibility to test this model, but the design of the dimensional photon accelerator represents here a test of a basic hypothesis in this model, which makes the model testable.

Related Links

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

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