Light, Gravity, and Mass

A Particle Theory

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The electromagnetic spectrum including visible light is most often characterized by wave theory. But there are effects that indicate it has particle characteristics. Hence, there is an ongoing discussion of wave particle duality. There has been work trying to make a wave act like a particle. This paper uses a particle and provides a mechanism for it to have wave properties. If it is a particle, could the same particle that is the cause of EM radiation also be the particle needed for pushing gravity? And how does mass fit in?

1. The Particle Theory of a Wave

One particle cannot describe a wave. But a group of particles could be arranged such that a simple or complex wave is described. If the particles are distributed such that they are close together in the first part of the wave and farther apart in the second part of the wave, the distribution could resemble a sine wave. Consider the following sequence:

(55, 60, 70, 60, 55, 45, 40, 30, 40, 45) **(1)**
500 particles in one second

There are 300 particles in the first half and 200 particles in the second half. Each number represents the number of particles in 0.1 seconds. The specific shape of this wave is shown in a series of flat steps which indicates distortion, but the basic wave and frequency are still there.

2. Sine Wave

A sine wave is shown as a continuous mathematical model. The mathematics of a sine wave is shown in equation 1.

$$a_t = A \sin 2\pi f t \quad \textbf{(2)}$$

There are two terms in this equation. There is Amplitude and frequency. Equation 3 describes the frequency of this wave in terms of wave length λ and velocity 'v'.

$$f = v/\lambda \quad \textbf{(3)}$$

Equation 2 and 3 are mathematical equations for which there is no physics. It was Max Planck that defined the energy of a charged atomic oscillator as being proportional to the frequency of a wave. His equation

$$E = hf \quad \textbf{(4)}$$

Although the equation appears continuous, the energy levels are reported as quantized.

3. Particle Wave

The physics for the particle theory of a wave is described in section 1 and is shown as a sequence of digital values. But it is actually a series of discrete particles. The amplitude of the wave shown in sequence 1 is determined as follows:

Amplitude

$$A = (D_{Max} - D_{min})/2 \quad \textbf{(5)}$$

The amplitude is A. The Density at peak is D_M, and the Density at Minimum is D_m. The value of A for sequence 1 is 20 particles. If the distribution of even, then there is no amplitude or frequency.

Frequency, Wavelength, and Velocity

The frequency of the particle wave is determined by the amount of time that the peak value takes to repeat. In sequence 1 this is one second and so the frequency is one cycle per second. The velocity of the particle is designated v_p. The equation for the frequency of the particle wave is:

$$f_w = v_p/\lambda_w \quad \textbf{(6)}$$

Intensity

For the particle wave, the intensity is different than amplitude. The amplitude helps define the frequency. The intensity of the wave is related to the energy. In sequence 1, intensity is proportional to the number of particles per wave.

$$I \propto N_p/\lambda_w \quad \textbf{(7)}$$

Using equation 6 to solve for λ_w we get:

$$I \propto \frac{N_p}{v_p} f_w \quad \textbf{(8)}$$

Intensity is proportional to frequency. But the number of particles per wave is an integer number and so equation 8 clearly shows that the value of intensity is quantized. If this model is true, then Planck's constant is not a constant!

4. Applying the Theory

Light and Gravity

It seems logical that this theory can be applied to the full electromagnetic spectrum From Gamma rays to Radio waves. The highest frequency of gamma rays can be generated if enough particles can be put in a very short wavelength. But physical restrictions will limit the upper frequency.

But it would appear that there is no restriction at low frequencies. In fact, a stream of particles could have zero amplitude and zero frequency. A stream of particles like this is exactly what is needed for pushing gravity. Could this one particle be valid for light and gravity? That's part of what we are trying to find out.

Mass

There is nothing in this particle theory that tells us about mass. It was Newton who defined the value of mass as the ratio of its acceleration relative to the acceleration of a standard mass. That's a definition of its value, not a definition of what it is.

Mass is known when its motion is detected. We know the value of the mass of the moon because we see it move. We cannot see the gravity particle move therefore the value of its mass is unknown. We don't see the light particle move either. We can only see a laser beam when the particle light reflects off of particles in the air.

5. Opportunities

When you have a new theory, there are many questions that need to be addressed. Here are some ideas that need to be explored.

Speed of the Particle

The speed of light is generally understood, but not completely. What causes light to slow down in water and glass? If light is a particle, then drag seems to be a possibility. The real hard part is what causes the light to speed up when it moves from water to air?

Do gamma rays and radio rays speed up and slow down? If gravity is caused by the same particle does it speed up and slow down?

Interaction

The interaction of this particle with other objects is quite varied. Here are some of the interactions and all need to be explained. The particle can:

Reflect (one or many frequencies)
Refract (change direction)
Pass through objects
Attenuate (lose some particles)
Absorb (be captured)
Push (cause objects to move)

Depending on the frequency, amplitude, intensity and speed of the wave any of these can happen. The theory needs to be applied to gamma rays, visible light, radio waves, and gravity.

There is a lot to do!

6. Particle Interaction

Here is one model for the particle interaction with an object. Figure 1 shows this particle entering a water molecule. It has two possibilities, stay with the molecule or be ejected by the water molecule.

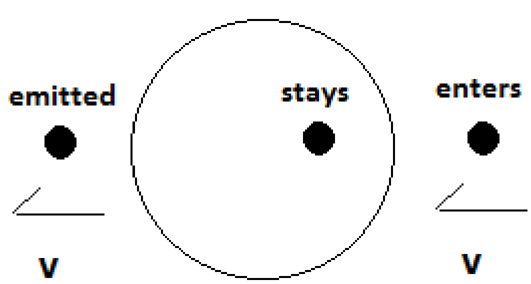

Figure 1 –Particle Entering Water

Stays

The particle enters the water and stays. The manner in which it stays is not known. In this case, the particle pushes the water and it is added to the amount of matter. This satisfies the requirement that gravity is a pushing force and suggests that this process may be part of the earth's expansion.

The mass of the particle in a wave is unknown. But if it is captured by the object, it adds matter. This added matter can now add to the mass of the object. We still don't know the mass of this particle.

Emitted

The second option is that the particle is re-emitted or a different particle is emitted and is emitted at the speed of c (the speed of light in a vacuum). If the particle pushes the object forward as it enters, then the object is pushed backward when it is emitted. In this case the pushing of the object is cancelled.

The release of the particle is assumed to be controlled but forces at the atomic level. Due to cause and effect, the emitted particle leaves the water molecule a fraction of a second later. So between molecules, the speed of the particle is c. But the short time delay causes an overall velocity of the particle to slow down. It is well known, that the speed of light in water is slower than the speed of light in water.

When the water particle is emitted from the last water molecule, it is emitted into the air a speed c. It was emitted at speed c when it started light years ago, and it is emitted here the same way. The particle enters the air at c, but soon slows down due the delay through the air molecules. In any case, the speed of the particle was slow in the water is now faster in air. This is how the light wave **speeds up** going from water to air.

7. Summary

This is an interesting model but needs experiments to prove it is a valid model. Only when it meets all or most requirements can the model be considered useful. Today we only have indirection evidence of gravity. Motion is indirect evidence. Only when we have direct evidence will we be able to confirm the model. We need to be able to see the particle doing all these things,

References

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