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(Review Article)

Examining a new dimension in quantum mechanics

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Abstract

In this paper we are examining the metric of the four dimensional world embedded in five dimensions. We prove that the worldline element may become imaginary and explain the consequences. We also find the five dimensional metric and examine it.

Keywords: Quantum Thermodynamics; Hidden Variables; Special Relativity; Quantum Mechanics; General Relativity; Theoretical Physics

1. Introduction

The search for the hidden variables in quantum mechanics has withheld for over a century. Einstein first introduced the idea that the speed of light may have a different value in the presence of mass. Among a lot of other fathers of quantum mechanics Louis De Broglie [1] tried to give answers by introducing the fifth dimension.

2. Main part

As we have discovered from our research [2,3], the volume in three dimensions is the hypersurface of present time in four dimensions which vibrates when the system is disturbed by the addition of energy and this vibration are the longitudinal. The hypersurface in five dimensions is a ring, a closed loop. This ring is the worldline in five dimensions a result which agrees with Kaluza theory and string theories.

The metric in presence of mass which alters the speed of light is:

$$ds^2 = d\vec{r}^2 - \frac{c^2}{\chi}dt^2 = d\vec{r}^2 - c^2dt^2 + (d\rho)^2 = d\tau^2 + (d\rho)^2 \ldots\ldots\ldots (1)$$

In equation (8) chi stands for the dielectric susceptibility. Obviously the spacetime interval tau may obtain imaginary solutions as well so the fifth dimension is an imaginary one describing this phenomenon. However by adding this extra dimension of rho the interval ds squared may become positive indeed.

The curvature of spacetime caused by mass depends on the fine structure constant and the Compton wavelength:

$$K = \frac{\alpha}{\lambda_C} \ldots\ldots\ldots\ldots\ldots(2)$$

We put forth the following formula:

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$$\rho = \frac{|\psi|}{K} \text{ ....(3)}$$

We shall present the following formula which we have proved in our work

$$\Omega = K\tau \text{ ....(4)}$$

Combining formulas (3) and (4) into equation (1) we arrive at the following equation for the new metric:

$$K^2 ds^2 = d\Omega^2 + d|\psi|^2 \text{ ....(5)}$$

In relativity the classical interval of the worldline with which the observer observes is:

$$ds^2 = dr^2 - c^2 dt^2 \text{ ....(6)}$$

When s is imaginary the events are neither in the past nor in the future. They are outside of the light cone. However we have the new metric in presence of mass:

$$ds^2 = d\vec{r}^2 - \frac{c^2}{\chi} dt^2 \text{ ... ... (7)}$$

With this new metric s may become imaginary for regions within the light cone because the speed of light increases and events that belong to the past of the observer may have happened elsewhere. This causes the uncertainty and entanglement of objects.

In equation (2) alpha is the fine structure constant and lambda is the Compton wavelength. The metric for a sphere of radius R=1/K is:

$$d\tau^2 = R^2 sin\theta^2 d\phi^2 + R^2 d\theta^2 = \frac{d\Omega^2}{K^2} \text{ ... ... (8)}$$

In equation (8) Omega is the solid angle. This way the geodesic in a surface of a sphere in five dimensional space is the spacetime.

Finally we have to correspond the letter Y(yin-yang) to the following[4,5,6,7,8]:

$$dY^2 = d\Omega^2 + d|\psi|^2 \text{ ....(9)}$$

3. Conclusions

The letter Y is symbolic for it asks a question why. Through our research we have raised a lot of questions and we have answered some others. We hope that other scientist will continue our work in the field of hidden variables in quantum mechanics and the reader is may refer to some bibliography supporting our arguments in this paper

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