In 5-dimensional Space-time Quantum Mechanics derive out Special Relativity Theory

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Abstract: Special Relativity Theory can be derived out from quantum mechanics. Special Relativity Theory is not a independent theory. Special Relativity Theory is included in the quantum mechanics.There exist a new physics view. Real physical world is 5-dimensional space-time.Human world is 4-dimensional space-time,it's only the projection of real physics world.Quantum mechanical particle-wave is present in 5-dimensional space-time.So we can derive out Mass-energy equation.So we can derive out Special Relativity Theory.In 5-dimensional space-time,all the particles speed is the light speed c.That is reason that the light speed c is very special.Discuss some questions in the new physics view.

Key Words: quantum mechanics; Special Relativity Theory; mass-energy equation; particle-wave; the 5th dimension; 5-dimensional space-time; the Light speed; Particularity of the light speed; Spatio-temporal projection; Lorentz symmetry.

1. Derive out Special Relativity Theory from Quantum Mechanics

In the quantum mechanics,the group velocity V_g is equal with particle velocity V.That is V_g =V

The phase velocity $V_p = \frac{c^2}{V}$

So we obtain, $V_g V_p = V \cdot \frac{c^2}{V} = c^2$

So we obtain a equation, $V_g V_p = c^2$ (1.1)

The equation (1.1) is derived.But we think from the other side.We suppose this equation is exist at first,not be derived out. The physics source will be explained at the 2nd chapter.Start from this equation, do some logical reasoning, we can obtain very meaningful results.

From De.Broglie equation,we obtain a equation,

$$V_g = \frac{d\varpi}{d\kappa} = \frac{d(\hbar\varpi)}{d(\hbar\kappa)} = \frac{dE}{dP} \quad (1.2)$$

Please pay attention to the equation, $V_g = \frac{dE}{dP}$.

From De.Broglie equation,we can derive out,the phase velocity,

$$V_p = \lambda\nu = \frac{h}{P}\frac{E}{h} = \frac{E}{P} \quad (1.3)$$

Take (1.3) and (1.2) into (1.1),we obtain,

$$V_g V_p = \frac{E}{P}\frac{dE}{dP} = \frac{dE^2}{dP^2} = c^2$$

So we obtain a equation,

$$\frac{dE^2}{dP^2} = c^2 \quad (1.4)$$

So we obtain, $dE^2 = dP^2 \cdot c^2$.So,

$$E^2 = P^2c^2 + cons\tan t \quad (1.5)$$

This equation is so familiar.It's more like energy-momentum equation in Special Relativity Theory.The constant is wait solving.Now we start to solve the constant value.

The group velocity V_g is equal with particle velocity V.That is V_g =V.

Exist equation,P=mV (1.6)

So,V=V_g =P/m (1.7)

Take (1.3) and (1.7) into (1.1),get, $V_g V_p = \frac{E}{P} \cdot \frac{P}{m} = \frac{E}{m} = c^2$

So obtain, $E = mc^2$ (1.8)

Equation (1.8) is the energy-mass equation in Special Relativity Theory.

Take (1.8) into (1.5), obtain,

$$m^2c^4 = P^2c^2 + cons\tan t$$

So we can set the constant is value when P=0.

We set $m^2c^2 = m_o^2c^2$ when P=0.So,

$$E^2 = m^2c^4 = P^2c^2 + m_o^2c^4 \quad (1.9)$$

This is the energy-mass equation in Special Relativity Theory.

Discover equation (1.9),so we can derive out Special Relativity Theory.From equation (1.9),we can derive out this result that the light speed c is the maximum speed.

Summarize the reasoning steps above again.We suppose exist the equation $V_gV_p = c^2$ at first.Then use the equation P=mV.Then use De.Broglie equation.So we can derive out equation (1.9),and can derive out Special Relativity Theory.

We can discover,the equation,$V_gV_p = c^2$ ($\frac{dE^2}{dP^2} = c^2$),is so much important.But why it is exist? It will be explained at the 2nd chapter.

In fact,the equation,P=mV. It's usage is that take mass concept into quantum mechanics.This mass is momentum mass. Momentum mass have another name, inertial mass.This mass is not gravitational mass.

From the reasoning steps above,we can see this.Before use equation P=mV,from(1.1) to (1.5),reasoning don't have relationship with mass concept.

Use equation (1.6),we take mass concept into quantum mechanics.Then we can derive out equation (1.9).And can derive out Special Relativity Theory.

We only suppose that equation (1.1) is exist at first,so we can derive out Special Relativity Theory from De.Broglie equation.So Special Relativity Theory is not a independent theory.The quantum mechanics have include Special Relativity Theory.

Why V_g =V?In Classical mechanics,dP=Fdt,dE=Fds.So,dE/dP=Fds/Fdt=ds/dt=V. From De.Broglie equation, can obtain (1.2),Vg=dE/dP.We obtain V_g =V.

Reasoning steps above seems only formal changes,It is not substantive changes.But,if we

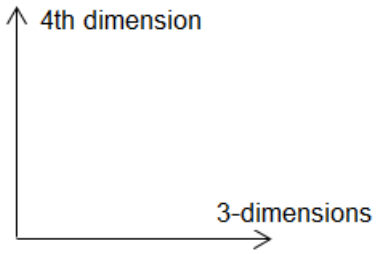
consider that Special Relativity Theory is not a independent theory.Our thinking is no longer been limited by Special Relativity Theory.Then we can get new thinking.

2. New physics view,particle-wave in 5-dimensional space-time

In first chapter,this equation, $V_g V_p = c^2$,is a hypothesis.So,what is its physical meaning? Thoughts two years, author finally found its physics significance. This equation's physical model, will bring a whole new view of physics.

This equation means that the particle wave is present in 5-dimensional space-time.The physical process of human perception,is only the spatio-temporal projection on the 4-dimensional space-time.Real physical process happen in 5-dimensional space-time.

The physical world of human perception,is in a 4-dimensional space-time.One dimension is time.Three dimension is space.Now we assume that a real physical world is in 5-dimensional space-time.There exist 5 dimension. One dimension is time.Four dimension is space.Real physical world is in 4-dimensional space.Humans live in 3-dimensional space.The physical process of human perception,is only the projection on the 3-dimensional space.



New 4th dimension space,and 3-dimensional space,forming orthogonal relationships.Total of 4-dimensional space,like 3-dimensional space,is a Hilbert space also.The vector operations in 4-dimensional space,follow the standard vector arithmetic rules also.

Because it adds a new dimension,in the new 4-dimensional space,particles movement and particle wave's movement,to it's velocity and momentum, there are very different with 3-dimensional space.It is because velocity and momentum is vectors,not scalars.

However,mass,energy,wavelength,frequency,these physical quantity,because it is a scalar, then there is no difference.

Now,we assume that,in new 4-dimensional,the wave-particle duality still holds, De.Broglie equation still holds.

$$E = h\nu$$
$$P = \frac{h}{\lambda} \qquad (2.1)$$

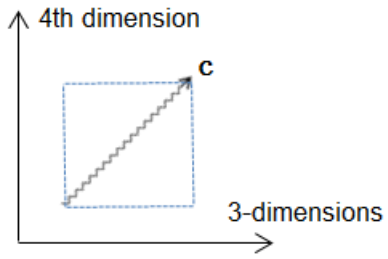
Please note that the frequency and wavelength,are in 4-dimensional space,is no longer just in 3-dimensional space.Energy and momentum are in 4-dimensional space,not just in 3-dimensional space.The velocity of the particle, particle-wave phase velocity and group velocity,is a 4-dimensional vector, not a 3-dimensional vector.

For energy and frequency,because it is a scalar,in 4-dimensional space,and in 3-dimensional space,its value are same.

For momentum,velocity,because it is a vector, in 4-dimensional space, and in 3-dimensional space, it is not the same.

For wavelength, it is a length quantity,is closely related with dimensions.it is not a scalar or vector.In 4-dimensional space,and in 3-dimensional space,it is also not the same.

In the following statements,please reader carefully distinguish each physical quantity, are in 4-dimensional space, and in 3-dimensional space.



Now, we assume that, in the new 4-dimensional space, particle-wave phase velocity and the Group velocity is the same,and its numeric value is the speed of light c. And, in the new 4-dimensional space, all particles, all particle-wave, movement speed is lightspeed c. In 4-dimensional space, there not exist static particles,and not exist static particle waves. As long as the particle exist, is necessarily in movement at the speed of light c, inevitably accompanied by the particle-wave. And, in the new 4-dimensional space, the Group velocity of the particle-wave, and particle velocity of the particle-wave , have same value, V_g =V.

So, obtain,

$$V_g = c$$
$$V_p = c \qquad (2.2)$$

So,we obtain this equation,

$$V_g V_p = c^2 \qquad (2.3)$$

This is the physical source of the equation. Please note that distinction, the phase velocity and the Group velocity, is in new 4-dimensional space, is not only in 3-dimensional space.

We can see that, the vast majority of cases, to the Group velocity of the wave-particle, its projection speed in 3-dimensional space, is no more than a numerical vector which in the 4-dimensional space. So, in 3-dimensional space, particle velocity, which is the Group velocity of projection speed, do not exceed the speed of light c. Only in extreme cases, the particle velocity completely only have the component in 3-dimensional space. In the 4th dimension, its velocity component is zero. The projection speed in 3-dimensional space, is entirely the vector itself values. The particle speed is the speed of light c in 3-dimensional space. Photon are examples of this.

Then, there exist another special case. Particle-wave group velocities, complete only have the component in 4th dimension.In 3-dimensional space, its projection components, completely to zero. This is a what? In fact, in this case, is the static object in 3-dimensional space.The 3-dimensional space,is human perception physical world. In 3-dimensional space, the object is static, not move. But that only exist in the classical macroscopic physical. At the microscopic quantum world, because the wave-particle duality, actually not exist a completely stationary particles. Perhaps, this is the essential difference between classical macroscopic world and microscopic quantum world. Classical macroscopic physical world cannot perceive the 4th dimension. Microscopic quantum world, can perceive the 4th dimension. This view, there is only one author speculation. It is true or wrong, is uncertain.

In 3-dimensional space,the particle is static,not move, it was just an illusion. In new 4-dimensional space, the particle movement is at the speed of light c. Therefore, the particle has energy. Energy is a scalar, not a vector, its physical effects in each dimension will show effect. This is the physical sources that particle have rest mass in the 3-dimensional space. But the particle velocity and momentum is a vector, orthogonal component is zero in 3-dimensional space,

the projection is zero, so it will not show effects. This is a proper physical explanation about particle rest mass. Why particle-wave have frequency and wavelength when particle is static in 3-dimensional space?This is its physical explanation.

To phase velocity, because it involves the wavelength, than the Group velocity, is more complex. Obviously, lengths is closely associated with dimensions. The length in 4-dimensional space, the projection length in 3-dimensional space, they have what kind of relationship, it is not sure. Wavelength in 4-dimensional space, and projection of the wavelength in 3-dimensional space, is clearly not a simple vector orthogonal relationships.The relationships is not clear alsoe. It is still a problem that requires careful study.

Exist a equation:

P=mV (2.4)

It's usage is that take mass concept into quantum mechanics.This mass is momentum mass. Momentum mass have another name, inertial mass.This mass is not gravitational mass. But please note that the momentum here, is the momentum in 4-dimensional space. Here the velocity V, is in 4-dimensional space also. But the mass quality is a scalar, so in 4-dimensional space, and in 3-dimensional space, is same, have same numeric value.

Because in 4-dimensional space, the particles speed V is the speed of light c. And V_g =V . So, (2.4) equation is equivalent to this:

P=mV=mc (2.5)

But it is true only in 4-dimensional space.In 3-dimensional space,it is incorrect.

The momentum in 4-dimensional space, have an orthogonal component in 3-dimensional space. Mark the orthogonal component in 3-dimensional space with lowercase p.There exist p=mv. Here, p is the 3-dimensional momentum, v is a 3-dimensional velocity. m is a scalar.

In 4-dimensional space,from (2.1) and (2.2), can obtain:

$$V_p = \lambda\nu = \frac{h}{P}\frac{E}{h} = \frac{E}{P} = c$$

And (2.5), so obtain:

$$E = Pc = mcc = mc^2 \qquad (2.6)$$

We assume,in 5-dimensional space-time(4- dimensional space,1-dimensional time),have V=Vg also.So obtain,

$V = V_g$ =c (2.7)

To the momentum P in 4-dimensional space, have an orthogonal component in 3-dimensional space(mark with P1),and have an orthogonal component in new 4th dimension(mark with P2). There exist, $P^2 = P_1^2 + P_2^2$. And (2.6),so obtain:

$$P^2c^2 = P_1^2c^2 + P_2^2c^2 = E^2 = m^2c^4$$

When particle is static in 3-dimensional space,P1=0,P=P2. Named this mass with rest mass.Mark this mass with m_0 .So obtain:

$$P_2c = m_0cc = E_0 = m_0c^2 \qquad (2.8)$$

So obtain:

$$E^2 = m^2c^4 = p^2c^2 + m_0^2c^4 \qquad (2.9)$$

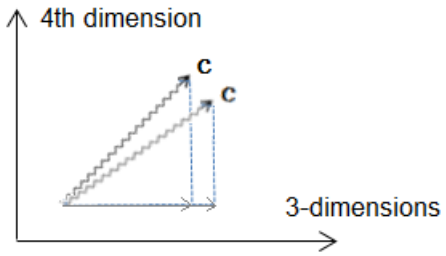
Here, p=P1, is the momentum component in 3-dimensional space. Therefore, the energy-mass equation in Special Relativity Theory, is the natural result of this new physical view.

Why the mass-energy equation shows a strict right angle triangle relationship, which is a very strange phenomenon. This is many people's doubts. On this issue, the new physical view, can give a very direct answer. Mass-energy equation, is, indeed, a vector orthogonal relationship performance.

As can be seen, the momentum of the particle in the 4th dimension component values, is a variable that will always remain the same. What is its physics means, this is not clear.It need further study.

In 4-dimensional space, there is no static particle. But judging from the macroscopic physical, in 3-dimensional space, there exist static object. Why? It need further study.

From the above discussion, we can see that particle's mass is a human artificial concept. Mass concept is taked into physics is by a equation,P=mV. Mass seems to not exist real physical meaning. Have a real physical meaning is, energy, momentum, speed, frequency, wavelength, these concepts. Therefore, the real physical meaning of mass quality, need further study.



From the diagram above, you can also see, the energy-momentum of the particle increases, showed speed in 3-dimensional space projection component mounting. In 4-dimensional space, the real is the rotation of the particle in the 4th dimension. Greater energy-momentum particle movement and 3-dimensional orthogonal angle is smaller, and the 4th dimension orthogonal angles greater. This is a problem that requires further study. We know that in physics, the force, like electromagnetic force, its effect is changing the energy and momentum of the particle. In the new view, in 4-dimensional space, the energy-momentum of the particle changes, inevitably accompanied by a rotating effect, this is similar to the bending of space effects in the general relativity. Through this new view, it might be possible to unify quantum mechanics and general relativity.

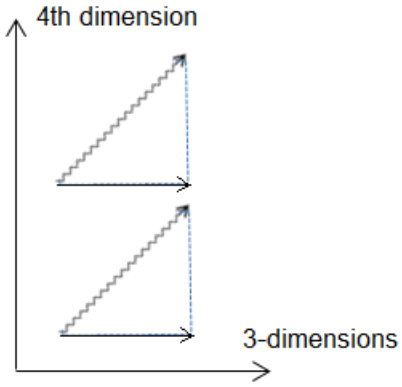
The photon is the most exceptional circumstances, only have motion components in 3-dimensional space completely, not have moving components in the 4th dimension, so the photon rest mass is zero, so the photon speed is equal to the lightspeed in 3-dimensional space.

All particles, including photons, in 4-dimensional space, movement speed is the speed of light,is c. This is the essence of Lorentz symmetry. Photons are no longer in a special place in physics.

In this new model, the 1-dimensional time, and the 4-dimensional space, they relationship, require further study. But at least you can see that one dimension of time, and 4-dimensional space, there is still a great deal of difference. At least, to physical vectors, there is no observable orthogonality relations in time dimension, only orthogonal relationships in spatial dimensions are considerably.

Please note that following a simple sketch, the projection components in 3-dimensional space , are exactly the same. In 3-dimensional space, unable to distinguish the difference between two case. Therefore, the 3-dimensional space of human current perception, is real dimensions of 4-dimensional space, or just a shadow effect, is impossible to distinguish accurately. Further

research is also needed to wait for.



New physical models, and Einstein's theory of special relativity, are two equivalent mathematical calculations.But their relationships also require in-depth study.

New physics model, still not mature, there are still many issues pending clarification, even look a little crazy. However, this new physical view is not speculation. A new view is still build on top of existing physics, is based on rigorous Mathematical derivation, and transfer the results back to the existing theory of physics. Author express the new physical view, just to provide a whole new perspective of physical question, raised that possibility. The new view is correct or not, if promising, what change will bring physics, author unknown. New views, perhaps is a complete misconception, perhaps is the beginning of new physics, unpredictable, waiting for the facts to give an answer. But the new view, at least bring a whole new perspective.

If the new physical view is true, it can be expected, will bring great change in physics.

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