MODIFIED PAULI EXCLUSION PRINCIPLE

S HUSSAINSHA

Research scholar ECE, G.Pullaiah College of Engineering and Technology, Kurnool, Andhra Pradesh, India

Email: ssshaik80@gmail.com Cell: +91 9000390153

Abstract: *The principal objective of this paper is to describe the force of gravity according to the rules of quantum mechanics, and where quantum effects cannot be ignored. The result of this concept modifies Pauli Exclusion Principle so that it is possible to explain Quantum Entanglement in terms of relativity. The result shows Dark Matter is due to Entanglement, and Expansion of Universe is due to generalized Pauli Exclusion Principle (GPEP).*

Keywords: *Quantum gravity, Pauli Exclusion Principle, Space – like interval, Geodesic, Quantum Entanglement.*

1. INTRODUCTION

We know that, at present we have lot of theories to study the force of gravity in terms of Quantum mechanics. For example; 'the string theory' and 'the loop quantum gravity'[3].

To me, these theories are not simple but they are so impressive! So I follow different way to define the force of gravity in terms of Quantum mechanics.

What's wrong if I assume Time is absolute, and part of the background is the special case of Einstein's Space-time?

This simple inquisitive type question made me to study force of gravity in terms of Quantum mechanics.

The essence of this paper: when ever complete universe is packed to a single point or single position (That is, $ds^2 = 0$), there exist Einstein – Rosen bridges inside that single point in between the particles that are squeezed to single point. Einstein – Rosen bridges arises due to Generalized Pauli Exclusion Principle (GPEP). Einstein – Rosen bridges acts as a cable wires through which information transfers instantaneously (Entanglement).

The above concept is also defined as; All particle (set of points) that are separated by Einstein – Rosen bridges that all have the same time coordinate (time is absolute), such that every point on the surface has a space-like ($ds^2 < 0$) separation.

Therefore Quantum Entanglement is the subject of bringing all observers or particles to a single point such that the clocks of those observers read same. That is the passage of time is same to all observers (time is absolute). But due to Generalized Pauli Exclusion Principle (GPEP) there exists Einstein – Rosen bridges by which entanglement takes place.

Quantum entanglement is the consequence of Quantum mechanics. Therefore there is nothing wrong if you take time as absolute in Quantum mechanics.

Time is absolute in Quantum mechanics is true because of quantum universe is a just single point. But truly speaking time is not absolute. To prove this you need other point or extra space. But there is no other point. So, time is absolute.

Quantum mechanics is considered as an aspect of General Relativity. Because, general relativity tells; all particle are squeezed to single point. Hey I am Black Hole.

Quantum Entanglement is a subject of studying single point where all particles reside and general relativity is a subject of making that single point and brings all particles nearer (gravity). GPEP opposes bringing all particles nearer (Expanding universe).

This essence is explained in detail in the following section 2.

2. QUANTUM GRAVITY

Different notions of geodesic I am following in this paper:

1) Space – like geodesic ($ds^2 < 0$)
2) Null – like geodesic ($ds^2 = 0$)
3) Time – like geodesic ($ds^2 > 0$)

2.1.Generalized Pauli Exclusion Principle

Now let see how destiny plays with single position where all observers (all particles) situated. That is, those all observers think they are not present in a single position with simple principle called "Generalized Pauli Exclusion Principle".

I define 'The Pauli exclusion principle' with one difference. That is, not only fermions but also bosons obey 'The Pauli exclusion principle'!

We know that; Particles with an integer spin, or bosons, are not subject to the Pauli Exclusion Principle: any number of identical bosons can occupy the same quantum state. But I am predicting that it's not true. Bosons also obey 'The Pauli exclusion principle'! Therefore I am predicting that the quantum state (where identical bosons can occupy the same quantum state) is a state of discrete quantum states. That is, position is discrete. Though the identical bosons occupy the same quantum state but all the identical bosons cannot occupy the same position in that quantum state. We differentiate two electrons present in a same quantum states in terms of ℓ, the angular momentum quantum number, m_ℓ, the magnetic quantum number, n, the principal quantum number, and m_s, the spin quantum number. Now you have to add another difference called 'position'. That is, identical electrons cannot occupy the same position.

Now I generalize The Pauli Exclusion Principle as "identical particles (fermions, bosons) cannot occupy the same position".

2.2.Quantum Entanglement:

I can say entanglement is the consequence of;

1) Generalized Pauli Exclusion Principle.
2) Space – like interval of relativity.

For example take an electron around an orbit inside an atom;

A quantum mechanical particle that is confined (bound) spatially can only take on certain discrete values of energy. These discrete values are called energy levels.

According to generalized Pauli Exclusion Principle identical particles cannot occupy the same orbital. For example, If two electrons reside in the same orbital (2®*r*) implies; violating the generalized Pauli Exclusion Principle. Therefore to overcome this violation a new concept emerges here. That concept is named as “Quantum Entanglement”.

According to generalized Pauli Exclusion Principle; “identical particles (fermions, bosons) cannot occupy the same position”. If they occupy the same position, *there exists “Quantum Entanglement” between those particles*.

Therefore I am predicting that; if two electrons reside in the same orbital implies; those particles are entangled particles. That is, if you apply any change to one electron; instantaneously the other electron will be affected.

It is the consequence of relativity because of; intervals.

If they are in same position implies $ds^2 = 0$ which implies Light – like interval.

1) But According to generalized Pauli Exclusion Principle ds^2 should not equal to zero ($ds^2 \neq 0$)
2) If they are in same position implies; ds^2 should not be greater than zero.

Therefore the only one choice to overcome the violation of generalized Pauli Exclusion Principle is: ds^2 should be less than zero ($ds^2 < 0$) implies space – like interval.

Therefore space – like interval has physical meaning. Is it true?

2.3.Einstein-Rosen Bridge is equal to einstein podolsky rosen paradox:

To get physical meaning; take ER = EPR

If two electrons reside in the same orbital or if they reside in a same position implies $ds^2 = 0$ (Null geodesics, where $ds^2 = 0$ and proper time is unchanging, ie $d\tau = 0$).

By this, in this space – time, it is possible to come up with coordinate systems such that if you pick a hyper-surface of constant time. A set of points that all have the same time coordinate, such that every point on the surface has a space-like ($ds^2 < 0$) separation, giving what is called a 'space-like surface' ($ds^2 < 0$) and draw an "embedding diagram" depicting the curvature of space at that time, the embedding diagram will look like a tube connecting the two exterior regions, known as an "Einstein–Rosen bridge".

This "Einstein–Rosen bridge" is “einstein podolsky rosen paradox” or “quantum entanglement”.

The same is applied to **“Black Hole”.**

2.4.Black Hole

What is quantum gravity?

Answer: We know that, “physics that seeks to describe the force of gravity according to the principles of quantum mechanics, and where quantum effects cannot be ignored (near Black Hole)”.

Black Hole is subject of Einstein’s Space – Time where all particles packed in a single point. Packing of particles in a single point violates generalized Pauli Exclusion Principle. Therefore inside this point an "Einstein–Rosen bridges" exists in between particles.

2.5.Expanding universe:

Here ER = EPR[4] does not mean two distant black holes are connected through the interior via an Einstein-Rosen bridge.

ER = EPR means whenever all particle are packed in a single point, there exist Einstein-Rosen bridges inside that single point in between particles which are situated at that point. As time passes; the separation between particles increases due to generalized Pauli Exclusion Principle. That is every time that single point thinks all the particles are in same position (because universe is ageless). I can name this as expanding universe. Therefore, expanding universe is the consequence of generalized Pauli Exclusion Principle.

Therefore by adopting general relativity it has good sense to define quantum entanglement. And by adopting quantum mechanics it has good sense to define black hole.

Note: EPR paradox is Quantum Entanglement under the prediction of quantum mechanics that it is impossible to know both the position and the momentum of a quantum particle. Quantum mechanics is incomplete until there is no generalized Pauli Exclusion Principle. But now we have generalized Pauli Exclusion Principle. Therefore Quantum mechanics may be complete.

2.6.Dark matter:

I am predicting that the force (may be electric, gravity) will remain same in between entangled particles. For example if you take two entangled electrons; the electric force will remain same in between two electrons whatever may be the distance between them. But according coulombs inverse square law force has to fall down with respect to distance. So due to coulombs inverse square law observer may think there exist Dark charge.

In a similar way if two galaxies revolving with each other the gravitational force will remain same as distance increases. If an observer tries to measure orbital velocity of galaxy the values did not match with Newton's gravitational force. So observer may think their exist Dark Matter.

Therefore Expanding universe and Dark Matter is due to Entanglement and GPEP.

2.7.Quantum mechanics:

Quantum mechanics is a subject of Einstein's Space – Time where $ds^2 = 0$ and proper time is unchanging (fixed), ie $d\tau = 0$.

By this, in this space – time, it is possible to come up with coordinate systems such that if you pick a hyper-surface of constant time. A set of points that *all have the same time coordinate (absolute Time)*,

> **Therefore time is absolute! Time is absolute, and part of the background is the special case of Einstein's Space-time.**

What makes Time is absolute, and part of the background is the special case of Einstein's Space-time?

Answer: Entanglement. Such that every point on the surface has a space-like ($ds^2 < 0$) separation, giving what is called a 'space-like surface' ($ds^2 < 0$).

Therefore; for non-relativistic quantum mechanics, it is not so surprising that time and space are treated differently, with position being an operator and not time.

That is, Albert Einstein and Isaac Newton are present in a same position therefore their clocks read same so they think time is absolute. If they are not present in the same position then they can say time is not absolute.

In a similar way if you place infinite observers at the same position their clocks read same so they think time is absolute.

Quantum mechanics is the name given to that bizarre nature! This is the deeper insight we missed till now about QM. **Non-relativistic quantum mechanics is special case of Einstein's Space-time.**

Albert Einstein says to Isaac Newton though our clocks read same does not mean that "Time is absolute".

Therefore in Quantum mechanics there is nothing wrong if you assume "time is absolute".

2.8. Let us study the General Relativity according to the principles of quantum mechanics: This section is not a part of this paper. But I am including here for the sake of sharing my thoughts with my people.

What is the 'key' to crack gravity in between two bosons or in between two electrons?

Answer: I can say the key is 'Metric Tensor[1]' or 'geodesics'.

What is geodesic?

Answers:

a) **According to the principles of quantum mechanics:**

A geodesic is the shortest distance between "two probabilities (probability density)".

Position observable = it depends on the probability density of finding the particle at position 'x'.

Probability density of finding the particle at position ‘x’ = $\left|\cdot\right|^2 = \cdot^{*}\cdot$

What do we use as the time parameter in the Schrodinger equation?

Answer: The time measured in *Relativity* by a clock that moves along a time-like world line.

Proper time: In relativity, proper time[2] along a time - like world line is defined as the time as measured by a clock following that line (of course it is absolute!).

I support a particle exist all over a space which is the backbone of quantum tunneling. But a particle has different probability densities all over a space. Therefore each position in a space takes different probability value. Each probability defines a position. Therefore the shortest distance between two probabilities is called a geodesic.

For example take an electron. The position observable of an electron is shown in figure (1). The figure (1) tells; in a given space, the probability density of finding particle at a particular position ‘x’.

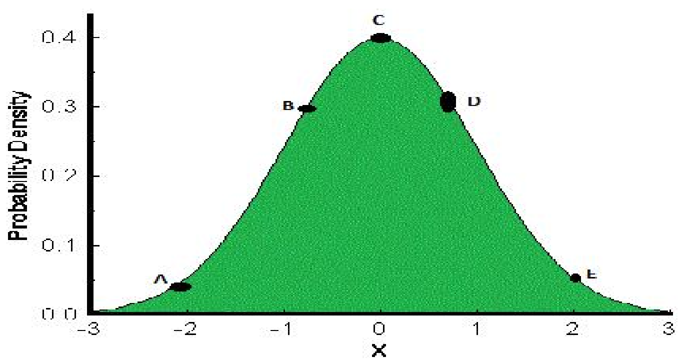

Figure 1 position verses probability density graph.

From figure (1) geodesic is defined as the shortest distance between A and B, A and E, B and C etc.,,

In a similar way if you take two position observables as shown in figure (2). Geodesic is defined as the shortest distance between two probabilities of each position observable.

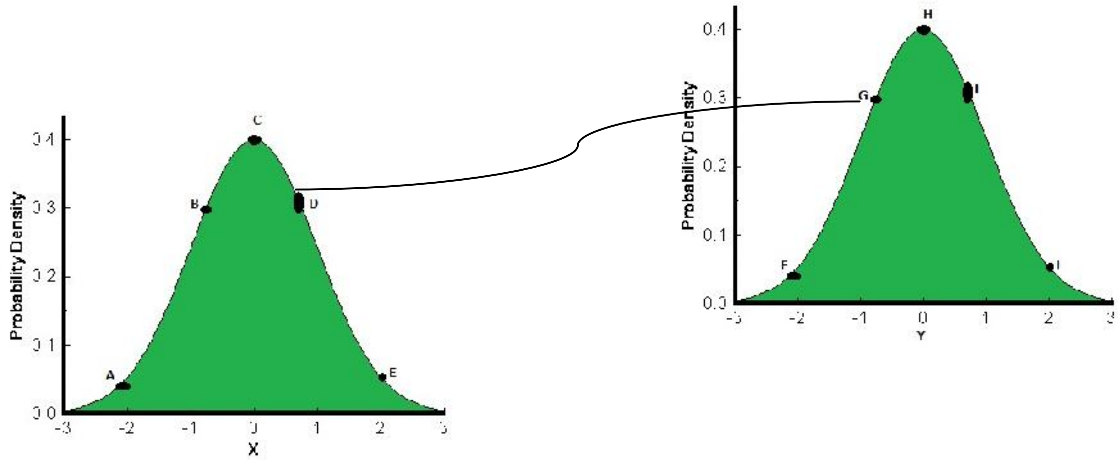

Figure 2: position verses probability density graph

From figure (2) geodesic is defined as the shortest distance between A and F, D and G, E and I etc.,,

Therefore **probability density decides “metric tensors” in turns “metric tensor” decides “curvature”; implies gravity which is left hand side of Einstein’s field equation**.

$$R_{«^3} - \frac{1}{2} R g_{«^3} = \frac{4®G}{c^4} T_{«^3} \qquad (1)$$

Equation (1) is Einstein’s field equation without cosmological constant.

Do you need any new or extra math here?

Answer: No. because, you know the mathematics of general relativity and quantum mechanics.

b) According to the principles of classical mechanics:

We know already how to define geodesic according to the principles of classical mechanics. So to me it’s no need to define here.

3. CONCLUSION

In this paper I developed theory to study force of gravity in terms of quantum mechanics. The result gives bran new way to define quantum entanglement.

ACKNOWLEDGEMENT

Author wants to thank Irfan, kirran, yugandhar, venkatesh, jagadish and ghouse for their cooperation in preparing this paper.

REFERENCES

Books:

[1] Stephen hawking, A stubbornly persistent illusion (running press book publishers, Philadelphia, London).

[2] Albert Einstein, relativity, the special and the general theory (Mahaveer Publishers, India).

[3] Lee Smolin, the trouble with physics (published by Penguin Group, London).

websites:

[4] https://arxiv.org/abs/1306.0533