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Article

# Quantum Space-Time with Energy and Unified Field Theory

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## Abstract

In this paper, We constructed a Space-Time with energy model just considering the velocity of the light  $C$  and the Plank constant  $h$  and  $1/a_g$  ( $a_g$  is the strength of gravitation ( $m/s^2$ )) This model will just provide a probability to combine the **Gravitation** and **Electric-Magnetics field** under a basic structure of quantum Space -Time with energy. We hope to throw a little bit light on the big picture of uniting the quantum mechanics and General relative theory. In this paper, We also find the symmetry number structure about line-1/2 for Unified Field Theory.

**Keywords:** quantum time-space with energy; Unified Field Theory

## 1. Time Quantization

**Time** is a basic concept in physics. But till now, we have no idea to use mathematical model to describe the structure of "**Time**". In Newton's system, Time is an independent existence with space. In Einstein's system, Time and Space are bonded together just considering the Velocity of Light is a constant **C(m/s)**. And then for a Quantum system, we consider the energy is discrete and then the "**Time contentiousness**" disappeared in this system. But It is that the **Dimension** of Plank's constant **h(J.s)** is also including the unit of **Time**. So, we think that if we may construct a Dimension system of Time-Space with energy based on two priori conditions: the velocity of light is a constant **C** and the unit of **energy with Time** is a constant **h, Plank constant**. And if we can quantized this Time-Space with energy system, Maybe we can get a mathematical model to describe more physics details of the basic structure of Space -Time with energy and get a **Unified Field Theory**.

$\tau$  can be defined as

$$\tau \sim nh \text{ (J.s)} \quad n \sim (1,2,3,\dots)$$

$h$  (J.s) is Planck constant. We can call  $\tau$  as **Time – been**

$t$  can be defined as

$$t \sim n \left( \frac{c}{a_g} \right) \text{ (J.s)} \quad n \sim (1,2,3,\dots)$$

$C$  is the velocity of Light ( m/s ), and  $a_g$  is the Intensity of field of gravitation ( $m/s^2$ ). We can call  $t$  as **Time – to be**.

And

$$T \sim 2n \text{ (J.s)}$$

We call  $T$  **Time – being**.

So we got a **Time-space with Energy** coordinate system  $(1/c-h(-T -c/ag) -1/c)$  show as **Figure 1(a)**.

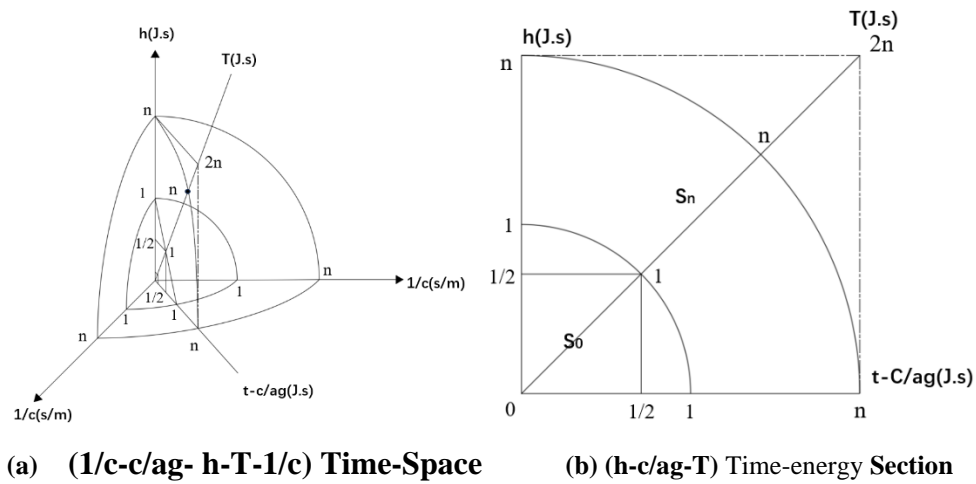


Figure 1. Time- Space with energy coordinate.

$$\langle T \rangle = \langle \tau \rangle + \langle t \rangle \sim n * \left[ \langle h \rangle + \left\langle \frac{c}{a_g} \right\rangle \right]$$

We can define **mass M** as:

$$M_0 \sim \frac{h}{c^2} (\text{kg.s})$$

$$M \sim n^3 \frac{h}{c^2} (\text{kg.s})$$

and show as Figure 1(b)  
at moments  $T \sim 2n(\text{J.s})$

$$\tau = t$$

$$nh = nc/a_g$$

$$\frac{1}{a_g} = h/c \quad (\text{J.s}^2.\text{m}^{-1})$$

So we have:

$$M_0 a_g \sim 1/c \quad (\text{s.m}^{-1})$$

## 2. Quantum Time Space with Energy

We will define a space-time with energy as:

$$M_0 a_g \sim 1/c \quad (\text{s.m}^{-1})$$

$$T \sim 2n \quad (\text{J.s}) \quad n \sim (1,2,3,\dots)$$

$$S_0 \sim \frac{1}{4} * h * \frac{c}{a_g} \sim \left(\frac{1}{2} * h\right)^2 \quad S_n \sim n^2 h * \frac{c}{a_g} \sim (nh)^2$$

$$\frac{S_n}{S_0} = 4n^2$$

$$\frac{M}{M_0} \sim n^3$$

### 3. The Symmetry Number Structure About Line-1/2 for Unified Field Theory

We can call  $\tau(J.S)$  as **Time – been**  $t(J.S)$  as **Time – to be**.  $T(J.S)$  as **Time – being**. ( $\tau, t, T \in R$ ).

Abscissa:  $\tau \leftarrow 0 \rightarrow t$  **Bergson Time**

Vertical ordinate:  $0 \rightarrow T$  **Newton’s Time**

1.  $zp = \frac{1}{2} \pm \varepsilon$  ( $\varepsilon = a + bi$   $a, b \in R$  )

$$0 = \frac{1}{2} - \frac{1}{2}$$

$$1 = \frac{1}{2} + \frac{1}{2} = \left(\frac{1}{2} - \varepsilon\right) + \left(\frac{1}{2} + \varepsilon\right)$$

This is a model for Quantum Entanglement.

2.  $Pn \pm p0 = 2n$

$$p0 \leftrightarrow \left(\frac{1}{2} - \varepsilon\right)$$

$$n \leftrightarrow \frac{1}{2}$$

$$pn \leftrightarrow \left(\frac{1}{2} + \varepsilon\right)$$

$n \sim (1, 2, 3, 4, \dots)$  All natural numbers excepted 0

$p0, pn \in P \sim (2, 3, 5, 7, \dots)$  All prime numbers

$$Pn + p0 = 2n \quad n \sim (2, 3, 4, \dots)$$

This is a model for gravitation

$$Pn - p0 = 2n \quad n \sim (1, 2, 3, 4, \dots)$$

When  $n=1$   $Pn - p0 = 2$

This is a model for the electromagnetic field.

So we get a Symmetry Number Structure about Line-1/2 for Unified Field Theory as Figure 2. we can call it **Einstein-Quantum Space-Time with energy**.

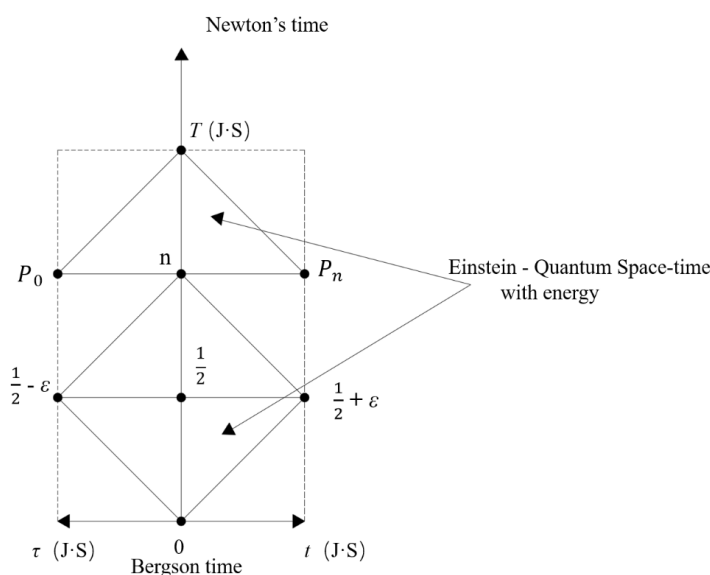


Figure 2. The Symmetry Number Structure about Line-1/2 for Unified Field Theory.

### 4. Discussion

**Galilei** said that he can creative the Universal only using **Space, Time** and **Logarithm**. Einstein thanked that a Unified Field Theory should be a geometrization one. And Roger Penrose pointed out that if we want to get the uniting of the Mass and Time-Space , we need the help of Complex Number[1].The paper [2] discusses that a Unified field theory should be a model with **Plank constant** 、 **gravitation** and the **velocity of Light**. **Wilczek** [3] want to use a concept called **Quantum Time Crystals** to **define the Time space with energy**.

In Newton's system, Time is an independent existence with energy.

$$S \sim E * t$$

In Einstein's system, Time and Space are bonded together just considering the Velocity of Light is a constant **C(m/s)**.

$$S \sim 1 * \left(\frac{c}{a_g}\right)$$

**$a_g$**  is the strength of gravitation (m/s<sup>2</sup>)

And for a Quantum system, the energy is considered discrete and then the "Time contentiousness" disappeared in this system. But It is that the **Dimension** of Plank's constant **h (J.s)** is also including the unit of Time .

$$S \sim (E * t)^2 = (nh)^2$$

h is Plank constant, we can find that the **Dimension** of Plank's constant **h(J.s)** is also including the unit of Time .

In our system, we can get

$$S^{1/2} \sim E * t \sim \sqrt{h * \left(\frac{c}{a_g}\right)}$$

$$S_n / S_0 \sim 4n^2$$

$$M_0 a_g \sim 1/c$$

And we notice that if **Goldbach conjecture**  $2n = p_0 + p_n$  (n is a nature number , and  $p_0, p_n$  are primer numbers)and **Polignac's conjecture**  $p_n - p_0 = 2n$  (n is a nature number , and  $p_0, p_n$  are primer numbers) be proofed, then

$$T \sim 2n = (p_n \pm p_0)$$

$$\frac{S_n}{S_0} \sim 4n^2 = (p_n \pm p_0)^2$$

$$\frac{M}{M_0} \sim n^3 = \left(\frac{p_n \pm p_0}{2}\right)^3$$

Because of the randomness of prime numbers, This will be a model to explain the **randomness** of the nature and **Quantum Entanglement**.

## 5. Summary

In this paper, We constructed a Space -Time with energy model just considering the velocity of the light C and the Plank constant *h*. Our Model give a definition of **Quantum Space Time** as

$$m_0 \sim \frac{h}{c^2} \sim 10^{-50} (\text{J} \cdot \text{m}^{-2} \cdot \text{s}^3)$$

$$1/a_g \sim \frac{h}{c} \sim 10^{-42} (\text{J} \cdot \text{m}^{-1} \cdot \text{s}^2)$$

$$S_0 \sim \frac{1}{4} * h * \left(\frac{c}{a_g}\right) (\text{J}^2 \cdot \text{s}^2)$$

$$T \sim 2n (\text{J} \cdot \text{s})$$

$$\frac{S_n}{S_0} \sim 4n^2$$
$$\frac{M}{M_0} \sim n^3$$

This model just provides a basic structure of quantum Space -Time with energy.

**Competing Interests statement:**  The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

**Data Availability statement:** No datasets were generated or analyzed during the current study.

## References

1. R.Penrose and W.Rindler. Spinors and Space-Time. Vol.1, Cambridge University Press, Cambridge 1984
2. Gamov D, Ivanenko L, Landau D Physics of Atomic Nuclei 2002. **65** 1403-1405.
3. Frank Wilczek Physics Review Letters 109, 160401 (2012).

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