The Spiral Motion in Space and Time

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Abstract: The Spiral Motion has a wave function, it can also have a "minimum length" as it's radius, this role can make itself to have a contingent coordinate system as inertial. After trying to impose the additivity, a motion theory appears and can be chosen as a solution comprising both classical motion and relativity motion.

1. Wave

A wave function has the form,

$$\psi = Ae^{i(kx-wt)} \quad where\ p = \hbar k\ and\ E = \hbar w \tag{1}$$

This is a general form of solution of wave packets, based on Mr. DE BROGLIE's work [1]. This solution can make linear superpositions, but this is not easy to impose. This is because p and E are only underlying elements (or observables) under a given inertial system, how to add different p's and E's is problematic because the inertial systems are sometimes different.

2. Quantum Coordinate Systems

Mr. A MEESSEN worked out a quantum coordinate system in his series of papers (for example in [2]). Mr. A MEESSEN based his work on a "minimum length". He successfully made the differentiations and he hinted there should be the integration part but didn't state explicitly.

Define the minimum length,

$$a > 0 \tag{2}$$

3. Discrete Universe

Mr. JOSE GARRIGUES BAIXAULI also based a "minimum length", he called "Planck Length", to construct a discrete universe model comprising both wave and particles. For example, in [3]. He made a discovery that the gravitational force is not only universe but also recursive. He is near the Spiral Motion even though what he advocated is a 4D model, but the computations between these two models are nearly the same.

4. Spiral Motion Universe

Mr. XIANG QIAN ZHANG claimed he copied a physics theory from outer space, a highly civilized Planet, named GOOK (古可), in his book [4]. He based his theory on Spiral Motion, for example, if a ballpen falls from your hand to the desk, this ballpen is not moving, the space is moving. The Spiral Motion is thread-like. But how to add different spiral motions into a "bigger" one? Mr. XIANG QIAN ZHANG didn't make an answer in his book.

Notably In his book he made a short and complete computing for the momentum P,

$$P = m(C - V) \tag{3}$$

And after taking derivatives to time t, one can get four forces instantly. These four forces are said to be four basic forces. But before doing this, let us remember m is a variable here, comprising many Spiral Motion Threads, so which one of these threads is the most

privileged one, this is still a problem.
In this article, I try to find an added coordinate for this composite Momentum p. My aim is to find a coordinate system and under which the Momentum p will remain as the traditional entity and its formula will not be changed.

5. Zigzag Like Computation

Mr. ALBERT EIENSTEIN had an intuition of global summation in his work [5] when he developed Mr. BOSE's model. Mr. GROMMER helped to work out this solution. This solution used Taylor series.

6. The Additivity of ψ

A direct addition of exponential function is tedious. My discovery based on a formula of momentum conservation principle in [3] by Mr. BAIXAULI. It is also noticeable Mr. ZHANG made the same formula in an informal way and stated that it was the explanation of "Red Shift", this formula is,

$$m\lambda = \frac{h}{c} \; or \; m\lambda_{bar} = \frac{\hbar}{c} \tag{4}$$

And m is movement mass,

$$m = m_0\sqrt{1 - v^2/c^2} \tag{5}$$

We make m_0 as rest mass.
Notice, $k = 1/\lambda_{bar}$, so we can rewrite (4) as,

$$\frac{m_0\sqrt{1 - v^2/c^2}}{k} = \frac{\hbar}{c} \tag{6}$$

I found this formula had already the Additivity, why?
Set the energy of this moving body $as\ E_m$, this is also the formal definition in Mr. ZHANG's book [4].

$$E_m = mc^2 = m_0c^2\sqrt{1 - v^2/c^2} \tag{7}$$

And make a suggestion,

$$E_m = k \cdot constant \cdot E_u \; and \; just \; let \; constant = \frac{a}{\pi} \; , E_u \; is \; Energy \; of \; Universe. \tag{8}$$

We have,

$$m_0c^2\sqrt{1 - v^2/c^2} = k\frac{a}{\pi}E_u \tag{9}$$

Use (6) to divide (9), we get,

$$E_u = \frac{hc}{2a} \tag{10}$$

This coincides with Mr. MEESSEN's definition in [2], which can make (6) have the Additivity.
By the recursive character of gravitational law, we have,

$$\frac{Gm}{r} = v^2 \tag{11}$$

Because of $k = 1/r$, we can have,

$$v^2 = Gmk \tag{12}$$

Expand (5), and input (12),

$$m = m_0\sqrt{1 - v^2/c^2} \cong m_0\left(1 - \frac{\frac{1}{2}v^2}{c^2}\right) = m_0 - m_0\frac{Gmk}{2c^2}$$

Solve m,

$$m = \frac{m_0}{1 + \frac{m_0 Gk}{2c^2}} \tag{13}$$

Input (13) into (4) (6) , which is the momentum conservation formula, and after simplifying, we get,

$$\frac{Gm_0\hbar}{2c^2}k^2 + \hbar k - m_0 c = 0 \tag{14}$$

This is a quadratic equation for k, because $k > 0$, we solve and get,

$$k = \frac{-\hbar + \sqrt{\hbar^2 + 2m_0{}^2 G\hbar/c}}{\frac{Gm_0\hbar}{c^2}} \tag{15}$$

7. Movement theory

In k's expression in (15), the only variable is the rest mass m_0, which says the fundamental things of movement are to make the mass variable, why? Because this contains 2 cases as a whole.

Case 1: m_0 is a constant.

Because, $E = \frac{p^2}{m} = \frac{(mc)^2}{m} = mc^2\ , so\ \frac{dE}{dp} = \frac{1}{m}(2p)\ , and\ \frac{d^2E}{dp^2} = \frac{2}{m}$

We get back to Newton's law of motion [2],

$$\frac{dv}{dt} = \frac{d\frac{dE}{dp}}{dt} = \frac{d\frac{dE}{dp}}{dp}\frac{dp}{dt} = \frac{d^2E}{dp^2}\frac{dp}{dt} = \frac{1}{m}F$$

Case 2: m_0 is a variable.

By (5), (12), we have, $v^2 = Gmk = Gkm_0\sqrt{1 - v^2/c^2} \cong Gkm_0\left(1 - \frac{\frac{1}{2}v^2}{c^2}\right)$

Solve this to get,

$$v = \sqrt{\frac{m_0}{\frac{m_0}{2c^2} + \frac{1}{Gk}}} \tag{16}$$

The only variable behind v is still m_0, because $v = v(m_0, k) = v(m_0, k(m_0))$

Then because $v = \frac{w}{k}$, we get,

$$w = vk \tag{17}$$

The only variable behind w is also m_0

By (15),(16) and (17), we can construct (1) and make the corresponding Lorentz Transform available, such as in [1] and [6].

8. Restricted Relativity

Notice the Relativity we are following about is the Restricted Relativity, such as in [3]. The

Lorentz Transform in Restricted Relativity works slightly differently with how it works in Special Relativity.

9. Detailed Poisson Summation

There was a Detailed Poisson Summation Process behind, why?
Let the wave packet as $\phi = e^{ikx}$, Notice $k = 1/\lambda_{bar}$, we can rewrite,

$$\phi = e^{ikx} = e^{2\pi i \frac{1}{2\pi\lambda_{bar}}x} = e^{2\pi i \frac{1}{\lambda}x} = e^{2\pi inx} \tag{18}$$

We make n as a pseudo frequency variable, and set up the Poisson Summation computing [7],
Set $\mathbb{R}$ as Real Numbers, $S(\mathbb{R})$ as Schwarz function, and make $f(x) \in S(\mathbb{R})$. Define,

$$F_1(x) = \sum_{n=-\infty}^{n=\infty} f(x+n)$$

And $F_1(x)$ is a converged sum with period 1. We get,

$$\begin{aligned}\hat{F}_1(m) &= \int_0^1 \sum_{n=-\infty}^{n=\infty} f(x+n)\, e^{-i2\pi mx} dx \\ &= \sum_{n=-\infty}^{n=\infty} \int_0^1 f(x+n)\, e^{-i2\pi mx} dx \\ &= \sum_{n=-\infty}^{n=\infty} \int_n^{n+1} f(x)\, e^{-i2\pi mx} dx\, e^{i2\pi mn} \\ &= \int_{-\infty}^{\infty} f(x)\, e^{-i2\pi mx} dx\;\, e^{i2\pi mn} \\ &= \hat{f}(m)\, e^{i2\pi mn}\end{aligned}$$

The first line comes from definition and period of 1, the third line comes from the change of variable.

Because mn is an integer, and $e^{i2\pi mn} = 1$, set $e^{i2\pi mn} = e^{i\pi u_x} = e^{i2\pi \frac{u_x}{2}}$, Notice x is a hidden variable in u_x and u_x is an integer. And because of the inverse Fourier Transform,

$$F_1(x) = \sum_{n=-\infty}^{\infty} \hat{F}_1(n)\, e^{i2\pi nx}$$

We get,

$$\begin{aligned}F_1(x) &= \sum_{n=-\infty}^{\infty} \hat{f}(n)\, e^{i2\pi nx}\, e^{i2\pi \frac{u_x}{2}} \\ &= f(x)\;\, e^{i2\pi \frac{u_x}{2}}\end{aligned}$$

And finally, we get,

$$e^{i2\pi \frac{u_x}{2}} = \frac{F_1(x)}{f(x)}\ , and\ \frac{u_x}{2} = \frac{1}{2\pi i}\log\frac{F_1(x)}{f(x)} \tag{19}$$

In $\frac{u_x}{2}$, 2 comes from setting. And if $x = 0$, things go back to Poisson Summation, we can set $u_0 = 0$, which means $u_x = x$ when $x = 0$. The process can be the Detailed Poisson Summation Process.

Notice this also integrates with Mr. MINKOWSKI's theory.

10. The Physical Meaning of k

In Spiral motion, k is the curvature. One of the examples about this is the Lorentz Transform. For example,

$$\begin{cases} x' = k(x - vt) \\ x = k'(x' + vt') \end{cases} \tag{20}$$

This simple setting can easily get the formula of Lorentz Transform [4], k is apparently the curvature factor. The curvature from state x to state x' is the same curvature from state x' to the state x , so that $k = k'$ and (x', x) are two different states.

Comparatively this version of Lorentz Transform works in a “stage way”, the ideal shape often comes from the manifold shape, so that the Gauss Divergence Theorem will generally hold.

11. Summary

The basic movements are constructed by the Spiral Motion basically and quantumly. There are two kinds of Relativity, Restricted Relativity and Special Relativity. Restricted Relativity works under the coordinate system we just derived. The Special Relativity works between two inertial systems, each of them is a coordinate system we derived here, so the inertial systems are recursive.

For the Restricted Relativity, Lorentz Transform works slightly differently, and (x', x) are two different states, not just one state depicted by two perspectives (such as in Special Relativity).

References

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