Time Has Two Dimensions-Exploring Coordinate Connotation of Five-Dimensional Space

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ABSTRACT

For purpose of further quantifying and perfecting the theory of five-dimensional space, and building upon the ideas of Theodor Kaluza, Itzhak Bars and David Bohm, as well as recognizing the validity of B. Feng's new physics theory for deeper understanding particle physics and astrophysics, the corresponding coordinate connotation representation has been determined through reasoning, repressed in form (x, y, z, ict, iat^2). Here, a represents the curvature acceleration of light, equal to $1.627746473 \times 10^{31}$ m/s^2. This is believed to be the maximum possible acceleration in the universe, beyond which nothing can exceed. It currently has no prospects for practical application, except for theoretical supplementation. The essence of the two time dimensions is special relativity and general relativity.

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I. BACKGROUND

Itzhak Bars, an American theoretical physicist, was the first to propose the concept of *two dimensions of time*. He introduced this idea in 2001[1]. Bars' proposal builds on ideas from string theory and aims to provide a framework for understanding the fundamental nature of spacetime and its relationship to particle physics. His work has stimulated further research and discussions within the theoretical physics community (His work was followed by Penrose Roger (2004), McDonald John Q (2006), Marcus Chown (2007), Weinstein Steven (2009, 2013) and Dinov Ivo; Velev Milen (2021) *et al.* scientists).

Itzhak Bars discovered that incorporating a second dimension of time could help resolve specific issues and provide a deeper understanding of fundamental physical phenomena. In Bars' framework, the second dimension of time is conceptualized as an additional temporal degree of freedom, orthogonal to the conventional notion of time. This extra dimension allows for a richer description of dynamical processes. It may have implications for understanding various phenomena in physics, such as the nature of causality and the behavior of particles at high energies. In Bars' theory, time isn't linear; instead, it forms a 2D plane in curvature interwoven throughout the dimensions.

Previously, two prominent scientists have explored similar ideas related to multiple time dimensions, although their proposals may not be identical to Bars'. They are,

David Bohm: Theoretical physicist, proposed a theory of quantum mechanics that includes a concept called "implicate order," where, time is viewed as multidimensional and unfolds in an interconnected manner, suggesting a more intricate relationship between time and space. His distinguished statement in 1973 is that "*space is not empty, and is the ground for the existence of everything, including ourselves.*"[2]

John Archibald Wheeler: He introduced the concept of "*spacetime foam*," suggesting that at the most minor scales, spacetime may have a fluctuating, foam-like structure with additional temporal degrees of freedom beyond the conventional notion of time. His famous saying in 1955 is that "*spacetime is a theoretical phenomenon arising from quantum fluctuations at extremely small scales.*"[3]

Recently, in the past decade, a physicist David Deutsch, who known for his work on quantum computing and the theory of parallel universes, subsequently, has explored the idea in 2013 that time may have *multiple branching paths or dimensions*, leading to different possible futures.[4]

Back to Itzhak Bars. As for recognition within the academic community, Bars' proposal has generated interest and discussion among physicists, particularly those working in theoretical physics and related fields. While it hasn't been universally accepted as a mainstream concept; it has stimulated further research and debate, showcasing its impact on the field.

Currently, several novel studies have emerged making valuable contributions to their respective fields and yielding many supportive outcomes;[5-6] these contributions have been compiled in a monograph.[7] This theory incorporates the fundamental concepts of higher-dimensional space time proposed by Kaluza, Itzhak Bars, and other scientists. By merging Einstein's theory of relativity with quantum mechanics, it established a relatively comprehensive and self-contained theoretical framework. This groundbreaking work is attributed to B. Feng and is called"*B. Feng's new physics theory*."In the context of five-dimensional space, researchers have theoretically derived a concise set of elegant mathematical formulas. These formulas yield results consistent with actual measurements, including fundamental quantities such as basic charge, electron mass, proton mass, electron radius, proton radius, and the fine-structure constant. Surprisingly it does not require any physical constants to calculate the fine structure constant, but merely some high-dimensional geometric parameters; then, when calculating the primary charge, there is no need for it to use the fine structure constant, but only three essential physical constants as vacuum dielectric constant, vacuum speed of light and Planck constant. The critical point is that, when calculating the mass and radius of a particle, the concept of the"*radius of light-based manifold*" is proposed and utilized as an additional parameter. The radius of the manifold (R_0) has been established as the fourth fundamental physical constant in nature.

B. Feng's new physics theory has attracted the attention of some physicists; yet it remains unacknowledged on a widespread scale and has not gained an extensive recognition. Neverthless, this article asserts the need for further improvement and fill in gaps, guided by its sound reasoning and a harmonious and consistently well-constructed conclusion. The original intent behind writing this article aligns with the goal stated in title.

II. EXPLORING THE ORIGIN OF FOUR-DIMENSIONAL SPACETIME

The discovery and proposal of an extra space dimension originated with Einstein's special relativity. From a physical perspective, time is integrated into the properties of space, rendering the theory of special relativity plausible, its accuracy has been validated through experiments and practical applications. Initially, Einstein merged time with space, introducing the concept of four-dimensional spacetime denoted by coordinates (x, y, z, t). However despiting its mathematical elegance, this representation did not reflect a genuine physical spacetime due to the disparity in scale dimensions between time (t) and space. Einstein later refined this perspective, incorporating Minkowski's spacetime framework, adjusting the coordinates to (x, y, z, ict) within his theory of general relativity. Thus, the concept of an actual physical four-dimensional spacetime emerged, albeit with time represented in an imaginary form. Despite these advancements, Einstein still maintained a mathematical interpretation of spacetime, akin to his approach to quantum theory; at the same time, he acknowledged the findings of quantum mechanics, he resisted accepting the wave-particle duality and non-local characteristics of physical matter, hindering his pursuit of a unified field theory.

Returning to the original premise, if (x, y, z, ict) signifies genuine physical space, velocity is projected into time through imaginary numbers. By extension, one may inquire whether acceleration could be spatialized in time likewise. With general relativity's validation, there is merit in exploring the existence of a five-dimensional space in inferential physics (x, y, z, ict, iat^2), indicating Einstein's reminder of time's dual dimensions. Based on this notion, B. Feng's theory of new physics posits a five-dimensional space.

The concept of five-dimensional space was initially proposed by Kaluza and endorsed for publication by Einstein, while Einstein perpetuated his belief in time's mono-dimension property. However, Kaluza's interpretation remained confined to a mathematical framework, lacking a physical connotation. Nonetheless, Einstein's foundational contributions paved the way for the establishing of the five-dimensional physics space.

By the way, in contrast, the eleven-dimensional space pertains to string theory, where the additional eight dimensions lack distinct physical significance and are postulated to curl within a minuscule spatial range, lacking a theoretical basis for this curvature. In my assessment, compared to a five-dimensional space, the additional six dimensions serve as a mathematical correction, rectifying the initial misconception and aligning with reality. Pursuiting of perfect symmetry necessitated concessions they are, ultimately resorting to the insertion of Higgs particles or fields via spontaneous symmetry breaking in mathematical Lagrangians to acquired mass of elementary particles. Thus, the additional six dimensions might be compensating for their “quarks” error, I guess.

III. EXPLORE THE COORDINATE (X, Y, Z, ICT, IAT^2)

The coordinate system (x, y, z, ict, iat^2) shows us the universe space of a five-dimensional and complex, and the extra dimensions are two imaginary dimensions related to time.

In the fourth dimension, ict, the information is clear, where c is velocity and also the extreme velocity carried by light. However,

In the fifth dimension, iat^2, where the information has not been cleared, symbol a is known as acceleration; however, what does it to be in value?

Well, you see, generally we have,

$$a = \frac{v^2}{R},$$

Let’s substitute the value into its corresponding limit. Then, c replaces v. Here, we only replace R with the radius of light base manifold, R_0, which appears to be reasonable. The radius of light base manifold R_0 in B. Feng’s theory system[6] is,

$R_0 = 5.521469059 \times 10^{-15}$ m, then we have,

$$a = \frac{c^2}{R_0} = \frac{(2.99792457982 \times 10^8)^2}{5.521469059 \times 10^{-15}} = 1.627746473 \times 10^{31} \text{ m/s}^2$$

In this way, the problem has been solved. The character “a” here has been specially defined as the *curvature acceleration constant of light* in physics, a new concept introduced in this paper.

IV. DISCUSSION

Light travels in speed of constant *c*. However, when it travels in a circle, its acceleration is in a constant *a*; and *a* becomes the greatest acceleration in the universe, nothing can exceed it. When light travels in a circle, a basic particle is born; reverse looking, the fundamental particles are indeed a circled light with different energy. In B. Feng's theory framework, only electrons and protons moving in opposite circular directions can stably exist in nature, as determined by solving the relevant equations therein.

In coordinate (x, y, z, ict, iat^2), the imaginary dimensions act as actual degree of freedom. They cannot be recognized as nonexistent, nor do they exist in the same way as the real dimensions. It participates in controlling or describing the laws of motion of things. When it encounters square cases, it will return to a real, but negative value, which cannot be ignored. The imaginary numbers are not just mathematics, but physical reality. May the imaginary dimensions result in spatial contraction and convergence, equivalent to relativistic effects according to the analysis in the text. Looking into the future, a possible theoretical application is that the complex solution process of the results of general relativity can be obtained through simple operations in the five dimensional space under the proposed coordinates.

Furthermore, it can be said that the constant curvature speed of light (acceleration) and conservation of angular momentum result in the charge properties of particles and their masses, as well as their corresponding positive and negative charges, causing space to bend. Its coexistence leads to the neutralization of charge in neutrons and atoms, greatly canceling out the spatial property of charge. The remaining two dipole interactions in mathematics are reflected in the form of intermolecular forces and an invariant weak force coefficient. At this point, quantity is quality, and the accumulation of mass creates a macroscopic space warp.

V. CONCLUSION

The five-dimensional space corresponds to coordinates of (x, y, z, ict, iat^2), where c is the speed of light, and a represents the acceleration of light in a curved state, with a value of $1.627746473 \times 10^{31}$ m/s^2. The essence of the two time dimensions is special relativity and general relativity.

Postscript

To clarify, the main points and concepts of this article are brief, clear, and prominent for easy grasp. However, It's normal to have some doubts when reading roughly, to gain a deeper understanding, it is necessary to have a thorough familiarity and mastery of references 5-7 in advance, which would require a lot of effort.

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