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The CPT Symmetry Breaking

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Abstract

Currently, according to physics, symmetry breaking cannot occur in the case of continuous symmetries (in the case of symmetries of equations, symmetry breaking has already been proven to occur: some discrete symmetries are also broken in the weak interaction, namely the P, C and CP symmetries; and the spontaneous symmetry breaking, however, is a different chapter in physics), i.e. according to the generally accepted position, the Charge Parity Time symmetry always remains.

Returning to the issue of discrete symmetries, symmetry breaking is a precise indication that the physics of nature has not been fully defined in effective theories. Because if there were no symmetry breaking in the physics of the equations (these are not natural continuous symmetries, but discrete symmetries), the universe could not exist, as has been proven in many studies. Therefore, if we refine our description of the physics of nature with further research, there is no need for symmetry breaking. Precisely, this further step is provided by the theory of quantum gravity that we have developed; the correctness of the theory is also proven by the fact that everything can remain symmetrical in the physical system of nature, there is no need for symmetry breaking in our complete, 11-dimensional time-space model and description of physics, because it takes better into account the functioning of physical nature (the time space is not an incorrect text, but a significant change).

Based on the quantum gravity theory we have developed, the above and all the important open fundamental questions of physics can be answered. The experimentally created CPT symmetry breaking is one of the starting points of this new theory and proof; therefore, we can state that based on theoretical and experimental results, the continuous symmetries of nature, including the CPT symmetry, are demonstrably violated, and to a large extent (I repeat, this symmetry violation only exists within the framework of the current effective theory and this problem is immediately solved in the new quantum gravity theory).

So, this symmetry breaking can be detected directly, by well-evaluated measurements, at any time. This means that, as stated above, the 4-pulse invariance, energy conservation and with it the Lorentz covariance - invariance are violated, and gauge symmetry is broken, in the framework of the current basic, proven (usually four-dimensional), effective theories. However, in the theory of Quantum Gravity, this is not necessary, the continuous symmetries are not broken.

For a more detailed understanding of quantum gravity, I recommend my published article: Research & Reviews: Journal of Pure and Applied Physics, Published: 09-May-2025, DOI:10.4172/2320-2459.13.1.001.

The topic of our following study is to introduce the CPT symmetry breaking, by presenting the basic experimental results and the corresponding theoretical derivations. Related to this, my article given above allows you to get to know the new physical model based on the CPT symmetry breaking better. At the same time, the theory of quantum gravity is largely based on the knowledge and proof of the Charge Parity Time symmetry breaking.

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Introduction

Currently, according to physics, symmetry breaking cannot occur in the case of continuous symmetries (in the case of symmetries of equations, symmetry breaking has already been proven to occur: some discrete symmetries are also broken in the weak interaction, namely the P, C and CP symmetries; and the spontaneous symmetry breaking, however, is a different chapter in physics), i.e. according to the generally accepted position, the Charge Parity Time symmetry always remains.

The postulate of the conservation of continuous, natural symmetries is one of the cornerstones of modern physics, the basis of current theories. In the past 30 years, in terms of proving fundamental particle theoretical predictions, despite the expectations of physicists, only one result has been achieved in particle physics (the detection of the Higgs boson is part of the basic model, it did not create fundamentally new physics): namely, that none of them have been experimentally proven – this, in turn, fundamentally questions naturalness, because if this remains the case, then the existence of our universe would require unnatural fine-tuning of physical constants.

While physics is soaring in some practical areas, e.g. in condensed matter physics, the most fundamental questions in the field of particle physics have remained unproven. So far, there has been no quantum gravity theory and two fundamental effective theories, classical gravity and quantum theory, have remained incompatible, although both are very useful and successful theories according to their boundary conditions and premises and this will always remain so, because within the given abstraction framework, the correct calculations and mathematical relationships do not change. Because, only in a broader, new knowledge-providing interpretation can the appropriate chapter of physics be taken over and placed on a more secure basis, a new theory, within its own extended boundary conditions. In recent times, the Standard Model has also been questioned in several areas, and its shortcomings have been confirmed (e.g. according to some research, such an area is the behavior of dark energy).

Returning to the issue of discrete symmetries, symmetry breaking is a precise indication that the physics of nature has not been fully defined in effective theories. Because if there were no symmetry breaking in the physics of the equations (these are not natural continuous symmetries, but discrete symmetries), the universe could not exist, as has been proven in many studies. Therefore, if we refine our description of the physics of nature with further research, there is no need for symmetry breaking. Precisely, this further step is provided by the theory of quantum gravity that we have developed; the correctness of the theory is also proven by the fact that everything can remain symmetrical in the physical system of nature, there is no need for symmetry breaking in our complete, 11-dimensional time-space model and description of physics, because it takes better into account

the functioning of physical nature (the time space is not an incorrect text, but a significant change).

For example, spontaneous symmetry breaking had to be introduced in physics, because current effective theories could not fully address the problem of invariant mass, and thus, in abstract mathematical models developed on incomplete foundations, this had to be corrected within the framework of some theory, namely by introducing the mass-generating Higgs scalar field. However, the theory of quantum gravity also contains the correct theory of invariant mass, in a way that is consistent with the introduced model of the Higgs field, even though it differs significantly from it (the theory approximates the natural physical world better and therefore its starting foundations and boundary conditions are different).

So, in the new theory, there is a well-defined physical reason why it was not possible to find a directly acting parameter for the existence of invariant mass in previous physics, and an explanation is also given for why physicists could not find a direct invariant mass parameter for this in current models. At the same time, in quantum gravity, the inertial and gravitating mass, and the effect associated with it, appear directly and regulate gravitational processes, therefore the space there is no need for a separate, spontaneous braking field. After all, in this case, the directly existing invariant mass determines the parameter based on which gravity works in the observed way and in this theory, this is why gravity can assign different energy values to each body ("that's why a heavy stone and a light feather fall at the same speed").

This also means that the quantum Yang-Mills derivation is and remains a correct derivation in the abstraction environment of current physics, and on this basis it was possible to create the Higgs boson in experiments, within the framework of the current theory.

Based on the quantum gravity theory we have developed, the above and all the important open fundamental questions of physics can be answered. The experimentally created CPT symmetry breaking is one of the starting points of this new theory and proof; therefore, we can state that based on theoretical and experimental results, the continuous symmetries of nature, including the CPT symmetry, are demonstrably violated, and to a large extent (I repeat, this symmetry violation only exists within the framework of the current effective theory and this problem is immediately solved in the new quantum gravity theory).

So, this symmetry breaking can be detected directly, by well-evaluated measurements, at any time. This means that, as stated above, the 4-pulse invariance, energy conservation and with it the Lorentz covariance - invariance are violated, and gauge symmetry is broken, in the framework of the current basic, proven (usually four-dimensional), effective theories. However, in the theory of Quantum Gravity, this is not necessary, the continuous symmetries are not broken.

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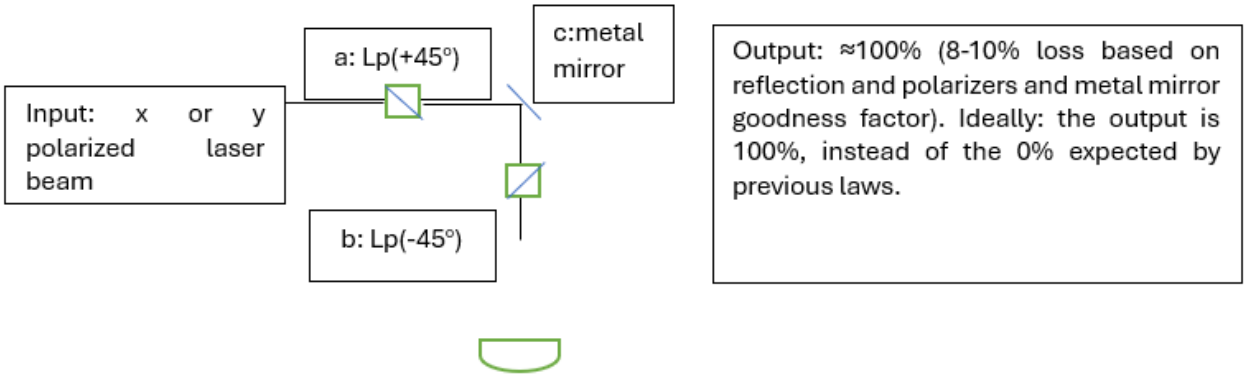
Materials and Methods

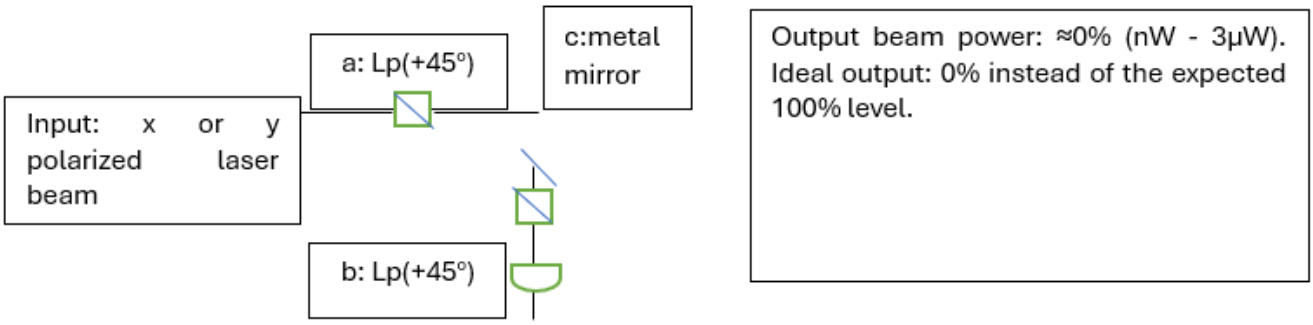
Description of the measurement

We introduced a polarised beam (λ=532 nm) into the following laser optics experiment setup and measured the output:

Figure 1:
Measurement A)



Measurement (B)



In case we place the polarizers in straight line (without mirror) into cross-polarized position, in each case the zero-output performance is obtained.

All other polarized directions (not +45°, or -45°), with inserting the appropriate cross-polarizer (with or without mirror): output is equivalent to zero (expressed to ideal case). In the experiment: I+45°>+I-45°>= I is not possible, linear super positioned state>, because <a I b>=0, and we set the input already to one of the polarizations.

Inserting e.g. a metal mirror between the polarisers and generating the I+45°>=1 input state: the output is I-45°>=1. Based on symmetry preservation and energy conservation of the spacetime theory so far (the generally used: case of 4 dimensional spacetime closed system), the occurrence of the above result assumes, entry of a particle or free field:

I+45°>=1, transformation: 1-1=0 and 0+1=1 → I-45°>=1: quasi surplus energy enters
I -1 I + I +1 I=2

Measurement Report Extracts

We have been using this process continuously, during the development of an invention-patent license. In each experiment, we have experienced the measurement results given above. We have continued to use this process in our experiments to this day.

Anyone can repeat the measurement at any time: however, it is not the measurement, but the conclusions drawn from the measurement that are important!

In measurement example A): we use a polarized input beam, and then a +45° linear polarizer. We will show with an example how the cross polarization we constantly use worked in this and in all other cases. That is, the same 45° polarizer quasi did not let the beam through! While the cross polarizer always quasi completely let the light beam through.

Table A: Linear beam Lp(y) and its polarization at +45 degrees. Then measurement on a cross polarizer.

A) Table: Linear beam Lp(y) and its polarization at +45 degrees. Then measurement on a cross polarizer.						
	1.	Next columns: measured state of the beam, after reflection from a metal mirror.	2.	3.	1.-2.	1.-3.
Lp(y) / µW	Lp(+45°) / µW		Lp(-45°) / µW	Lp(+45°) / µW		
incoming	outgoing		outgoing	outgoing	8,08%	99,999920%
9700	4330		3980	≈0,0035	350	4329,9966

Table B: Measurement of a Cross-Polarized 45 Degree Beam

Table B): Measurement of a cross-polarized 45 degree beam.						
The reason for the difference compared to table A) is the different structural composition.						
Lp(y)	Lp(+45°) / µW	Next columns: measured state of the beam, after reflection from a metal mirror.	Lp(-45°) / µW	difference: 1-2	%	date
incoming	outgoing		outgoing			
1300	610		546	-64	-10,49%	2017.06.07/1
1300	608		542	-66	-10,86%	
3250	1510		1340	-170	-11,26%	2017.06.07/2
3300	1560		1390	-170	-10,90%	
3240	1520		1340	-180	-11,84%	2017.06.07/4
3160	1480		1320	-160	-10,81%	
3120	1470		1310	-160	-10,88%	
3090	1440		1290	-150	-10,42%	2017.06.07/4.1
3100	1450		1300	-150	-10,34%	
3100	1450		1290	-160	-11,03%	

In the above experiments, if we do not consider the performance degradation caused by the quality factors of the devices and the differences in the settings: I+45°>=I-45°>=1.
Therefore, this result can also be characterized as follows.

In the following formulas, the first state will always be the non-vacuum state and the second factor will be the vacuum state. If, in the traditional way, we also assume the preservation of CPT symmetry, then obviously both polarizations must exist somewhere in space. Or we must assume that a free field, or perhaps a new source, has entered the process. In this case, however, we get the following result:

(I+45°>*I-45°>)+(I-45°>*I+45°>)=1+1=2 vagy (I-45°>*I+45°>)+(I+45°>*I-45°>)=1+1=2(I1>*I1>)+(I1>*I1>)=2 energy conservation violation (according to models based on spacetime theory, the experiment also breaking the conservation of 4 pulse invariantia).

Of course, in our experiment we excluded the above-mentioned auxiliary assumptions ensuring symmetry preservation, therefore the energy conservation breaking still holds.

Consequently, in the form written in the formulas, symmetry breaking obviously did not occur. However, symmetry breaking did occur beyond all doubt. Namely, in the sense that the polarization of the beam has changed, it has been rotated by 90°; and there is no acceptable explanation for this fact in current physics. In the proof procedure, we derive the CPT symmetry breaking process in detail, within the framework of the description of the 11-dimensional, elementary-natural-physical-system.

Elements of Proof of the CPT Symmetry Breaking

1. The measuring device can only select one of the linear superposition states (elements of the linear vector space), one of the possible states of the system, and convert it to an index position (see measurement theory). We prove that in the experiment, the states I + 45°>, I-45°> are orthogonal to each other and non-linear superposition states: still, the state and state function of the photons have been modified beyond the possibilities of the previous theory.

That is, the measuring device measured a non-linear superposition state. We also know that every orbit is both geodetic and impact (stationary), so with the above measurement the state of gravity has been modified without presumable interaction. In the classical picture, this means a change in the energy-impulse tensor, possibly a change in the $\vec{E}$ field strength vector, and an $\hat{E}$ field strength operator: in the experimental case, this change is not justified.

2. We prove the symmetry violation (quantum mechanics, QED, relativistic quantum mechanics) according to the rules for C, P, T and together, the CPT operators.
In the following, based on ourexperiment, we proceed from the classic plane wave approach.

$$\vec{E}(z,t) = \begin{matrix} ex \\ ey \\ ez = 0 \end{matrix} e^{i2\pi(z/\lambda/n)-t/T)} = \vec{E}(z,t) = \begin{matrix} ex \\ ey \\ ez = 0 \end{matrix} e^{i(kz-\omega t)} \rightarrow e^{i(kz-\omega t)} \text{ legyen } e^{\phi}.$$

$$\vec{E}(z,t) = \begin{matrix} ex = [1,0] * c1 \\ ey = [0,1] * c2 \\ ez = [0,0] * c3 \end{matrix} \; {}^{*}e^{\phi} \; c_i = c_1, c_2, c_3 \; i = 1,2,3.$$

The linear coefficient is the scalar multiplier belonging to the stationary effect point rn: this is indicated by the first index: rn← cn,i (rn: is a zero-dimensional, virtual measuring point).

We extend this starting point to the complete solution: we perform the quantization, introduce the related uncertainty relation, and implement the transition to the relativistic solution. According to the first axiom of quantum mechanics and the state function of Ψ, we include our physical model (taking into account other axioms). We introduce the dynamics connected to QED as well. Considering the physical theory so far, therefore, we quasi-restart when we move away from the classical solution: this is necessary because the previous theory cannot interpret the given experimental result in a meaningful way, so we must afresh examine the possibilities and causes. We apply in our mathematical model as is the case with spins (c: linear coefficient)

and assume the unit eigenvalues $r_n=\hat{f}_{n,e}*c_{n,i} \rightarrow \hat{f}_{n,e}=[1,0]$, $\hat{f}_{n,e}$: spatial, scalar, frequency unit operator to characterize states up to the measurement (before measurement the f^n: operator of non-spatial potential state, f^n≠fn). The linear coefficient cn,i, based on our model will have a positive real eigenvalue when the measurement is done (and f^n,e=fn,e=1 or 0, fn,e : the frequency unit eigenvalue). The "description of the wavelength property" will be introduced separately through the interpretation of the wavelength: for this we will also use a superposition scalar characterization that only influences the extent of the reaction range.

Development of the physical model and related mathematical abstraction, mathematical structure.

The results of our 22 years of theoretical research, we have been linked to the experimental CPT symmetry breaking phenomenon, thus we discovered and described a new gravity-based physics that takes place at the elementary level of nature. The theoretical results achieved are summarized as follows:

- The model of the elementary-natural-physics system is implemented in 11 dimensions (connected to the physical conditions of nature): the dimensions are grouped in physical sectors, the structure of which is followed by the abstraction. The system is built similarly to supersymmetric theories, but based on elementary natural physics, in a structure and dynamics that is significantly different from them.
- Classical, semi-classical and indirectly the quantum theories are based on space-time as a starting point: it is impossible to follow this at the physical model level, because the geometric solution (Einstein tensor or equations: the basis of current effective theories), according to our proof, cannot be elementary - natural - physical description.
- According to our theoretical groundwork, the mathematical structure of the universe is bound to space (has already by quantum mechanics, time is cannot be measured external parameter). - The space is controlled indirectly by time, and directly by time-space geometry. Ultimately, the external parameter, the effect of time all of this. Time: According to its internal relations, from the side of space and of the physical system, it is an inaccessible and can not be influenced (this is further degree of internal quantum mechanical freedom). Time is internally a non-physical sector, a non-mathematical sector and thus a not system-like sector.
- Time directly affects time-spaces: however, we can not attach the energy back into the time sector (the time sector is non-energy interval). In elementary - natural - physics time as physical variable are denoted by the word Present. The Present, the outer time factor of the universe, is different from Newton's present and Einstein's time. We start capitalizing the word, because it is our universe Own Present: outer time-factor of physical sector. The Present it affects the Future time-space and the Gravitational sector phase, it affects the 6 dimensional time-space (this is a gone-past time-space). And the Present indirectly affects past time-space, the space (space: this is only an externally time-space sector, from the inside, this is a zero-dimensional mirror-phase space). It can be seen that the time-space sectors implement a relation to the Present, and relate to the Present in time-based physical separation. The Present: quasi (Future * past * gone-past) and the Future is coming again. Based on the elemental - natural - physical system, according to our new physics - physical model, all characteristics and definitions had to be renewed.

For example, the concept of measurement (observer measurement) should be defined as objective, physical measurement. There is no interaction in the zero-dimensional space, no geometry, no observational measurement: therefore, the concept of objective physical measurement as one of the characteristics of rn virtual measuring point changes should be introduced.

Physical measurement: we interpret a virtual orbit in space (the space is only virtually quasi-geometric manner extensive, only within the given abstraction) and the individual points of space, in this virtual orbit, quasi

interact with each other through time dilation. So physical measurement is a natural physical process performed by the physical nature system: this action can be distinguished by well-defined parameters (see the appropriate section). Physical measurement does not include any observer or measuring instrument, these is composite objects they are not present in the mirror-phase space. We overestimate ourselves (as observers) when we think that physical nature cannot work without us (see eg Wheeler: Law Without Law). The elemental physical space is zero-dimensional, so no complex particle, e.g. the observer and the observer measurement, can not be part of the direct. Physical measurement always gives physical information that can be used during the measurement of observer, because the virtual measurement point rn will be super determined (from the previous superposition system-state: quasi the extradimensional wave function collapses). Until physical measurement, there is a system of superpositions (linear and non-linear superpositions), which do not give a superdetermined eigenvalue in space: these are the conditions that precede the physical measurement described herein. Elements of the superposition system although they have, by their physical order, an extradimensional superdetermined output - but they do not give a spatially measurable eigenvalue. Without physical measurement, there is no measurable phenomenon: so then observational measurement is impossible.

The mathematical structure and coordinates directly related to the elementary natural physical system are recorded, as shown in Figure 2.

Figure 2

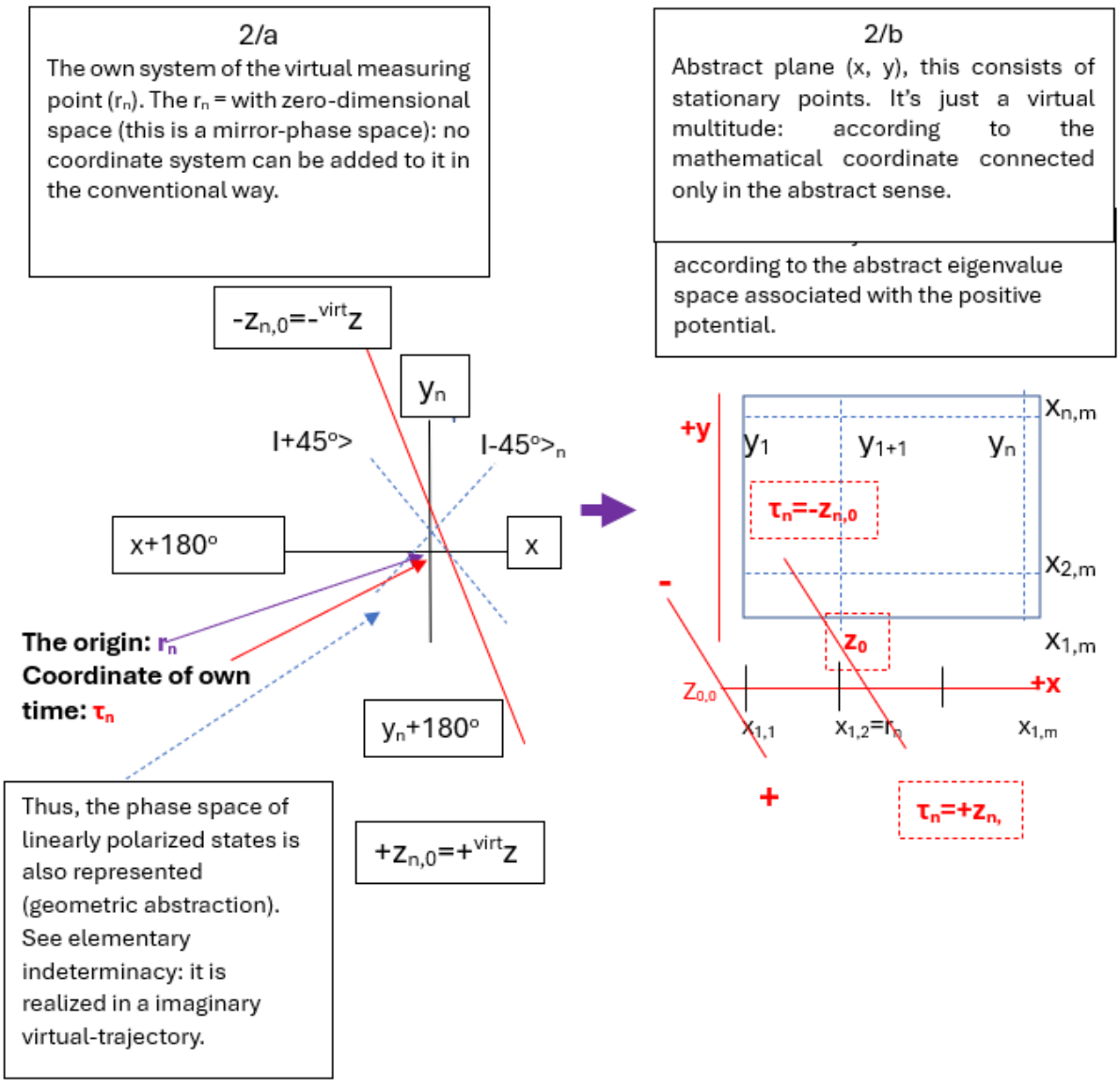
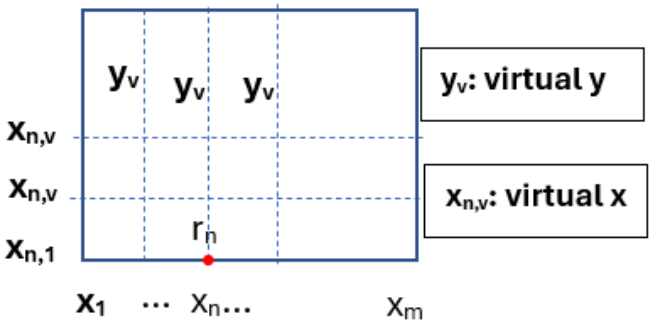


Figure 2/c
2/c



Planck$_{physical}$ point = Planck length (and Parameters), rn virtual measurement point = 0 outspread →is the eigenvalue of the virtual metric = 1, t = 1 (t_p) = t_v = virtual time quantum, s = 1 (l_p), h = 1 = Planck constant →h / t_v = stationary unit potential. On a virtual imaginary coordinate of space, on which the τn eigen-time is located, we add space-related geometrodynamic variables (these are eigen-time variables). In this case, at the n point of the abstract coordinate x there is the present-point variable: z_0. The geometrodynamic variables in the non-linear superposition $z_{n,0}$=+$z_{n,0}$*-$z_{n,0}$ are displayed in their own time (τ_n). At virtual measurement point $x_{n,v}$=r_n, only x abstract, ie virtual coordinate axis, should be added to characterize the virtual paths (y_v=y virtual coordinate axis, not required for the x parameter at the virtual measurement point rn). The rn: virtual measuring point, n = 1,2,… m, (0 <n, m <∞ and 0 <r_n <∞). Aligned to a zero-dimensional rn virtual measuring point, x-axes do not need to be distinguished during: within the interval of a stationary state. So then tv * r_n / t_v: a single stationary eigenvalue point through which all rotations are aligned to an x-coordinate axis. Where tv a virtual time quantum: virtual time of stationary state. Rotation cannot be directly interpreted in the plane of Figure 2 / b in a stationary state: space exists only in this temporal virtual interval. The τ_n time-space parameter (non-spatial eigen-time of r_n): its space-like expression is a geometrodimatic parameter associated with space: virtz_n=$z_{n,0}$(+$z_{n,0}$; z_0; -$z_{n,0}$) and Iτ_n>=$z_{n,0}$=+$z_{n,0}$*-$z_{n,0}$. We also apply a potential superposition axis in the coordinate system, because in the case of abstract x coordinate, the concept of place appears in the abstraction, it is expedient to have a potential (eigenvalue) coordinate this is the x_0 axis. The virtual measurement point rn = contains both properties, because r_n = x_n = potential eigenvalue, in this case equals t_v * r_n / t_v =f^$_{n,e}$: unity value operator, applied with parameters [1,0], it can be linked to its superposition states of the extradimensional superposition system.

Interpretation of the frequency operator, on spatial virtual particle trajectory

Each its own universe
Creating order and chaos – Mandelbrot fractals
As time watches on
No longer steadfastly absolute
But ever wavering
Dependent on one's frame of reference and gravity

Enter the weak force
Radioactivity's half life
Acknowledging the work of George Gamow
Encompassing quantum tunnelling
Cosmology and nucleosynthesis
And an intuitive insight
Into genetic code
Now an instrument
To combat viruses and future diseases.

Help artificial intelligence, anyone!
Release us from this prison of the mind
So that entropy talks to decoherence
And decoherence returns the compliment
As natural boundaries of thermodynamics appear
And general relativity mergers with quantum field theory
Through a pathway
Of entropic gravity, string theory, quantum loop gravity
Or as with gauge theory
Are they just manifestations
Of the same fundamental truth?

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