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Particle-wave dualism.

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Abstract

According to the French physicist and Nobel Prize laureate Louis-Victor-Pierre-Raymond Broglie (August 15, 1892 – March 19, 1987), 7th duc de Broglie, generally known as Louis de Broglie, any moving particle has an associated wave. The greater the energy of a particle, the larger the frequency and the shorter the wavelength. Thus, everything that is, seems to be composed either out of particles or out of waves. But, in a particle wave/s can be found and vice versa. In a wave particle/s can be found. Only, the one excludes its own other. A wave is not a particle and vice versa, a particle is not a wave. Can both exist each without its own other or is the wave the local hidden variable of the particle and vice versa. Is the particle the local hidden variable of the wave. This publication will proof that the basic relationship between particles and waves is based on Einstein's basic field equation and can be expressed by the equation

$$\left(\left[\frac{(Energy*R_{ab})}{(c*c)}-\left(\frac{(4*2*\pi*\gamma*T_{ab})*(R*g_{ab})}{(c*c*c*c)\quad*\quad 2}\right)\right]*\left[\frac{(Energy*R_{ab})}{(c*c)}-\left(\frac{(4*2*\pi*\gamma*T_{ab})*(R*g_{ab})}{(c*c*c*c)\quad*\quad 2}\right)\right]\right)$$

$$=(\kappa*\kappa)*\left(\left[\left(\frac{(R_{ab}*(4*2*\pi*\gamma*T_{ab}))}{(c*c*c*c)}\right)-\left(\frac{(4*2*\pi*\gamma*T_{ab})*(4*2*\pi*\gamma*T_{ab})}{(c*c*c*c)*(c*c*c*c)}\right)\right]*\left[\left(\left(\frac{R_{ab}*(R*g_{ab})}{2}\right)-\left(\frac{(R*g_{ab})*(R*g_{ab})}{2*2}\right)\right)\right]\right)$$

Key words: Corpuscle, Wave, Relativistic quantum theory, General relativity, Einstein, Barukčić.

1. Background

According to Louis-Victor de Broglie's hypothesis all matter and not just only light has a wave-like nature, matter is neither particle nor wave, but has certain properties of both and is equally never simultaneously both. Under certain experimental conditions, microscopic objects like electrons exhibit wave-like behaviour, such as interference. Under other conditions, the same type of microscopic objects exhibit particle-like behaviour, such as scattering. But, we can observe only one type of property at the same time or simultaneously. A stronger manifestation of the wave nature leads to a weaker manifestation of the particle nature and vice versa. According to Einstein et al. "**the wave function does not provide a complete description of the physical reality**" (Einstein et al. 1935, p. 780). In so far, we will not use Schrödinger equation, the Klein-Gordon equation or the Dirac equation to solve the problem of corpuscle and wave. We will use Einstein's basic field equation (Einstein 1916) and the General contradiction law (Barukčić 2006) to solve the problem of corpuscle and wave. Our intention on this view is to enable a fully relativistic quantum theory.

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2. Material and Methods

Einstein's theory of general relativity, especially Einstein's basic field equation describes how energy, time and space are interrelated, how the one changes into its own other and vice versa. According to Einstein, energy (E) is matter (m) or $E = mc^2$. In so far, matter or corpuscle and waves must be somehow in relation with Einstein's field equation. Thus, our starting point to solve the problem of corpuscle and wave is Einstein's basic field equation.

2.1. Einstein's field equation.

Recall, the below mathematical form of Einstein's field equation is for the -+++ metric sign convention. The -+++ metric sign convention is commonly used in general relativity. Einstein field equations were initially formulated in the context of a four-dimensional theory. However, Einstein field equations can be seen to hold in n dimensions too.

Einstein's basic field equation (EFE for the -+++ metric sign convention).

Let

R_{ab} denote the Ricci tensor,

R denote the Ricci scalar,

g_{ab} denote the metric tensor,

T_{ab} denote the stress-energy tensor,

h denote Planck's constant, $h \approx (6.626\ 0693\ (11)) * 10^{-34}$ **[J * s],**

π denote the mathematical constant π, also known as **Archimedes' constant.** The numerical value of π truncated to 50 decimal places is known to be about

$$\pi \approx 3.14159\ 26535\ 89793\ 23846\ 26433\ 83279\ 50288\ 41971\ 69399\ 37510,$$

c denote the speed of all electromagnetic radiation in a vacuum, the speed of light, where

$$c = 299\ 792\ 458\ [m / s],$$

γ denote Newton's gravitational 'constant', where

$$\gamma \approx (6.6742 \pm 0.0010) * 10^{-11}\ [m^3 / (s^2 * kg)],$$

Einstein's field equation describes how a field or energy (or matter) and time changes space and vice versa. Einstein's basic field equation (EFE) is usually written in the form

$$(((4 * 2 * \pi * \gamma) * T_{ab}) / (c^4)) + ((R * g_{ab}) / 2)) = (R_{ab}).$$

The stress-energy-momentum tensor is known to be the source of space-time curvature and describes more or less the density and flux of energy and momentum in space-time in Einstein's theory of gravitation. Philosophically, let the stress-energy-momentum tensor denote the **energy**.

The metric of space-time is determined by the matter and energy content of space-time. The Ricci scalar/metric tensor completely determines the curvature of space-time and defines such notions as *future, past,* distance, volume, angle. Philosophically, let the Ricci scalar/metric tensor denote the **time**.

The Ricci tensor, named after Gregorio Ricci-Curbastro, is a key term in the Einstein field equations and more or less a measure of *volume distortion*. Philosophically, let the Ricci tensor denote the **space**.

2.1.1. Properties of Einstein's field equation.

The final form of Albert Einstein's General Field Equation of 1916 is based on the basic relation between matter and gravitational field. In accordance with Einstein, matter (M) is nothing else then energy (E) or $E = m * c^2$. Einstein's basic field equation is based on some assumptions. Einstein himself has made a distinction between "mater" and the "gravitational field". Einstein denoted everything as matter but the gravitational field, that is to say ***Vacuum*** too is part of matter. Albert Einstein wrote:

"Wir unterscheiden im folgenden zwischen 'Gravitationsfeld' und 'Materie', .." (Einstein 1916, p. 802) .

or in English <We make a distinction hereafter between '**gravitational field**' and '**matter**'>. Einstein is not only making a distinction between gravitational filed and matter, he has made a distinction between gravitational filed and matter in his own special way. Einstein denoted everything but the gravitational field as 'matter'. **In so far, vacuum too is part of Einstein's understanding of matter**! According to Einstein, 'matter' includes therefore not only matter in the ordinary sense, but the electromagnetic field as well and the vacuum too. In his famous paper, Einstein wrote:

"Wir unterscheiden im folgenden zwischen 'Gravitationsfeld' und 'Materie', in dem Sinne, daß ***alles außer dem Gravitationsfeld als 'Materie'*** bezeichnet wird, also nicht nur die 'Materie' im üblichen Sinne, sondern auch das elektro-magnetische Feld. " (Einstein 1916, pp. 802-803).

Einstein's writing in English: >>We make a distinction hereafter between '**gravitational field**' and '**matter**' in this way, that we denote everything but the gravitational field as 'matter', the word matter therefore includes not only **matter in the ordinary sense**, but the **electromagnetic field** as well.<< In so far, according to Einstein, there is no third between "matter" and the "gravitational field", **tertium non datur**. On the other hand, the word "matter" according to Einstein includes "matter in the ordinary sense" and the "electromagnetic field" too. This can be expressed in a simple mathematical formula. Let **E** denote the energy, let **m** denote the matter, let **a** denote the matter in the ordinary sense or something like a **particle**, let **c** denote the electromagnetic field. According to Einstein (Einstein 1916, pp. 802-803) we obtain $m = \mathbf{a + c + (d=0)}$. According to Einstein, matter is nothing else then energy. We obtain $\mathbf{E = m * c^2}$ or $\mathbf{E = (a + c + (d=0)) * c^2}$. In so far, Einstein's energy-tensor of matter is an energy-tensor of matter in the ordinary sense and equally an energy-tensor of electromagnetic field too. Thus, the solution of the problem of particles and waves can be found in Einstein's field equation. The 2 by 2 table gives an overview over Einstein's basic field equation.

m = a = Matter in the ordinary sense	*b = Gravitational field*	g = a + b
c = Electro-magnetic field	***d = Vacuum = 0***	h = c + d
e = a + c	*f = b + d*	**n = a+b+c+d = All**

2..2.2. Einstein's field equation: Definitions

In general and for our further analysis, let us define the following.

Definitions.

Let

a denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **matter in the ordinary sense** according to A. Einstein (Einstein 1916,pp.802-803).Let **a=m**, thus $m=a=Energy/c^2$, (1)

b denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **gravitational field** according to Albert Einstein (Einstein 1916, pp. 802-803), (2)

c denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **electromagnetic field** according to Albert Einstein (Einstein 1916, pp. 802-803), (3)

d denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **vacuum** according to Albert Einstein (Einstein 1916, pp. 802-803), (4)

e denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **e = a + c**, tertium non datur, (5)

f denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **f = b + d**, (6)

g denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **g = a + b**, tertium non datur, (7)

h denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **h = c + d**, tertium non datur, (8)

n denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **n = a + b + c + d**. (9)

The 2 by 2 table below gives an overview.

2 by 2 table.	B		
A	**a**	b	**g = a + b**
	c	d	h = c + d
	e=a+c	f=b+d	**n=a+b+c+d**

Recall, there are some interdependencies.

$$n = a + b + c + d \tag{10}$$

$$g - e = b - c \tag{11}$$

$$g + c = e + b \tag{12}$$

$$g = e + b - c \tag{13}$$

$$e = g + c - b \tag{14}$$

$$d - a = n - e - g \tag{15}$$

$$a - d = e + g - n \tag{16}$$

$$d = n + a - e - g \tag{17}$$

$$a = d + e + g - n \tag{18}$$

Einstein introduced the term **cosmological constant** to allow a static universe which is not in accordance with Hubble`s law. Besides of this, the existence of a cosmological constant is at the end equivalent to the existence of a non-zero vacuum energy. More generally, a vacuum region, **denoted by d**, a region of space-time where there are no gravitational sources (masses), i.e. a region of space-time where the energy-momentum tensor T_{ab} vanishes, must not be equivalent to a zero vacuum energy. We assumed here for better understanding of Einstein's field equation that **d = 0**, that is to say, we assumed only a zero vacuum energy, the same must not be equal to zero.

Set **d = 0**. Thus

$$a = + e + g - n. \tag{19}$$

2.2. Tensors

Einstein's general relativity (Einstein, 1916) is formulated completely in the language of tensors. The following definitions are because of this based on tensors too. A **tensor** is a mathematical object **in and of itself** that is independent of human mind and consciousness. A tensor is independent of any chosen frame of reference and can be defined with respect to any system of co-ordinates by a number of functions of the co-ordinates. This functions of the co-ordinates can be called the components of the tensor. The components of a tensor can be calculated for a new system of co-ordinates according to certain rules, if the components of a tensor for the original system of co-ordinates are known and if the transformation connecting the both systems is known too (Barukčić 2006e). Tensors were introduced by William Rowan **Hamilton** in 1846. Gregorio **Ricci-Curbastro** developed the notation tensor around 1890. The notation tensor was made accessible to mathematicians by Tullio **Levi-Civita** in 1900. The following is based on Einstein's publication (Einstein, 1916).

2.2.1 Four-vectors

2.2.1.1 Contravariant Four-vectors

Let a linear element be defined by the four components dx_v. The law of transformation is then expressed by the equation

$$dx'_{\sigma} = \left(\sum_{v} \frac{(\partial x'_{\sigma})}{(\partial x_v)} dx_v \right) \tag{20}$$

The $d\,x\,'_\sigma$ are expressed as homogeneous and linear functions of the $d\,x_v$. These co-ordinate differentials are something like the components of a tensor of the particular kind. Let us call this object a contravariant four-vector. In so far, if something is defined relatively to the system of co-ordinates by four quantities A^v and if it is transformed by the same law

$$A'^{\sigma} = \left(\sum_v \frac{(\partial\, x'_\sigma)}{(\partial\, x_v)} \; A^v \right) \tag{21}$$

it is also called a contravariant four-vector. According to the rule for the addition and subtraction of tensors it follows at once that the sums $A^\sigma \pm B^\sigma$ are also components of a four-vector, if A^σ and B^σ are such.

2.2.1.2 Covariant Four-vectors

Let us assume that for any arbitrary choice of the contravariant four-vector B^v

$$\left(\sum_v A_v \; B^v \right) = \text{Invariant} \tag{22}$$

In this case, the four quantities A_v are called the components of a covariant four-vector. Let us replace B^v on the right-hand side of the equation

$$\left(\sum_\sigma A'_\sigma \; B'^\sigma \right) = \left(\sum_v A_v \; B^v \right) \tag{23}$$

by an expression which is resulting from the inversion of (21),

$$\left(\sum_\sigma \frac{(\partial\, x_v)}{(\partial\, x'_\sigma)} \; B'^\sigma \right) \tag{24}$$

thus we obtain

$$\left(\sum_\sigma B'^\sigma \right) * \left(\sum_v \frac{(\partial\, x_v)}{(\partial\, x'_\sigma)} \; A_v \right) = \sum_\sigma B'^\sigma A'_\sigma \tag{25}$$

This equation is true for arbitrary values of the B'^σ, thus we obtain the law of the transformation of a covariant four-vector as

$$A'_\sigma = \left(\sum_v \frac{(\partial\, x_v)}{(\partial\, x'_\sigma)} \; A_v \right) \tag{26}$$

The covariant and contravariant four-vectors can be distinguished by the law of transformation. According to Ricci and Levi-Civita, we denote the covariant character by placing the index below, the contravariant character by placing the index above.

2.2.2 Tensors of the Second and Higher Ranks

2.2.2.1 Contravariant Tensors

Let A^μ and B^v denote the components of two contravariant four-vectors

$$A^{\mu v} = A^\mu \, B^v \,. \tag{27}$$

Thus, $A^{\mu\nu}$ satisfies the following law of transformation

$$A'^{\sigma\tau} = \left(\frac{\partial x'_{\sigma}}{\partial x_{\mu}} \right) * \left(\frac{\partial x'_{\tau}}{\partial x_{\nu}} \right) A^{\mu\nu} \tag{28}$$

Something satisfying the law of transformation (28) and described relatively to any system of reference by sixteen quantities is called a contravariant tensor of the second rank.

2.2.2.2 Contravariant Tensors of Any Rank

A contravariant tensors of the third and higher ranks can be defined with 4^3 components, and so on.

2.2.2.3 Covariant Tensors

Let A_μ and B_ν denote the components of two covariant four-vectors

$$A_{\mu\nu} = A_\mu B_\nu \,. \tag{29}$$

Thus, $A_{\mu\nu}$ satisfies the following law of transformation

$$A'_{\sigma\tau} = \left(\frac{\partial x_{\mu}}{\partial x'_{\sigma}} \right) * \left(\frac{\partial x_{\nu}}{\partial x'_{\tau}} \right) A_{\mu\nu} \tag{30}$$

This law of transformation (20) defines the covariant tensor of the second rank.

2.2.2.4 Mixed Tensors

A mixed tensor is a tensor of the second rank of the type which is covariant with respect to the index μ, and contravariant with respect to the index v. This mixed tensor can be defined as

$$A^{\nu}{}_{\mu} = A_\mu B^\nu \,. \tag{31}$$

The law of transformation of the mixed tensor is

$$A'^{\tau}_{\sigma} = \left(\frac{\partial x'_{\tau}}{\partial x_{\nu}} \right) * \left(\frac{\partial x_{\mu}}{\partial x'_{\sigma}} \right) A^{\nu}_{\mu} \tag{32}$$

2.2.2.5 Symmetrical Tensors

A contravariant or covariant tensor of the second or higher rank is said to be symmetrical

$$A_{\mu\nu} = A_{\nu\mu} \tag{33}$$

or respectively,

$$A_{\mu\nu} = A_{\nu\mu}\,. \tag{34}$$

2.2.2.6 Antisymmetrical Tensors

A contravariant or a covariant tensor of the second, third, or fourth rank is said to be antisymmetrical if

$$A^{\mu\nu} = - A^{\nu\mu} \tag{35}$$

or respectively,

$$A_{\mu\nu} = - A_{\nu\mu} \tag{36}$$

or

$$A^{\mu\nu} = - A^{\nu\mu}\,. \tag{37}$$

That is to say, the two components of an antisymmetrical tensor are obtained by an interchange of the two indices and by an opposite sign. In a continuum of four dimensions there seems to be that there are no antisymmetrical tensors of higher rank than the fourth.

2.2.3 Multiplication of Tensors

2.2.3.1 Outer Multiplication of Tensors

The components of a tensor of rank n + m can be obtain from the components of a tensor of rank n and from the components of a tensor of rank m by multiplying each component of the one tensor by each component of the other. Examples.

$$C_{\mu\nu\sigma} = A_{\nu\mu} B_{\sigma} \tag{38}$$

$$C^{\mu\nu\sigma\tau} = A^{\nu\mu} B^{\sigma\tau} \tag{39}$$

$$C^{\mu\nu}{}_{\sigma\tau} = A^{\nu\mu} B_{\sigma\tau} \tag{40}$$

2.2.3.2 "Contraction" of a Mixed Tensor

The rank of mixed tensors can be decreased to a rank that is less by two, by contraction that is by equating an index of contravariant with one of covariant character, and summing with respect to this index. The result of contraction possesses the tensor character.

2.2.3.3 Inner und Mixed Multiplication of Tensors

The inner und mixed multiplication of tensors consist at the end in a combination of contraction with outer multiplication.

2.2.4 Division of Tensors

Tensor algebra appears to me is not that much developed. To allow something like division operations on tensors, we must go an special way. Let us divide X by X that is to say X / X. The result should be something like 1 or X / X = 1 as long as X ≠ 0. This division can be expressed in another way too. Let us perform an operation on a tenors X that way, that X * d(X) = 1, then we have done equally a division operation too. The problem is, is there an operation like the term * d(X).

Thus, let A denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness.

Let d(A) denote something like an law of transformation of the (covariant, contravariant, mixed, ...) tensor A or something like another tensor. Whatever d(A) may be, d(A) must obey some special rules. It has to be true that

$$\mathbf{A * d(A) = 1.} \qquad (41)$$

Such an d(A) would enable us to perform division operations on tensors.

2.2.5 Necessity and randomness of a tensor

Let A denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness.

Let n(A) denote the law of transformation of the (covariant, contravariant, mixed, ...) tensor A or another tensor. Whatever n(A) may be, n(A) must obey some special rules.

Let B denote a another (covariant, contravariant, mixed, ...) tensor B (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness.

Let n(B) denote the law of transformation of the (covariant, contravariant, mixed, ...) tensor B or another tensor. Whatever n(A) may be, n(B) must obey some special rules.

Let C denote a another (covariant, contravariant, mixed, ...) tensor C (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness.

$$\mathbf{A + B = C.} \qquad (42)$$

There is no third between A and B, tertium non datur!

$$\mathbf{A} = n(A) * \mathbf{C.} \qquad (43)$$

$$\mathbf{B = (1 - n(A)) * C) = n(B) * C .} \qquad (44)$$

$$\mathbf{n(A) + n(B) = 1.} \qquad (45)$$

n denotes something like the necessity of a tensor.

2.3. Definitions in general

Definitions.

Let

a	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **matter in the ordinary sense** according to Albert Einstein (Einstein 1916, pp. 802-803). Let **a=m**, thus $m=a=Energy/c^2$,
b	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **gravitational field** according to Albert Einstein (Einstein 1916, pp. 802-803),
c	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **electromagnetic field** according to Albert Einstein (Einstein 1916, pp. 802-803),
d	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **vacuum** according to Albert Einstein (Einstein 1916, pp. 802-803),
N	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **C** = **n = a + b + c + d**,
A	denote the (covariant, contravariant, mixed, ...) tensor A (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **a + b = A**,
Anti A	denote the anti tensor of B, the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the hidden part of A, the Anti A, let **A+(Anti A)=C,**
B	denote the (covariant, contravariant, mixed, ...) tensor B (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **a + c = B**, let **B + (Anti B) = C,**
Anti B	denote the anti tensor of B, the other side of B, the local hidden variable of B, the opposite of B, the complementary of B, the hidden part of B, the Anti B, Let us respect **the law of the excluded middle**. That is to say, there is no third between A and Anti A, or between B and Anti B, **tertium non datur**.
n(A)	denote the necessity of A, the determinatedness of A,
n(Anti A)	denote the randomness of A, the indeterminatedness of A, the necessity of Anti A,
n(B)	denote the necessity of B, the determinatedness of B,
n(Anti B)	denote the randomness of B, the indeterminatedness of B, the necessity of Anti B,
$\Delta(A)^2$	denote the **inner contradiction** of A,
$\Delta(B)^2$	denote the **inner contradiction** of B,
$\sigma(A)$	denote **the standard deviation** of A,
$\sigma(B)$	denote **the standard deviation** of B,
$\sigma(A)^2$	denote **the variance** of A,
$\sigma(B)^2$	denote **the variance** of B,
$\sigma(A , B)$	denote **the co-variance** of A and B.

Then

$$\mathbf{A + (Anti\ A) = N} \tag{46}$$

$$\mathbf{B + (Anti\ B) = N} \tag{47}$$

Set N = **0**. We obtain the next equation.

$$\mathbf{(Anti\ A) = - A} \tag{48}$$
$$\mathbf{(Anti\ B) = - B} \tag{49}$$

If N = 0, then (**Anti A**) = **- A** or (**Anti B**) = **- B.**
In this case, an identity of an **anti tensor** and an **antisymmetrical tensor** can be obtained.

$$\mathbf{A * (Anti\ A) \leq (N*N) / 4.} \tag{50}$$
$$\mathbf{B * (Anti\ B) \leq (N*N) / 4.} \tag{51}$$

Let us define the following.

$$A = n(A) * N \tag{52}$$
$$B = n(B) * N \tag{53}$$

$$n(Anti\ A) = 1 – n(A) \tag{54}$$
$$n(Anti\ B) = 1 – n(B) \tag{55}$$

$$n(A) + n(Anti\ A) = 1 \tag{56}$$
$$n(B) + n(Anti\ B) = 1 \tag{57}$$

$$\Delta(A)^2 = A * (N - A) = (Anti\ A) * (N - (Anti\ A)) \tag{58}$$
$$\Delta(B)^2 = B * (N - B) = (Anti\ B) * (N - (Anti\ B)) \tag{59}$$

Let us assume, that the division by N is allowed. (60)

$$\sigma(A)^2 = \Delta(A)^2/ (N*N) =(A*(N-A))/(N*N) = ((Anti\ A)*(N-(Anti\ A)))/ (N*N) \leq (1 / 4) \tag{61}$$
$$\sigma(B)^2 = \Delta(B)^2/ (N*N) =(B*(N-B))/(N*N) = ((Anti\ B)*(N-(Anti\ B)))/ (N*N) \leq (1 / 4) \tag{62}$$

$$\sigma(A)^2 = n(A) * n(Anti\ A) = n(A)*(1 - n(A)) \leq (1 / 4) \tag{63}$$
$$\sigma(B)^2 = n(B) * n(Anti\ B) = n(B)*(1 - n(B)) \leq (1 / 4) \tag{64}$$

$$\sigma(A)^2 = \sigma(A)* \sigma(A) \tag{65}$$

$$\sigma(B)^2 = \sigma(B)* \sigma(B). \tag{66}$$

Let us assume, that the division by N is allowed.

$$\sigma(A, B) = ((N*a) - (A*B)) / (N*N) \tag{67}$$

3. Results

3.1. The inner contradiction and the variance of a random variable

Definition. The inner contradiction of a random variable I.

Let

A denote something existing independently of human mind and consciousness,

Anti A denote the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the Anti A,

N denote the unity of A and (Anti A) .

N = **A + (Anti A).**

Let us respect **the law of the excluded middle**.
That is to say, there is no third between A and Anti A, **tertium non datur**.

Let

$\Delta(A)^2$ denote the **inner contradiction** of A,

$\Delta(\text{Anti } A)^2$ denote the **inner contradiction** of Anti A.

Then

$$(A)*(\text{Anti } A) = (N * A) - (A * A)$$

Proof.

$$A = A \quad (68)$$

$$A * (\text{Anti } A) = A * (\text{Anti } A) \quad (69)$$

$$A * (N - A) = A * (\text{Anti } A) \quad (70)$$

Let us define the inner contradiction of A as $\Delta(A)^2 = A * (\text{Anti } A)$.

$$(N * A) - (A * A) = A * (\text{Anti } A). \quad (71)$$

Q. e. d.

Definition. The inner contradiction of a random variable II.

Let

A denote something existing independently of human mind and consciousness,

Anti A denote the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the Anti A,

N denote the unity of A and (Anti A) .

N = **A + (Anti A).**

Let us respect **the law of the excluded middle**.
That is to say, there is no third between A and Anti A, **tertium non datur**.

Let

$\Delta(A)^2$ denote the **inner contradiction** of A,

$\Delta(\text{Anti } A)^2$ denote the **inner contradiction** of Anti A.

Then

$$(A)*(\text{Anti } A) = (N * (\text{Anti } A)) - ((\text{Anti } A)*(\text{Anti } A)).$$

Proof.

$$(\text{Anti } A) = (\text{Anti } A). \quad (72)$$

$$A * (\text{Anti } A) = A * (\text{Anti } A) \quad (73)$$

$$(N - \text{Anti } A)*(\text{Anti } A) = A * (\text{Anti } A) \quad (74)$$

Let us define the inner contradiction of A as $\Delta(\text{Anti } A)^2 = A * (\text{Anti } A)$.

$$(N * (\text{Anti } A)) - ((\text{Anti } A)*(\text{Anti } A)) = A * (\text{Anti } A) \quad (75)$$

Q. e. d.

A and Anti A are different and not the same but both are equally united in their inner contradiction.

Definition. The inner contradiction of a random variable III.

Let

A	denote something existing independently of human mind and consciousness,
Anti A	denote the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the Anti A,
N	denote the unity of A and (Anti A) .
N =	**A + (Anti A).**
	Let us respect **the law of the excluded middle**. That is to say, there is no third between A and Anti A, **tertium non datur**.

Let

$\Delta(A)^2$	denote the **inner contradiction** of A,
$\Delta(\text{Anti } A)^2$	denote the **inner contradiction** of Anti A.

Then

$$\Delta(\text{Anti } A)^2 = (A)*(\text{Anti } A) = \Delta(A)^2$$

Proof.

$$A = A \quad (76)$$

$$A * (\text{Anti } A) = A * (\text{Anti } A) \quad (77)$$

$$(N - \text{Anti } A)*(\text{Anti } A) = A * (\text{Anti } A) \quad (78)$$

$$(N * (\text{Anti } A)) - ((\text{Anti } A)*(\text{Anti } A)) = A * (\text{Anti } A) \quad (79)$$

$$(N * (\text{Anti } A)) - ((\text{Anti } A)*(\text{Anti } A)) = A * (N - A) \quad (80)$$

$$(N * (\text{Anti } A)) - ((\text{Anti } A)*(\text{Anti } A)) = (N * A) - (A * A) \quad (81)$$

$$\Delta(\text{Anti } A)^2 = \Delta(A)^2 \quad (82)$$

Q. e. d.

Definition. The variance of a random variable I.

Let

A	denote something existing independently of human mind and consciousness,
Anti A	denote the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the Anti A,
N	denote the unity of A and (Anti A) .
N =	**A + (Anti A).**
	Let us respect **the law of the excluded middle**. That is to say, there is no third between A and Anti A, **tertium non datur**.

Let

$\Delta(A)^2$	denote the **inner contradiction** of A,
$\Delta(\text{Anti } A)^2$	denote the **inner contradiction** of Anti A.
$\sigma(A)^2$	denote the variance of A,
$\sigma(\text{Anti } A)^2$	denote the variance of Anti A.

Then

$$\sigma(A)^2 = ((N * A) - (A * A)) / (N*N)$$

Proof.

$$A = A \qquad (83)$$

$$A * (\text{Anti } A) = A * (\text{Anti } A) \qquad (84)$$

$$A * (N - A) = A * (\text{Anti } A) \qquad (85)$$

$$(N * A) - (A * A) = A * (\text{Anti } A) \qquad (86)$$

Let us assume, that the division of the terms above by N is allowed and possible.

$$((N * A) - (A * A)) / (N*N) = (A * (\text{Anti } A)) / (N * N) \qquad (87)$$

Let us define the variance of A as $\sigma(A)^2 = ((N * A) - (A * A)) / (N*N)$. (88)

Let us assume that it is allowed to divide by $\sigma(A)^2$.

$$\sigma(A)^2 = ((N * A) - (A * A)) / (N*N) = (A*(\text{Anti } A)) / (N*N) = \Delta(A)^2 / (N*N) \qquad (89)$$

$$(N*N) = \Delta(A)^2 / \sigma(A)^2 \qquad (90)$$

$$(N*N)*\sigma(A)^2 = ((N * A) - (A * A)) = (A * (\text{Anti } A)) \qquad (91)$$

Q. e. d.

The variance of Anti A is obtained in a similar way.

Definition. The variance of a random variable II.
Let

A	denote something existing independently of human mind and consciousness,
Anti A	denote the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the Anti A,
N	denote the unity of A and (Anti A) .
N =	**A + (Anti A).**
	Let us respect **the law of the excluded middle**. That is to say, there is no third between A and Anti A, **tertium non datur**.
Let	
$\Delta(A)^2$	denote the **inner contradiction** of A,
$\Delta(\text{Anti } A)^2$	denote the **inner contradiction** of Anti A.
$\sigma(A)^2$	denote the variance of A,
$\sigma(\text{Anti } A)^2$	denote the variance of Anti A.

Then

$$\sigma(\text{Anti } A)^2 = ((N*(\text{Anti } A)) - ((\text{Anti } A) * (\text{Anti } A))) / (N * N).$$

Proof.

$$(\text{Anti } A) = (\text{Anti } A) \quad (92)$$

$$A * (\text{Anti } A) = A * (\text{Anti } A) \quad (93)$$

$$(N - (\text{Anti } A))* (\text{Anti } A) = A * (\text{Anti } A) \quad (94)$$

$$(N*(\text{Anti } A)) - ((\text{Anti } A)*(\text{Anti } A)) = A * (\text{Anti } A) \quad (95)$$

Let us assume, that the division by N is allowed and possible.

$$(N*(\text{Anti } A))-((\text{Anti } A)*(\text{Anti } A)) /(N*N) = (A * (\text{Anti } A)) / (N * N) \quad (96)$$

Let us define the variance of Anti A as $\sigma(\text{Anti } A)^2 = ((N * A) - (A * A)) / (N*N)$. (97)

$$\sigma(\text{Anti } A)^2 = ((N*(\text{Anti } A))-((\text{Anti } A)* (\text{Anti } A))) /(N*N) = (A * (\text{Anti } A)) / (N * N) \quad (98)$$

$$(N*N)*\sigma(\text{Anti } A)^2 = ((N*(\text{Anti } A))-((\text{Anti } A)* (\text{Anti } A))) = (A * (\text{Anti } A)) \quad (99)$$

Q. e. d.

Definition. The co-variance of a random variables I.

Let

A	denote something existing independently of human mind and consciousness,
A =	a + b,
Anti A	denote the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the Anti A,
Anti A =	c + d,
N	denote the unity of A and (Anti A) ,
N =	**A + (Anti A),**
N =	a + b + c + d.
	Let us respect **the law of the excluded middle**. That is to say, there is no third between A and Anti A, **tertium non datur**.
B	denote something existing independently of human mind and consciousness,
B =	a + c,
Anti B	denote the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the Anti A,
Anti B =	b + d,
N	denote the unity of B and (Anti B) too ,
N =	**B + (Anti B),**
N =	**a + b + c + d.**
	Let us respect **the law of the excluded middle**. That is to say, there is no third between A and Anti A, **tertium non datur**.

The following 2x2 table gives an overview about this relationships.

a	b	A
c	d	Anti A
B	Anti B	N

$\Delta(A)^2$	denote the **inner contradiction** of A,
$\Delta(B)^2$	denote the **inner contradiction** of B,
$\Delta(A, B)$	denote the **inner contradiction** between A and B,
$\sigma(A, B)$	denote the co-variance of A and B,
$\sigma(A)^2$	denote the variance of A,
$\sigma(B)^2$	denote the variance of B.

Then

$$\sigma(A, B) = ((N * (a)) - (A * B))/(N * N) = ((a*d)-(b*c)) /(N * N).$$

Proof.

$$a = a \quad (100)$$
$$(a*d) = (a*d) \quad (101)$$
$$(a*d) - (b*c) = (a*d) - (b*c) \quad (102)$$
$$+0 - 0 + (a*d) - (b*c) = (a*d) - (b*c) \quad (103)$$
$$+(a*b) - (a*b) + (a*d) - (b*c) = (a*d) - (b*c) \quad (104)$$
$$+ (a*b) + (a*d) - (a*b) - (b*c) = (a*d) - (b*c) \quad (105)$$
$$+0 - 0 + (a*b) + (a*d) - (a*b) - (b*c) = (a*d) - (b*c) \quad (106)$$
$$(a*c) - (a*c) + (a*b) + (a*d) - (a*b) - (b*c) = (a*d) - (b*c) \quad (107)$$
$$+ (a*b) + (a*c) + (a*d) - (a*c) - (a*b) - (b*c) = (a*d) - (b*c) \quad (108)$$
$$+(a*b)+(a*c)+(a*d) -(a*c)-(a*b)-(b*c) = (a*d) - (b*c) \quad (109)$$
$$+0^2 -0^2 +(a*b)+(a*c)+(a*d) -(a*c)-(a*b)-(b*c) = (a*d) - (b*c) \quad (110)$$
$$+a^2 -a^2 +(a*b)+(a*c)+(a*d) -(a*c)-(a*b)-(b*c) = (a*d) - (b*c) \quad (111)$$
$$+a^2+(a*b)+(a*c)+(a*d) -a^2-(a*c)-(a*b)-(b*c) = (a*d) - (b*c) \quad (112)$$
$$a^2+(a*b)+(a*c)+(a*d)-(a^2+(a*c)+(a*b)+ (b*c)) = (a*d) - (b*c) \quad (113)$$
$$a^2 + (a*b) + (a*c) + (a*d) - ((a +b)*(a + c)) = (a*d) - (b*c) \quad (114)$$
$$((a + b + c + d)*a) - ((a +b)*(a + c)) = (a*d) - (b*c) \quad (115)$$
$$(N * a) - ((a +b)*(a + c)) = (a*d) - (b*c) \quad (116)$$
$$(N * a) - (A *(a + c)) = (a*d) - (b*c) \quad (117)$$

$$(N * a) - (A * B) = (a*d) - (b*c) \quad (118)$$

Let us define the inner contradiction between A and B as $\Delta(A, B) = (a*d) - (b*c)$.

$$\Delta(A, B) = ((N * a) - (A * B)) = ((a*d) - (b*c)) \quad (119)$$

Let us assume that the division by N is allowed and possible.

$$\Delta(A, B) / (N*N) = ((N*a) - (A*B)) / (N*N) = ((a*d) - (b*c))/ (N * N) \quad (120)$$

Let us define the co-variance between A and B as $\sigma(A, B) = ((N*a) - (A*B)) / (N * N)$.

$$\sigma(A, B) = ((N * a) - (A * B)) / (N * N) = ((a*d) - (b*c))/ (N * N) \quad (121)$$
$$(N * N) = \Delta(A, B) / \sigma(A, B) \quad (122)$$
$$(N * N)*\sigma(A, B) = ((N * a) - (A * B)) = ((a*d) - (b*c)) = \Delta(A, B) \quad (123)$$

Q. e. d.

Definition. The κ relationship.
Let

A	denote something existing independently of human mind and consciousness,
A =	a + b,
Anti A	denote the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the Anti A,
Anti A =	c + d,
N	denote the unity of A and (Anti A) ,
N =	**A + (Anti A),**
N =	a + b + c + d.
	Let us respect **the law of the excluded middle**. That is to say, there is no third between A and Anti A, **tertium non datur**.
B	denote something existing independently of human mind and consciousness,
B =	a + c,
Anti B	denote the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the Anti A,
Anti B =	b + d,
N	denote the unity of B and (Anti B) too ,
N =	**B + (Anti B),**
N =	**a + b + c + d.**
	Let us respect **the law of the excluded middle**. That is to say, there is no third between A and Anti A, **tertium non datur**.

The following 2x2 table gives an overview about this relationships.

a	b	A
c	d	Anti A
B	Anti B	N

$\Delta(A)^2$	denote the **inner contradiction** of A,
$\Delta(B)^2$	denote the **inner contradiction** of B,
$\Delta(A, B)$	denote the **inner contradiction** between A and B,
$\sigma(A, B)$	denote the co-variance of A and B,
$\sigma(A)^2$	denote the variance of A,
$\sigma(B)^2$	denote the variance of B.
κ	denote the relationship between A and B,

Then

$$\sigma(A , B) = | \kappa | * (\sigma(A) * \sigma(B)).$$

Proof.

$$a = a \qquad (124)$$

$$a + b = a + b \qquad (125)$$

$$a + b + c = a + b + c \qquad (126)$$

$$a + b + c + d = a + b + c + d \qquad (127)$$

$$N = N \qquad (128)$$

$$(N*N) = (N*N) \qquad (129)$$

$$(N*N)*(N*N) = (N*N)*(N*N) \qquad (130)$$

Recall, $(N*N) = \Delta(A, B) / \sigma(A,B)$.
Let us assume, that it is allowed and possible to divide by $\sigma(A,B)$.

$$(\Delta(A, B) / \sigma(A,B))*(\Delta(A, B) / \sigma(A,B)) = (N*N)*(N*N) \qquad (131)$$

Recall, $(N*N) = \Delta(A)^2 / \sigma(A)^2$.
Let us assume, that it is allowed and possible to divide by $\sigma(A)^2$.

$$(\Delta(A, B) / \sigma(A,B))*(\Delta(A, B) / \sigma(A,B)) = (\Delta(A)^2 / \sigma(A)^2)*(N*N) \qquad (132)$$

Recall, $(N*N) = \Delta(B)^2 / \sigma(B)^2$.
Let us assume, that it is allowed and possible to divide by $\sigma(B)^2$.

$$(\Delta(A, B) / \sigma(A,B))*(\Delta(A, B) / \sigma(A,B)) = (\Delta(A)^2 / \sigma(A)^2)*(\Delta(B)^2 / \sigma(B)^2) \qquad (133)$$

$$(\Delta(A, B) * \Delta(A, B) / (\Delta(A)^2 * \Delta(B)^2) = (\sigma(A,B) * \sigma(A,B)) / (\sigma(A)^2 * \sigma(B)^2) \qquad (134)$$

$$(\Delta(A,B)/(\Delta(A)*\Delta(B)))*(\Delta(A,B)/(\Delta(A)*\Delta(B))) = (\sigma(A,B)/((\sigma(A)*\sigma(B))))*(\sigma(A,B)/((\sigma(A)*\sigma(B)))) \qquad (135)$$

Let us define $\kappa = \Delta(A,B) / (\Delta(A) * \Delta(B))$.

$$(\kappa*\kappa) = (\Delta(A,B)/(\Delta(A)*\Delta(B)))*(\Delta(A,B)/(\Delta(A)*\Delta(B))) = (\sigma(A,B)/((\sigma(A)*\sigma(B))))*(\sigma(A,B)/((\sigma(A)*\sigma(B)))) \qquad (136)$$

$$(\kappa*\kappa) = (\Delta(A,B)/(\Delta(A)*\Delta(B)))*(\Delta(A,B)/(\Delta(A)*\Delta(B))) \qquad (137)$$

$$(\kappa*\kappa) = (\sigma(A,B)/((\sigma(A)*\sigma(B))))*(\sigma(A,B)/((\sigma(A)*\sigma(B)))) \qquad (138)$$

$$\Delta(A, B) * \Delta(A, B) = (\kappa * \kappa) * (\Delta(A)^2 * \Delta(B)^2) \qquad (139)$$

$$\sigma(A, B) * \sigma(A, B) = (\kappa * \kappa) * (\sigma(A) * \sigma(B)) * (\sigma(A) * \sigma(B)) \qquad (140)$$

Let us assume that the square root operation is allowed.

$$\Delta(A, B) = |\kappa| * (\Delta(A) * \Delta(B)) \qquad (141)$$

$$\sigma(A, B) = |\kappa| * (\sigma(A) * \sigma(B)) \qquad (142)$$

Q. e. d.

It is not always possible and allowed to divide by N. In order to calculate the relationship κ, it is possible to use the inner contradiction of random variables without any restriction. Recall, κ can take the values

$$-1 \leq \kappa \leq +1.$$

3.2. The inner contradiction of a tensor

If **A = A**, then A is identical with itself, A is not different, A is the pure origination from and within itself. Its determinedness is to be only itself, the pure equality with itself. There does not appear to be any relation between A and another. We are faced with the fact that the same A is not only A, it is a positive A and not a negative A. A itself as a positive A excludes from itself equally any determination that is negative. The positive A is thus itself by the non-being of its other, by the non-being of the negative A. A therefore contradicts itself. It is thus itself and equally the non-being of its other. The positive A by excluding its opposite, the negative A, makes itself into the negative of what it excludes from itself. The positive A makes itself into its opposite, A is in its own self the opposite of itself, it is A and not the other of itself, the not A or it is not the negative A. The positive A is not equally the negative A, it is excluding the negative A out of itself. Therefore, more closely considered, the positive A is opposed to itself, the positive A contradicts itself and has the ability to sublate itself. In point of fact, the positive A has thus at the end within itself a relation to its other moment, to the negative A. The positive A is mediated with itself by its other, the negative A and contains the same within itself. A is thus not devoid of an inner contradiction even if A = A. The positive A is determined by its other and has the same for condition. The positive A collapses within itself at the extreme point of its union with the negative A and vice versa. The positive A is thus in itself only a moment, it is the transition of the positive A out of itself into the other of itself, into the negative A. A as selfmoving is thus equally beginning out of itself and without an urge from an other. Consequently, A contains equally not merely the negative A, but also the positive A and is thus the contradiction. A is equally the very opposite of itself instead of being only the unmoved, pure and simple A. On the contrary, A in its own self, in its self-sameness is equally different from itself and thus selfcontradictory.

Theorem 1. The inner contradiction of a tensor I.

Let

A	denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,
Anti A	denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the hidden part of A,
N	denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of A and Anti A,
N =	**A + (Anti A).**
Anti A =	**N – A .**
	Further, let the tensor product obey the distributive law (K-theory).
	Let us respect **the law of the excluded middle**. That is to say, there is no third between A and Anti A, **tertium non datur**.
$\Delta(A)^2$	denote the **inner contradiction** of the tensor A,
$\Delta(\text{Anti } A)^2$	denote the **inner contradiction** of the tensor Anti A.

Then

$$(C * A) - (A * A) = (A * (\text{Anti } A)).$$

Proof.

$$A = A \quad (143)$$

$$A*(\text{Anti } A) = A*(\text{Anti } A) \quad (144)$$

$$A*(N - A) = A*(\text{Anti } A) \quad (145)$$

Let us define the inner contradiction of a tensor as $A*(\text{Anti } A) = \Delta(A)^2$.

$$\Delta(A)^2 = (N * A) - (A * A) = A*(\text{Anti } A) \quad (146)$$

Q. e. d.

Theorem 2. The inner contradiction of an anti tensor I.

Let

A denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,

Anti A denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the hidden part of A,

N denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of A and Anti A,

N = **A + (Anti A).**

Anti A = **N – A .**

Further, let the tensor product obey the distributive law (K-theory).

Let us respect **the law of the excluded middle**.
That is to say, there is no third between A and Anti A, **tertium non datur**.

$\Delta(A)^2$ denote the **inner contradiction** of the tensor A,

$\Delta(\text{Anti } A)^2$ denote the **inner contradiction** of the tensor Anti A.

Then

$$(C * (\text{Anti } A)) - ((\text{Anti } A) * (\text{Anti } A)) = (A * (\text{Anti } A)).$$

Proof.

$$\text{Anti } A = \text{Anti } A \quad (147)$$

$$A*(\text{Anti } A) = A*(\text{Anti } A) \quad (148)$$

$$(N - (\text{Anti } A)) * (\text{Anti } A) = A*(\text{Anti } A) \quad (149)$$

Let us define the inner contradiction of a tensor as $A*(\text{Anti } A) = \Delta(\text{Anti } A)^2$.

$$\Delta(\text{Anti } A)^2 = (N*(\text{Anti } A))-((\text{Anti } A)*(\text{Anti } A)) = A*(\text{Anti } A) \quad (150)$$

Q. e. d.

3.3. The variance of a tensor

Definition. The variance of a tensor I.

Let

A	denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,
Anti A	denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the hidden part of A,
N	denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of A and Anti A,
N =	**A + (Anti A).**
Anti A =	**N – A .**
	Further, let the tensor product obey the distributive law (K-theory).
	Let us respect **the law of the excluded middle**. That is to say, there is no third between A and Anti A, **tertium non datur**.
$\Delta(A)^2$	denote the **inner contradiction** of the tensor A,
$\Delta(\text{Anti } A)^2$	denote the **inner contradiction** of the tensor Anti A.
$\sigma(A)^2$	denote the variance of A,
$\sigma(\text{Anti } A)^2$	denote the variance of Anti A.

Then

$$(N*N)*\sigma(A)^2 = ((N * A) - (A * A))$$

Proof.

$$A = A \qquad (151)$$

$$A * (\text{Anti } A) = A * (\text{Anti } A) \qquad (152)$$

$$A * (N - A) = A * (\text{Anti } A) \qquad (153)$$

$$(N * A) - (A * A) = A * (\text{Anti } A) \qquad (154)$$

Let us assume, that the division by N is allowed and possible.

$$((N * A) - (A * A)) / (N*N) = (A * (\text{Anti } A)) / (N * N) \qquad (155)$$

Let us define the variance of A as $\sigma(A)^2 = ((N * A) - (A * A)) / (N*N)$.

Let us assume that it is allowed to divide by $\sigma(A)^2$.

$$\sigma(A)^2 = ((N * A) - (A * A)) / (N*N) = (A*(\text{Anti } A)) / (N*N) = \Delta(A)^2 / (N*N) \qquad (156)$$

$$(N*N) = \Delta(A)^2 / \sigma(A)^2 \qquad (157)$$

$$(N*N)*\sigma(A)^2 = ((N * A) - (A * A)) = (A * (\text{Anti } A)) = \Delta(A)^2 \qquad (158)$$

Q. e. d.

The inner contradiction Δ of a tensor is the most important part of the variance of a tensor but both are equally not the same, both can and must be distinguished from each other. The inner contradiction of a tensor is valid even in a world where N = 0 and in a world where N ≠ 0. The variance of a tensor is valid in a world or in situations where N ≠ 0, since we are not allowed to divide by 0.

Theorem 3. The variance of a tensor g.

Let

a	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **matter in the ordinary sense** according to Albert Einstein (Einstein 1916, pp. 802-803). Let **a=m**, thus m=a=Energy/c^2,
b	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **gravitational field** according to Albert Einstein (Einstein 1916, pp. 802-803),
c	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **electromagnetic field** according to Albert Einstein (Einstein 1916, pp. 802-803),
d	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **vacuum** according to Albert Einstein (Einstein 1916, pp. 802-803),
e	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **B = e = a + c**, **tertium non datur**,
f	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **f = b + d**, **tertium non datur**,
g	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **A** = **g = a + b**, **tertium non datur**,
h	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **h = c + d**, **tertium non datur**,
A	denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,
Anti A	denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the hidden part of A,
N	denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of A and Anti A,
N =	**A + (Anti A).**
Anti A =	**N – A .**
N =	a + b + c + d.

A = g a + b.

Anti A = h = c + d.

Further, let the tensor product obey the distributive law (K-theory).

Let us respect **the law of the excluded middle**.
That is to say, there is no third between A and Anti A, **tertium non datur**.

$\Delta(A)^2$ denote the **inner contradiction** of the tensor A,

$\Delta(\text{Anti } A)^2$ denote the **inner contradiction** of tensor Anti A,

$\sigma(A)$ denote the **standard deviation** of A,

$\sigma(A)^2$ denote the **variance** of A.

Then

$$\mathbf{(N*N)*\sigma(A)^2 = ((N * A) - (A * A)) = (g * h).}$$

Proof.

$$a = a \quad (159)$$

$$a*\mathbf{c} = a*\mathbf{c} \quad (160)$$

$$(a*c) + \mathbf{(a*d)} + \mathbf{(b*c)} + \mathbf{(b*d)} = (a*c) + \mathbf{(a*d)} + \mathbf{(b*c)} + \mathbf{(b*d)} \quad (161)$$

$$(a*c) + (a*d) + (b*c) + (b*d) = (a + b)*(c + d) \quad (162)$$

$$(a*c) + (a*d) + (b*c) + (b*d) = (g*h) \quad (163)$$

$$\mathbf{(a*b)} + (a*c) + (a*d) + \mathbf{(a*b)} + (b*c) + (b*d) - \mathbf{(2*a*b)} = (g*h) \quad (164)$$

$$(a*a) + (a*b) + (a*c) + (a*d) + (a*b) + (b*c) + (b*d) - (a*a) - (2*a*b) = (g*h) \quad (165)$$

$$(a*a) + (a*b) + (a*c) + (a*d) + (a*b) + \mathbf{(b*b)} + (b*c) + (b*d) - (a*a) - (2*a*b) - \mathbf{(b*b)} = (g*h) \quad (166)$$

$$(a + b + c + d)*a + (a + b + c + d)*b - (a*a) - (2*a*b) - (b*b) = (g*h) \quad (167)$$

$$(N)*a + (N)*b - (a*a) - (2*a*b) - (b*b) = (g*h) \quad (168)$$

$$N * (a + b) - (a*a) - (2*a*b) - (b*b) = (g*h) \quad (169)$$

$$(N * g) - (a*a) - (2*a*b) - (b*b) = (g*h) \quad (170)$$

$$(N * g) - ((a*a) + (2*a*b) + (b*b)) = (g*h) \quad (171)$$

$$(N * g) - ((a + b) (a + b)) = (g * h) \quad (172)$$

$$(N * g) - (g*g) = (g * h) \quad (173)$$

$$\Delta(g)^2 = (N * g) - (g*g) = (g * h) \quad (174)$$

Let us assume (theoretical reasons) that the division by (N*N) is allowed and possible.

$$\sigma(g)^2 = \Delta(g)^2 /(N*N) = ((N * g) - (g * g))/(N*N) = (g * h)/(N*N) \quad (175)$$

Recall, g = A. h = Anti A. We obtain the next equation.

$$\sigma(A)^2 = \sigma(g)^2 = \Delta(A)^2 / (N*N) = \Delta(g)^2 / (N*N) = ((N * A) - (A*A))/ (N*N) = (A * (\text{Anti } A))/(N*N) \quad (176)$$

Let us assume that the division by $\sigma(A)^2$ is allowed and possible.

$$\mathbf{(N*N)} = \Delta(A)^2 / \sigma(A)^2 = \Delta(g)^2 / \sigma(A)^2 = ((N*A) \mathbf{-}(A*A))/ \sigma(A)^2 = (A* (\text{Anti } A))/ \sigma(A)^2 \quad (177)$$

$$\mathbf{\sigma(A)^2 = ((N * A) - (A * A)) / (N*N) = (g * h) / (N*N)} \quad (178)$$

$$(N * N) * \sigma(A)^2 = ((N * A) - (A * A)) = (g * h) = \Delta(A)^2 \quad (179)$$

Q. e. d.

According to classical logic and the identity law (Barukčić 2006d), it is true that **a = a**. The identity of **a** with itself determines the variance of g as σ(g)² = Δ(g)² / (n*n) = ((n*g) **-** (g*g))/ (n*n) = (g*h)/(n*n) . The pure matter which is denoted by **a** or the pure particle, the matter in the ordinary sense according to Albert Einstein, a particle without a gravitational field, a particle without an electromagnetic field, a particle without vacuum determines the variance of g. Only, the pure matter is nothing else then the pure energy or **energy = matter * c²**, matter is thus equally a wave too or it is the contradiction.

Theorem 4. The variance of e.

Let

a	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **matter in the ordinary sense** according to Albert Einstein (Einstein 1916, pp. 802-803). Let **a=m**, thus m=a=Energy/c²,
b	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **gravitational field** according to Albert Einstein (Einstein 1916, pp. 802-803),
c	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **electromagnetic field** according to Albert Einstein (Einstein 1916, pp. 802-803),
d	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **vacuum** according to Albert Einstein (Einstein 1916, pp. 802-803),
e	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **B = e = a + c**, **tertium non datur**,
f	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **f = b + d**, **tertium non datur**,
g	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **A** = **g = a + b**, **tertium non datur**,
h	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **h = c + d**, **tertium non datur**,
B	denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,
Anti B	denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of B, the local hidden variable of B, the opposite of B, the complementary of B, the hidden part of B,
N	denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of A and Anti A,
N =	**A + (Anti A).**
Anti B =	**N – A .**

N = a + b + c + d.
B = **e** = a + c.
Anti B = **f** = b + d.

Further, let the tensor product obey the distributive law (K-theory).

Let us respect **the law of the excluded middle**.
That is to say, there is no third between A and Anti A, **tertium non datur**.

$\Delta(B)^2$ denote the **inner contradiction** of the tensor A,
$\Delta(\text{Anti } B)^2$ denote the **inner contradiction** of tensor Anti A,
$\sigma(B)$ denote the **standard deviation** of A,
$\sigma(B)^2$ denote the **variance** of A.

Then

$$\mathbf{(N * N) * \sigma(B)^2 = ((N * B) - (B * B)) = (e * f).}$$

Proof.

$$\mathbf{a = a} \quad (180)$$

$$a*\mathbf{b} = a*\mathbf{b} \quad (181)$$

$$(a*b) + \mathbf{(a*d) + (b*c) + (c*d)} = (a*b) + \mathbf{(a*d) + (b*c) + (c*d)} \quad (182)$$

$$(a*b) + (a*d) + (b*c) + (c*d) = (a + c)*(b + d) \quad (183)$$

$$(a*b) + (a*d) + (b*c) + (c*d) = (e * f) \quad (184)$$

$$\mathbf{(a*a)} + (a*b) + \mathbf{(a*c)} + (a*d) + \mathbf{(a*c)} + (b*c) + (c*d) \mathbf{- (a*a) - (2*a*c)} = (e *f) \quad (185)$$

$$(a*a) + (a*b) + (a*c) + (a*d) + (a*c) + (b*c) + (c*c) + (c*d) - (a*a) - (2*a*c) -(c*c) = (e*f) \quad (186)$$

$$(a + b \; c + d)*a + (a + b + c + d)*c - (a*a) - (2*a*c) -(c*c) = (e*f) \quad (187)$$

$$(\quad N \quad)*a + (\quad N \quad)*c - (a*a) - (2*a*c) -(c*c) = (e*f) \quad (188)$$

$$N*(a + c) - (a*a) - (2*a*c) -(c*c) = (e*f) \quad (189)$$

$$(N * e) - (a*a) - (2*a*c) -(c*c) = (e*f) \quad (190)$$

$$(N * e) - (a + c)*(a + c) = (e * f) \quad (191)$$

$$(N * e) - (e * e) = (e * f) \quad (192)$$

$$\Delta(e)^2 = (N * e) - (e * e) = (e * f) \quad (193)$$

Let us assume (theoretically reasons) that a division by (N*N) is allowed and possible.

$$\sigma(e)^2 = \Delta(e)^2 / (N*N) = ((n * e) - (e * e))/ (N*N) = (e * f)/ (N*N) \quad (194)$$

Recall, e = B. f = Anti B. We obtain the next equation.

$$\sigma(B)^2 = \sigma(e)^2 = \Delta(B)^2/C^2=\Delta(e)^2/ (N*N) = ((N*B) - (B*B))/(N*N) = (B*(\text{Anti } B))/(N*N) \quad (195)$$

Let us assume (theoretically reasons) that a division by $\sigma(B)^2$ is allowed and possible.

$$\mathbf{(N*N)} = \Delta(B)^2 / \sigma(B)^2 = \Delta(e)^2 / \sigma(B)^2 = ((N*B) - (B*B))/ \sigma(B)^2 = (B*(\text{Anti } B))/\sigma(B)^2 \quad (196)$$

$$\mathbf{(N*N) * \sigma(B)^2 = ((N*B) - (B*B)) = (e * f)} \quad (197)$$

Q. e. d.

If it is true that **a = a** which is in accordance with the identity law of classical logic (Barukčić 2006d),it is equally true that the identity **a=a** determines the variance of e as $\sigma(e)^2=((n*e)-(e*e))/(n*n)=(e*f)/(n*n)$. According to Einstein, we denoted the pure matter or , the matter in the ordinary sense with a. Such a matter is without a gravitational field, without an electromagnetic field, without vacuum and determines the variance of e too. If Einstein is right, then pure matter is nothing else then pure energy. In so far it is equally true that **energy = matter * c²** or matter must be equally a wave too and is thus the contradiction.

3.4. The co-variance of the tensors g and e

Theorem 5. The co-variance of g and e.

Let

a	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **matter in the ordinary sense** according to Albert Einstein (Einstein 1916, pp. 802-803). Let **a=m**, thus $m=a=Energy/c^2$,
b	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **gravitational field** according to Albert Einstein (Einstein 1916, pp. 802-803),
c	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **electromagnetic field** according to Albert Einstein (Einstein 1916, pp. 802-803),
d	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **vacuum** according to Albert Einstein (Einstein 1916, pp. 802-803),
e	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **B = e = a + c**, **tertium non datur**,
f	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **f = b + d**, **tertium non datur**,
g	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **A** = **g = a + b**, **tertium non datur**,
h	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **h = c + d**, **tertium non datur**,
A	denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,
Anti A	denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the hidden part of A,
N	denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of A and Anti A,

N =	**A + (Anti A).**
Anti A =	**N – A .**
N =	a + b + c + d.
A = g	a + b.
Anti A = h =	c + d.
B	denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,
Anti B	denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of B, the local hidden variable of B, the opposite of B, the complementary of B, the hidden part of B,
N	denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of B and Anti B too,
Anti B =	**N – A .**
N =	a + b + c + d.
B = **e** =	a + c.
Anti B = **f** =	b + d.
	Further, let the tensor product obey the distributive law (K-theory).
	Let us respect **the law of the excluded middle**. That is to say, there is no third between A and Anti A, **tertium non datur**.
$\Delta(A)^2$	denote the **inner contradiction** of the tensor A,
$\Delta(\text{Anti } A)^2$	denote the **inner contradiction** of the tensor Anti A.
$\sigma(A)$	denote the **standard deviation** of A,
$\sigma(A)^2$	denote the variance of A,
$\sigma(\text{Anti } A)^2$	denote the variance of Anti A.
$\Delta(B)^2$	denote the **inner contradiction** of the tensor B,
$\Delta(\text{Anti } B)^2$	denote the **inner contradiction** of the tensor Anti B.
$\sigma(B)$	denote the **standard deviation** of B,
$\sigma(B)^2$	denote the variance of B,
$\sigma(\text{Anti } B)^2$	denote the variance of Anti B.
$\Delta(A , B)$	denote the **inner contradiction** of the tensor A and B.
$\sigma(A, B)$	denote the **co-variance** of A and B.

Then

$$\mathbf{(N*N)*\sigma(A, B) = (N*N)*\sigma(g, e) = ((N * a) - (A * B)) = ((a * d) - (b * c))}$$

Proof.

$$\mathbf{a = a} \quad (198)$$

$$a*\mathbf{d} = a*\mathbf{d} \quad (199)$$

$$(a*d) \mathbf{- (b*c)} = (a*d) \mathbf{- (b*c)} \quad (200)$$

$$\mathbf{(a*a) - (a*a) + (a*b) - (a*b)} + (a*d) \mathbf{+ (a*c) - (a*c)} \mathbf{-} (b*c) = (a*d) \mathbf{-} (b*c) \quad (201)$$

$$(a*a) + (a*b) + (a*c) + (a*d) - (a*a) - (a*b) - (a*c) \mathbf{-} (b*c) = (a*d) \mathbf{-} (b*c) \quad (202)$$

$$(a*a) + (a*b) + (a*c) + (a*d) - ((a*a) + (a*b) + (a*c) + (b*c)) = (a*d) \mathbf{-} (b*c) \quad (203)$$

$$(a*a) + (a*b) + (a*c) + (a*d) - ((a + b) * (a + c)) = (a*d) \mathbf{-} (b*c) \quad (204)$$

$$(a*a) + (a*b) + (a*c) + (a*d) - ((g) * (e)) = (a*d) \mathbf{-} (b*c) \quad (205)$$

$$(a*a) + (a*b) + (a*c) + (a*d) - (g * e) = (a*d) \mathbf{-} (b*c) \quad (206)$$

$$(a + b + c + d)*a - (g * e) = (a*d) \mathbf{-} (b*c) \quad (207)$$

$$(\quad N \quad)*a - (g * e) = (a*d) \mathbf{-} (b*c) \quad (208)$$

$$(N * a) - (g * e) = (a*d) \mathbf{-} (b*c) \quad (209)$$

$$\Delta(g, e)^2 = \Delta(a)^2 =(N * a) - (g * e) = ((a*d) \mathbf{-} (b*c)) \quad (210)$$

Let us assume (theoretically reasons) that the division by N is allowed and possible.

$$\sigma(g, e) = \Delta(A, B)/(N*N) = \Delta(e, g) /(N*N) =((n*a) - (g*e))/ (N*N) = ((a*d) \mathbf{-} (b*c))/ (N*N) \quad (211)$$

Recall, g = A. h = Anti A. e = B. f = Anti B.

Let us assume (theoretically reasons) that the division by N is allowed and possible.

$$\sigma(A , B) = \sigma(g , e) = \Delta(g , e)^2 / (N*N)= ((N * a) \mathbf{-} (A * B))/ (N*N) \quad (212)$$

Let us assume that the division by **σ(A , B)** is allowed and possible.

$$(N*N) = \Delta(g , e) / \sigma(A , B) = ((N * a) \mathbf{-} (A * B))/ \sigma(A , B) \quad (213)$$

$$\mathbf{(N*N) * \sigma(A , B) = (N*N) * \sigma(g , e) = ((N * a) - (A * B)).} \quad (214)$$

Q. e. d.

The identity **a = a** determines the co-variance of the tensors A and B too.

3.5. Particle - The unity and the struggle between matter and vacuum

It is claimed that matter and vacuum have nothing in common although both cannot be separated from each other, the more precisely matter can be measured, the less precisely vacuum is determined. On the other hand, in matter there is vacuum and in vacuum there is matter. It is impossible to separate the one from its own other.

Theorem 6. The equivalence of matter and vacuum.

Let

a denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **matter in the ordinary sense** according to Albert Einstein (Einstein 1916, pp. 802-803). Let **a=m**, thus m=a=Energy/c^2,

b denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **gravitational field** according to Albert Einstein (Einstein 1916, pp. 802-803),

c denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **electromagnetic field** according to Albert Einstein (Einstein 1916, pp. 802-803),

d denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **vacuum** according to Albert Einstein (Einstein 1916, pp. 802-803),

e denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **B = e = a + c**, **tertium non datur**,

f denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **f = b + d**, **tertium non datur**,

g denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **A = g = a + b**, **tertium non datur**,

h denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **h = c + d**, **tertium non datur**,

A denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,

Anti A denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the hidden part of A,

N denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of A and Anti A,

N =	**A + (Anti A).**
Anti A =	**N – A .**

N =	a + b + c + d.
A = g	a + b.
Anti A = h =	c + d.
B	denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,
Anti B	denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of B, the local hidden variable of B, the opposite of B, the complementary of B, the hidden part of B,
N	denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of B and Anti B too,

Anti B =	**N – A .**
N =	a + b + c + d.
B = **e** =	a + c.
Anti B = **f** =	b + d.

N =	**A + B .**

Further, let the tensor product obey the distributive law (K-theory).

Let us respect **the law of the excluded middle**.
That is to say, there is no third between A and Anti A, **tertium non datur**.

The following 2x2 table gives an overview.

a	b	A
c	d	Anti A
B	Anti B	N

$\Delta(A)^2$	denote the **inner contradiction** of the tensor A,
$\Delta(\text{Anti } A)^2$	denote the **inner contradiction** of the tensor Anti A.

$\sigma(A)$	denote the **standard deviation** of A,
$\sigma(A)^2$	denote the variance of A,
$\sigma(\text{Anti } A)^2$	denote the variance of Anti A.

$\Delta(B)^2$ denote the **inner contradiction** of the tensor B,
$\Delta(\text{Anti } B)^2$ denote the **inner contradiction** of the tensor Anti B.

$\sigma(B)$ denote the **standard deviation** of B,
$\sigma(B)^2$ denote the variance of B,
$\sigma(\text{Anti } B)^2$ denote the variance of Anti B.

$\Delta(A , B)$ denote the **inner contradiction** of the tensor A and B.
$\sigma(A, B)$ denote the **co-variance** of A and B.

Then

a = d.

Proof.

$$A = A \quad (215)$$

$$A * B = A * B \quad (216)$$

$$(N - A)* A = A * B \quad (217)$$

$$\Delta(A)^2 = A*(N - A) = B * (N - B) = \Delta(B)^2 \quad (218)$$

$$(N * A) - (A * A) = A * B \quad (219)$$

$$(N * A) - (A * A) = B * (N - B) \quad (220)$$

$$(N * A) - (A * A) = (N * B) - (B * B) \quad (221)$$

Let us assume (for theoretically reasons) that the division by (N*N) is allowed.

$$((N * A) - (A * A)) / (N*N) = ((N * B) - (B * B))/ (N*N) \quad (222)$$

$$\sigma(A)^2 = \sigma(B)^2 \quad (223)$$

$$\sigma(A)^2 =((N * A) - (A * A)) / (N*N) = ((N * B) - (B * B))/ (N*N) = \sigma(B)^2 \quad (224)$$

Recall, g = A. g = a + b. Recall, e = B. e = a + c.

$$((n * g) - (g * g))/(N * N) = ((n * e) - (e * e))/(N*N) \quad (225)$$

$$((n * g) - (g * g)) = ((n * e) - (e * e)) \quad (226)$$

$$(a+b)*(a+b+c+d) - (a+b)^2 = (a+c)*(a+b+c+d) - (a+c)^2 \quad (227)$$

$$\begin{aligned} &+(a*a) + (a*b) + (a*c) + (a*d) & &+(a*a) + (a*b) + (a*c) + (a*d) \\ &+(b*a) + (b*b) + (b*c) + (b*d) &=\; &+(c*a) + (c*b) + (c*c) + (c*d) \\ &-(a*a) - (a*b) - (a*b) - (b*b) & &-(a*a) - (a*c) - (a*c) - (c*c) \end{aligned} \quad (228)$$

$$\begin{aligned} &+(a*a) + (a*b) + (a*c) + (a*d) & &+(a*a) + (a*b) + (a*c) + (a*d) \\ &+(b*a) + (b*b) + (b*c) + (b*d) &=\; &+(c*a) + (c*b) + (c*c) + (c*d) \\ &-(a*a) - 2*(a*b) - (b*b) & &-(a*a) - 2*(a*c) - (c*c) \end{aligned} \quad (229)$$

$$(a*c) + (a*d) + (b*c) + (b*d) = (a*b) + (a*d) + (c*b) + (c*d) \quad (230)$$

$$(a*c) + (a*d) + (b*c) + (b*d) = (a*b) + (a*d) + (c*b) + (c*d) \quad (231)$$

$$(a*c) + (b*d) = (a*b) + (c*d) \quad (230)$$

$$(a*c) + (b*d) - (a*b) - (c*d) = 0 \quad (232)$$

$$(a - d)*(b - c) = 0 \quad (233)$$

$$(a - d) = 0 \quad (234)$$

$$\mathbf{a = d} \quad (235)$$

Q. e. d.

The **equivalence of matter and vacuum** under certain circumstances (A + B = N) is proofed as correct. In matter is vacuum, in vacuum is matter.

Matter

According to Albert Einstein's $E=m*c^2$, pure matter is the unity into which pure energy withdraws, it is the unity into which energy has collapsed at an extreme point of its union with its other, with its opposite. The pure matter, denoted by **a**, stands in contrast to determinate matter. In accordance with Albert Einstein, matter in the ordinary sense (Einstein 1916, pp. 802-803), is matter without any relation to a gravitational field, matter without any relation to an electromagnetic filed, matter without any relation to vacuum, is matter without any relation to an other, that is to say pure matter, matter that equates only itself, matter devoid of all determination, matter without any diversity within itself, matter without a reference outwards, matter free from any determinatedness in relation to its own other, an indeterminate matter. This pure matter has sublated all reference to an other, is without any distinction, is without any further specification and is equal only to itself, or

a = a.

Pure matter is equal only to itself but equally is not equal to its other or to vacuum. On the contrary, the matter is more or less rather the sheer other of vacuum. It appears to me the pure matter and invariant matter or **matter at rest** or m_o are identical.

Vacuum
Vacuum as a volume of space is empty of matter. But even an ideal and absolutely pure vacuum, as the complete absence of anything, seems to be not absolutely empty. It appears to me that in our world, vacuum energy will never be exactly zero (Casimir effect, Lamb shift). Such an absolutely pure vacuum, denoted by d, is simply equality with itself or **d = d**. Vacuum is vacuum, from such a vacuum only vacuum becomes, there is no progress, no particles are created, because in a particle vacuum remains vacuum, vacuum passes not into its other, into matter, out of vacuum comes vacuum, vacuum stays vacuum, all is like it is, there are no changes, there is no transition from vacuum into matter and vice versa. Matter and vacuum are strictly held apart, the transition of the one into the other is denied. The pure matter and the pure vacuum are thus equally without any determinatedness. If pure matter and pure vacuum had any determinatedness by which they were distinguished from each other then they would be determinate matter and determinate vacuum and not pure matter and pure vacuum that here they still are. The difference between the pure matter and the pure vacuum is therefore empty, each of the both is in the same way indeterminate. Pure matter and pure vacuum are thus the same, both are unseparated and inseparable but equally both are absolutely distinct and thus yet different. Matter and vacuum are not undistinguished from each other and thus, on the contrary, they are not the same, matter can be distinguished of from vacuum. The difference between matter and vacuum is a difference which no less sublates itself and thus is not. Each of them immediately vanishes in its opposite. This movement of the vanishing of the one into the other is the particle itself. The difference between matter and vacuum exists not in themselves but in a third, the particle. In a particle, matter and vacuum are only distinct moments, as the transition of the one into its own other, transition in this context is the same as particle. The particle only is, in so far as matter and vacuum are distinguished. The particle is an other than matter and vacuum. The matter and vacuum subsist only in this other, in particle. It is the immanent nature of matter and vacuum to manifest themselves, their unity, in a particle**.**

Particle
Matter passes over into vacuum and vice versa and so gives rise to the unity of matter and vacuum. Particle is this transition from matter into vacuum and vice versa. Particle is the unseparatedness of matter and vacuum, the determinate unity of matter and vacuum in which there is both matter and vacuum, the particle contains matter and vacuum as two unities. But in so far as matter and vacuum, each unseparated from its other, is, each is equally not. Both are in this unity but only as vanishing or as sublated moments. Both are the same, they paralyse and interpenetrate each other. The matter passes over into vacuum, but vacuum is equally the opposite of itself, and passes over into matter. Matter equally sublates itself and is rather the transition into vacuum, each is in its own self the opposite of itself and sublates thus itself in itself. The particle consists rather in this movement of matter and vacuum. The resultant equilibrium of this movement is the particle itself. Matter and vacuum are in this unity only as vanishing moments, the particle as such is only through their distinguishedness. The vanishing of matter and of vacuum is therefore the vanishing of the particle. Particle is the vanishing of matter in vacuum and of vacuum in matter and the vanishing of matter and vacuum generally; but equally, particles rests on the distinction between matter and vacuum. The particle is therefore inherently self-contradictory, because the determinations it unites within itself are opposed to each other. Now wherever and in whatever form matter and vacuum are in question, the particle, this third, must be present; for the two terms have no separate subsistence of their own but are only in particle. But we cannot leave entirely unmentioned that if vacuum would be independent of matter a particle could not made any further progress, such a particle could achieve some progress only be linking the same on to something extraneous, something outside of the particle itself.

3.6. Wave - The unity and the struggle between the gravitational field and the electromagnetic field

Theorem 7. The equivalence of gravitational field and electromagnetic field.

Let

a	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **matter in the ordinary sense** according to Albert Einstein (Einstein 1916, pp. 802-803). Let **a=m**, thus m=a=Energy/c^2,
b	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **gravitational field** according to Albert Einstein (Einstein 1916, pp. 802-803),
c	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **electromagnetic field** according to Albert Einstein (Einstein 1916, pp. 802-803),
d	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **vacuum** according to Albert Einstein (Einstein 1916, pp. 802-803),
e	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **B = e = a + c**, **tertium non datur**,
f	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **f = b + d**, **tertium non datur**,
g	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **A** = **g = a + b**, **tertium non datur**,
h	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **h = c + d**, **tertium non datur**,
A	denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,
Anti A	denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the hidden part of A,
N	denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of A and Anti A,

N =	**A + (Anti A).**
Anti A =	**N – A .**
N =	a + b + c + d.

A = g a + b.
Anti A = h = c + d.

B denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,
Anti B denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of B, the local hidden variable of B, the opposite of B, the complementary of B, the hidden part of B,
N denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of B and Anti B too,

Anti B = **N – A .**
N = a + b + c + d.
B = **e** = a + c.
Anti B = **f** = b + d.

N = **A + B .**
Further, let the tensor product obey the distributive law (K-theory).
Let us respect **the law of the excluded middle**.
That is to say, there is no third between A and Anti A, **tertium non datur**.

The following 2x2 table gives an overview.

a	b	A
c	d	Anti A
B	Anti B	N

$\Delta(A)^2$ denote the **inner contradiction** of the tensor A,
$\Delta(\text{Anti } A)^2$ denote the **inner contradiction** of the tensor Anti A.

$\sigma(A)$ denote the **standard deviation** of A,
$\sigma(A)^2$ denote the variance of A,
$\sigma(\text{Anti } A)^2$ denote the variance of Anti A.

$\Delta(B)^2$ denote the **inner contradiction** of the tensor B,
$\Delta(\text{Anti } B)^2$ denote the **inner contradiction** of the tensor Anti B.

$\sigma(B)$ denote the **standard deviation** of B,

$\sigma(B)^2$ denote the variance of B,
$\sigma(\text{Anti } B)^2$ denote the variance of Anti B.

$\Delta(A , B)$ denote the **inner contradiction** of the tensor A and B.
$\sigma(A, B)$ denote the **co-variance** of A and B.

Then

b = c.

Proof.

$$A = A \quad (236)$$

$$A * B = A * B \quad (237)$$

$$(N - A)* A = A * B \quad (238)$$

$$\Delta(A)^2 = A*(N - A) = B * (N - B) = \Delta(B)^2 \quad (239)$$

$$(N * A) - (A * A) = A * B \quad (240)$$

$$(N * A) - (A * A) = B * (N - B) \quad (241)$$

$$(N * A) - (A * A) = (N * B) - (B * B) \quad (242)$$

Let us assume (for theoretically reasons) that the division by (N*N) is allowed.

$$((N * A) - (A * A)) / (N*N) = ((N * B) - (B * B))/ (N*N) \quad (243)$$

$$\sigma(A)^2 = \sigma(B)^2 \quad (244)$$

$$\sigma(A)^2 =((N * A) - (A * A)) / (N*N) = ((N * B) - (B * B))/ (N*N) = \sigma(B)^2 \quad (245)$$

Recall, g = A. g = a + b. Recall, e = B. e = a + c.

$$((n * g) - (g * g))/(N * N) = ((n * e) - (e * e))/(N*N) \quad (246)$$

$$((n * g) - (g * g)) = ((n * e) - (e * e)) \quad (247)$$

$$(a+b)*(a+b+c+d) -(a+b)^2 = (a+c)*(a+b+c+d) - (a+c)^2 \quad (248)$$

$$\begin{matrix} + (a*a) + (a*b) + (a*c) + (a*d) \\ + (b*a) + (b*b) + (b*c) + (b*d) \\ - (a*a) - (a*b) - (a*b) - (b*b) \end{matrix} = \begin{matrix} + (a*a) + (a*b) + (a*c) + (a*d) \\ + (c*a) + (c*b) + (c*c) + (c*d) \\ - (a*a) - (a*c) - (a*c) - (c*c) \end{matrix} \quad (249)$$

$$\begin{matrix} +(a*a) + (a*b) + (a*c) + (a*d) \\ +(b*a) + (b*b) + (b*c) + (b*d) \\ -(a*a) - 2*(a*b) - (b*b) \end{matrix} = \begin{matrix} +(a*a) + (a*b) + (a*c) + (a*d) \\ +(c*a) + (c*b) + (c*c) + (c*d) \\ -(a*a) - 2*(a*c) - (c*c) \end{matrix} \quad (250)$$

$$(a*c) + (a*d) + (b*c) + (b*d) = (a*b) + (a*d) + (c*b) + (c*d) \quad (251)$$

$$(a*c) + (a*d) + (b*c) + (b*d) = (a*b) + (a*d) + (c*b) + (c*d) \quad (252)$$

$$(a*c) + (b*d) = (a*b) + (c*d) \quad (253)$$

$$(a*c) + (b*d) - (a*b) - (c*d) = 0 \quad (254)$$

$$(a - d)*(b - c) = 0 \quad (255)$$

$$(b - c) = 0 \quad (256)$$

$$\mathbf{b = c} \quad (257)$$

Q. e. d.

The **equivalence of a gravitational field and a electromagnetic field** under certain circumstances (A+B = N) is proofed as correct.

Gravitational field
According to general relativity, vacuum regions do not contain any energy. But besides of this, the gravitational field can do work. In so far, the gravitational field itself must possess energy. Thus, the pure gravitational field is the unity into which pure energy withdraws, it is equally the unity into which energy has collapsed. The pure gravitational field stands in contrast to determinate gravitational field and is more or less the other of electromagnetic field.

The pure gravitational field, a gravitational field without any further determination, a gravitational field without any diversity within itself, a gravitational field without a reference outwards, a gravitational field that is free from any determinatedness in relation to its own other, a gravitational field without any distinction, is equal only to itself or

b = b.

Electromagnetic field
The pure electromagnetic field as simply equality with itself is indeterminate, has sublated all reference to an other, is equally without any distinction and without any further specification, it is the pure electromagnetic field and not the determined electromagnetic field or

c = c.

In accordance with this, electromagnetic field is electromagnetic field, from electromagnetic field only electromagnetic field becomes, there is no wave because in a wave electromagnetic field remains electromagnetic field, electromagnetic field passes not into its other, into the gravitational field, out of electromagnetic field comes electromagnetic field, there is no a transition from electromagnetic field into gravitational field, the gravitational field and electromagnetic field are strictly are held apart, the transition of the one into the other is denied. If the pure gravitational field and the pure electromagnetic field had any determinatedness by which they were distinguished from each other then they would be determinate gravitational field and determinate electromagnetic field and not the pure gravitational field and pure electromagnetic field that here they still are. In so far, the pure gravitational field and pure electromagnetic field are the same, both are indeterminate.

But equally the pure gravitational field and pure electromagnetic field are not undistinguished from each other and thus, on the contrary, they are not the same, the gravitational field can be distinguished from the electromagnetic field, both are absolutely distinct and yet both are unseparated and inseparable. The difference between the pure gravitational field and the pure electromagnetic field is therefore empty, each of the both is in the same way indeterminate, their difference exists not in themselves but in a third, the wave. In a wave, the gravitational field and the electromagnetic field are only distinct moments, a transition of the one into its own other, transition is the same as wave. Each of them immediately vanishes in its opposite. This movement of the vanishing of the one into the other is the wave. The wave only is, in so, in so far as the gravitational field and the electromagnetic field are distinguished. The wave is an other than the gravitational field and the electromagnetic field. The gravitational field and the electromagnetic field subsist only in this other, in the wave. It is the immanent nature of the gravitational field and the electromagnetic field to manifest themselves, their unity, in a wave**.**

Wave

Gravitational field passes over into electromagnetic field and vice versa and so gives rise to the unity of gravitational field and electromagnetic field. The wave is this transition from gravitational field into electromagnetic field and vice versa. Wave is the unseparatedness of gravitational field and electromagnetic field, the determinate unity of gravitational field and electromagnetic field in which there is both gravitational field and electromagnetic field. The wave contains gravitational field and electromagnetic field as its own two unities. But in so far as gravitational field and electromagnetic field, each unseparated from its other, is, each is equally not. Both are in a wave, in this unity, but only as vanishing or as sublated moments. In so far, both are the same, they paralyse and interpenetrate each other. The gravitational field passes over into electromagnetic field, but the electromagnetic field is equally the opposite of itself, and passes over into gravitational field. Gravitational field equally sublates itself and is rather transition into electromagnetic field, each is in its own self the opposite of itself and sublates thus itself in itself. The wave consists rather in the movement of the gravitational field and the electromagnetic field. The resultant equilibrium of this movement is the wave itself. The gravitational field and the electromagnetic field are in this unity only as vanishing moments, the wave as such is only through their distinguishedness. The vanishing of the gravitational field and of the electromagnetic fields therefore the vanishing of wave.

Wave is the vanishing of gravitational field in electromagnetic field and of electromagnetic field in gravitational field and the vanishing of gravitational field and electromagnetic field generally; but equally, wave rests on the distinction between the gravitational field and the electromagnetic field. The wave is therefore inherently self-contradictory, because the determinations it unites within itself are opposed to each other. But we should not leave entirely unmentioned that if the electromagnetic field would be independent of the gravitational field and vice versa a wave could not made any further progress. In this case, a wave could achieve some progress only be linking the wave on to something extraneous, something outside of the wave.

Now wherever and in whatever form gravitational field and electromagnetic field are in question, the wave, this third, must be present; for the two terms have no separate subsistence of their own but are only in wave, thus in a **photon** too.

3.7. Particle - wave dualism: The unity and the struggle between particle and wave.

Theorem 8.
Particle - wave dualism: The unity and struggle between particle and wave I.

Let

a	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **matter in the ordinary sense** according to Albert Einstein (Einstein 1916, pp. 802-803). Let **a=m**, thus m=a=Energy/c^2,
b	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **gravitational field** according to Albert Einstein (Einstein 1916, pp. 802-803),
c	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **electromagnetic field** according to Albert Einstein (Einstein 1916, pp. 802-803),
d	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **vacuum** according to Albert Einstein (Einstein 1916, pp. 802-803),
e	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **B = e = a + c**, **tertium non datur**,
f	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **f = b + d**, **tertium non datur**,
g	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **A** = **g = a + b**, **tertium non datur**,
h	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **h = c + d**, **tertium non datur**,
A	denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,
Anti A	denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the hidden part of A,
N	denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of A and Anti A,

N =	**A + (Anti A).**
Anti A =	**N – A .**
N =	a + b + c + d.
A = g	a + b.

Anti A = h = c + d.

B denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,

Anti B denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of B, the local hidden variable of B, the opposite of B, the complementary of B, the hidden part of B,

N denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of B and Anti B too,

Anti B = **N – A .**

N = a + b + c + d.

B = **e** = a + c.

Anti B = **f** = b + d.

N = **A + B .**

Further, let the tensor product obey the distributive law (K-theory).

Let us respect **the law of the excluded middle**.
That is to say, there is no third between A and Anti A, **tertium non datur**.

The following 2x2 table gives an overview.

a	b	A
c	d	Anti A
B	Anti B	N

$\Delta(A)^2$ denote the **inner contradiction** of the tensor A,

$\Delta(\text{Anti } A)^2$ denote the **inner contradiction** of the tensor Anti A.

$\sigma(A)$ denote the **standard deviation** of A,

$\sigma(A)^2$ denote the variance of A,

$\sigma(\text{Anti } A)^2$ denote the variance of Anti A.

$\Delta(B)^2$ denote the **inner contradiction** of the tensor B,

$\Delta(\text{Anti } B)^2$ denote the **inner contradiction** of the tensor Anti B.

$\sigma(B)$ denote the **standard deviation** of B,

$\sigma(B)^2$ denote the variance of B,

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$\sigma(\text{Anti } B)^2$ denote the variance of Anti B.

$\Delta(A, B)$ denote the **inner contradiction** of the tensor A and B.
$\sigma(A, B)$ denote the **co-variance** of A and B.
κ denote the basic relationship between particle and wave.

Then

$$\Delta(A, B) * \Delta(A, B) = (\kappa * \kappa) * ((\Delta(A) * \Delta(A)) * (\Delta(B) * \Delta(B))) .$$

Proof.

$$a = a \qquad (258)$$

$$a + b = a + b \qquad (259)$$

$$a + b + c = a + b + c \qquad (260)$$

$$a + b + c + d = a + b + c + d \qquad (261)$$

$$N = N \qquad (262)$$

$$(N*N) = (N*N) \qquad (263)$$

$$(N*N)*(N*N) = (N*N)*(N*N) \qquad (264)$$

Recall, $(N*N) = \Delta(A, B) / \sigma(A,B)$.
Let us assume, that it is allowed and possible to divide by $\sigma(A,B)$.

$$(\Delta(A, B) / \sigma(A,B))*(\Delta(A, B) / \sigma(A,B)) = (N*N)*(N*N) \qquad (265)$$

Recall, $(N*N) = \Delta(A)^2 / \sigma(A)^2$.
Let us assume, that it is allowed and possible to divide by $\sigma(A)^2$.

$$(\Delta(A, B) / \sigma(A,B))*(\Delta(A, B) / \sigma(A,B)) = (\Delta(A)^2 / \sigma(A)^2)*(N*N) \qquad (266)$$

Recall, $(N*N) = \Delta(B)^2 / \sigma(B)^2$.
Let us assume, that it is allowed and possible to divide by $\sigma(B)^2$.

$$(\Delta(A, B) / \sigma(A,B))*(\Delta(A, B) / \sigma(A,B)) = (\Delta(A)^2 / \sigma(A)^2)*(\Delta(B)^2 / \sigma(B)^2) \qquad (267)$$

$$((N*a)-(A*B))/\sigma(A,B))*(((N*a)-(A*B))/\sigma(A,B)) = ((((N*A)-(A*A))/\sigma(A)^2)*(((N*B)-(B*B))/\sigma(B)^2)) \qquad (268)$$

$$(((N*a)-(A*B))*((N*a)-(A*B)))/(\sigma(A,B)*\sigma(A,B)) = (((N*A)-(A*A))*((N*B)-(B*B)))/(\sigma(A)^2*\sigma(B)^2) \qquad (269)$$

$$(((N*a)-(A*B))*((N*a)-(A*B)))/(((N*A)-(A*A))*((N*B)-(B*B))) = (\sigma(A,B)*\sigma(A,B)) / (\sigma(A)^2*\sigma(B)^2) \qquad (270)$$

$$(((N*a)-(A*B))*((N*a)-(A*B)))/(((N*A)-(A*A))*((N*B)-(B*B))) = (\sigma(A,B) / (\sigma(A)*\sigma(B))) * (\sigma(A,B) / (\sigma(A)*\sigma(B))) \qquad (271)$$

Let us define $\kappa = \Delta(A,B) / (\Delta(A) * \Delta(B)) = (\sigma(A,B) / (\sigma(A)*\sigma(B))$

$$(\kappa*\kappa)=((\Delta(A,B)*\Delta(A,B)/(\Delta(A)^2*\Delta(B)^2)) = (\sigma(A,B)*\sigma(A,B))/(\sigma(A)^2*\sigma(B)^2) \quad (272)$$

$$(\kappa*\kappa) = (\Delta(A,B)/(\Delta(A)*\Delta(B)))*(\Delta(A,B)/(\Delta(A)*\Delta(B))) = (\sigma(A,B)/((\sigma(A)*\sigma(B))))*(\sigma(A,B)/((\sigma(A)*\sigma(B)))) \quad (273)$$

$$(\kappa*\kappa) = (\Delta(A,B)/(\Delta(A)*\Delta(B)))*(\Delta(A,B)/(\Delta(A)*\Delta(B))) \quad (274)$$

$$(\kappa*\kappa) = (\sigma(A,B)/((\sigma(A)*\sigma(B))))*(\sigma(A,B)/((\sigma(A)*\sigma(B)))) \quad (275)$$

$$\Delta(A,B)*\Delta(A,B) = (\kappa*\kappa)*(\Delta(A)^2*\Delta(B)^2) \quad (276)$$

$$\sigma(A,B)*\sigma(A,B) = (\kappa*\kappa)*(\sigma(A)*\sigma(B))*(\sigma(A)*\sigma(B)) \quad (277)$$

Let us assume that the square root operation is allowed.

$$\sigma(A,B) = |\kappa|*(\sigma(A)*\sigma(B)) \quad (278)$$

$$\Delta(A,B) = |\kappa|*(\Delta(A)*\Delta(B)) \quad (279)$$

Q. e. d.

In so far, in a particle, the cause of a wave can be found and vice versa. In a wave, the cause of a particle can be found. The basic relationship between particle and wave based on | κ | and equally on Einstein's basic field equation can be expressed under certain circumstances (assumed the division is allowed) as

$$|\kappa| = \sigma(A,B)/(\sigma(A)^2*\sigma(B)^2)^{1/2} = \Delta(A,B)/(\Delta(A)^2*\Delta(B)^2)^{1/2} \quad (280)$$

Contrary to this, it is not always possible and allowed to divide by N, which is necessary for the variance and co-variance to be calculated. In order to calculate the relationship κ, it is possible to use only the inner contradiction of tensors without any restriction. Thus, it is equally true that

$$\Delta(A,B) = |\kappa|*(\Delta(A)*\Delta(B)). \quad (281)$$

Recall, κ lies in the range of

$$-1 \leq \kappa \leq +1.$$

The variance of k, $\sigma(\kappa)^2$, can be calculated as

$$\sigma(|\kappa|)^2 = |\kappa|*(1-|\kappa|) \leq (1/4). \quad (282)$$

In various cosmological models, the universe is assumed to contain matter, radiation and vacuum, the so called cosmological fluid consists of components. According to the modern interpretation of the cosmological constant Λ in terms of the energy density of the vacuum it is assumed that the same is non-zero. The equation-of-state parameter w_i is claimed to be a constant. This equation-of-state parameter w_i lies in the range of $-1 \leq w_i \leq +1$ like κ. For pressureless "dust" it is claimed that $w_i = 0$. For radiation it is claimed that $w_i = (1/3)$. For vacuum it is claimed that $w_i = -1$. The κ relationship is able to take values $-1 \leq \kappa \leq +1$ too and appears to be familiar with w_i. It is not unreasonable to accept, that there is an identity between w_i and κ. Are both at the end identical and the same?

On the other hand, κ and c, the mathematical formula of the causal relationship (Barukčić 2006a, p. 314) are very familiar with each other. In A the cause of B can be found and vice versa. In B the cause of A can be found. κ appears to be something like a mathematical formula of the causal relationship expressed in the language of tensors and has to do something with the creation and negation/annihilation of particles.

Theorem 9.
Particle – wave dualism: Vacuum.
Let

a	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **matter in the ordinary sense** according to Albert Einstein (Einstein 1916, pp. 802-803). Let **a=m**, thus m=a=Energy/c^2,
b	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **gravitational field** according to Albert Einstein (Einstein 1916, pp. 802-803),
c	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **electromagnetic field** according to Albert Einstein (Einstein 1916, pp. 802-803),
d	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **vacuum** according to Albert Einstein (Einstein 1916, pp. 802-803),
e	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **B = e = a + c**, **tertium non datur**,
f	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **f = b + d**, **tertium non datur**,
g	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **A** = **g = a + b**, **tertium non datur**,
h	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **h = c + d**, **tertium non datur**,
A	denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,
Anti A	denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the hidden part of A,
N	denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of A and Anti A,

N = **A + (Anti A).**

Anti A = **N – A .**

N = a + b + c + d.

A = g a + b.

Anti A = h = c + d.

B	denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,
Anti B	denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of B, the local hidden variable of B, the opposite of B, the complementary of B, the hidden part of B,
N	denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of B and Anti B too,

Anti B = **N – A .**

N = a + b + c + d.

B = **e** = a + c.

Anti B = **f** = b + d.

N = **A + B .**

Further, let the tensor product obey the distributive law (K-theory).

Let us respect **the law of the excluded middle**.
That is to say, there is no third between A and Anti A, **tertium non datur**.

The following 2x2 table gives an overview.

a	b	A
c	d	Anti A
B	Anti B	N

$\Delta(A)^2$ denote the **inner contradiction** of the tensor A,

$\Delta(\text{Anti } A)^2$ denote the **inner contradiction** of the tensor Anti A.

$\sigma(A)$ denote the **standard deviation** of A,

$\sigma(A)^2$ denote the variance of A,

$\sigma(\text{Anti } A)^2$ denote the variance of Anti A.

$\Delta(B)^2$ denote the **inner contradiction** of the tensor B,

$\Delta(\text{Anti } B)^2$ denote the **inner contradiction** of the tensor Anti B.

$\sigma(B)$ denote the **standard deviation** of B,

$\sigma(B)^2$ denote the variance of B,

$\sigma(\text{Anti } B)^2$	denote the variance of Anti B.
$\Delta(A, B)$	denote the **inner contradiction** of the tensor A and B.
$\sigma(A, B)$	denote the **co-variance** of A and B.
κ	denote the basic relationship between particle and wave.

Then

$$\kappa = -1.$$

Proof.

$$\kappa = ((a*d) - (b*c)) /((((a+b+c+d)*(a+b))-((a+b)* (a+b)))*(((a+b+c+d)* (a+c))-((a+c)*(a+c))))^{1/2} \quad (283)$$

Let us assume that the division and the square root operation is allowed.
Let us assume **a region of space with pure vacuum**.

Thus, we set **d = 0**, that is to say, the energy density of the vacuum equals 0.

$$\kappa = ((a*d) - (b*c)) /((((a+b+c+d)*(a+b))-((a+b)* (a+b)))*(((a+b+c+d)* (a+c))-((a+c)*(a+c))))^{1/2} \quad (284)$$

$$\kappa = ((a*0) - (b*c)) /((((a+b+c+0)*(a+b))-((a+b)* (a+b)))*(((a+b+c+0)* (a+c))-((a+c)*(a+c))))^{1/2} \quad (285)$$

$$\kappa = -1. \quad (286)$$

Q. e. d.

Pure vacuum appears to be the empty negative.

Theorem 10.
Particle - wave dualism: A world without gravitational fields or electromagnetic fields.
Let

a denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **matter in the ordinary sense** according to Albert Einstein (Einstein 1916, pp. 802-803). Let **a=m**, thus $m=a=Energy/c^2$,

b denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **gravitational field** according to Albert Einstein (Einstein 1916, pp. 802-803),

c denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **electromagnetic field** according to Albert Einstein (Einstein 1916, pp. 802-803),

d denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **vacuum** according to Albert Einstein (Einstein 1916, pp. 802-803),

e denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **B = e = a + c**, **tertium non datur**,

f denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **f = b + d**, **tertium non datur**,

g denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **A = g = a + b**, **tertium non datur**,

h denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **h = c + d**, **tertium non datur**,

A denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,

Anti A denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the hidden part of A,

N denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of A and Anti A,

N = **A + (Anti A).**

Anti A = **N – A .**

N = a + b + c + d.

A = g a + b.

Anti A = h = c + d.

B denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,

Anti B denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of B, the local hidden variable of B, the opposite of B, the complementary of B, the hidden part of B,

N denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of B and Anti B too,

Anti B = **N – A .**

N = a + b + c + d.

B = **e** = a + c.

Anti B = **f** = b + d.

N = **A + B .**

Further, let the tensor product obey the distributive law (K-theory).

Let us respect **the law of the excluded middle**.
That is to say, there is no third between A and Anti A, **tertium non datur**.

The following 2x2 table gives an overview.

a	b	A
c	d	Anti A
B	Anti B	N

$\Delta(A)^2$ denote the **inner contradiction** of the tensor A,

$\Delta(\text{Anti } A)^2$ denote the **inner contradiction** of the tensor Anti A.

$\sigma(A)$ denote the **standard deviation** of A,

$\sigma(A)^2$ denote the variance of A,

$\sigma(\text{Anti } A)^2$ denote the variance of Anti A.

$\Delta(B)^2$ denote the **inner contradiction** of the tensor B,

$\Delta(\text{Anti } B)^2$ denote the **inner contradiction** of the tensor Anti B.

$\sigma(B)$ denote the **standard deviation** of B,

$\sigma(B)^2$ denote the variance of B,

σ(Anti B)² denote the variance of Anti B.

Δ(A , B) denote the **inner contradiction** of the tensor A and B.
σ(A, B) denote the **co-variance** of A and B.
κ denote the basic relationship between particle and wave.

Then

$$\kappa = +1.$$

Proof.

$$\kappa = ((a*d) – (b*c)) /((((a+b+c+d)*(a+b))-((a+b)* (a+b)))*(((a+b+c+d)* (a+c))-((a+c)*(a+c))))^{1/2} \quad (287)$$

Let us assume that the division and the square root operations are allowed.
Let us assume **a world without gravitational or electromagnetic fields**.

Thus, we set b = **0** or/and c=0.

$$\kappa = ((a*d) – (b*c)) /((((a+b+c+d)*(a+b))-((a+b)* (a+b)))*(((a+b+c+d)* (a+c))-((a+c)*(a+c))))^{1/2} \quad (288)$$

$$\kappa = ((a*d) – (0*c)) /((((a+0+c+d)*(a+0))-((a+0)* (a+0)))*(((a+0+c+d)* (a+c))-((a+c)*(a+c))))^{1/2} \quad (289)$$

$$\kappa = +1. \quad (290)$$

Q. e. d.

Theorem 11.
Particle - wave dualism: pressureless "dust".
Let

a	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **matter in the ordinary sense** according to Albert Einstein (Einstein 1916, pp. 802-803). Let **a=m**, thus m=a=Energy/c²,
b	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **gravitational field** according to Albert Einstein (Einstein 1916, pp. 802-803),
c	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **electromagnetic field** according to Albert Einstein (Einstein 1916, pp. 802-803),
d	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **vacuum** according to Albert Einstein (Einstein 1916, pp. 802-803),
e	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **B = e = a + c**, **tertium non datur**,
f	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **f = b + d**, **tertium non datur**,
g	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **A = g = a + b**, **tertium non datur**,
h	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **h = c + d**, **tertium non datur**,
A	denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,
Anti A	denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the hidden part of A,
N	denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of A and Anti A,

N = **A + (Anti A).**

Anti A = **N – A .**

N = a + b + c + d.

A = g a + b.

Anti A = h = c + d.

B	denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,
Anti B	denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of B, the local hidden variable of B, the opposite of B, the complementary of B, the hidden part of B,
N	denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of B and Anti B too,

Anti B = **N – A .**

N = a + b + c + d.

B = **e** = a + c.

Anti B = **f** = b + d.

N = **A + B .**

Further, let the tensor product obey the distributive law (K-theory).

Let us respect **the law of the excluded middle**.
That is to say, there is no third between A and Anti A, **tertium non datur**.

The following 2x2 table gives an overview.

a	b	A
c	d	Anti A
B	Anti B	N

$\Delta(A)^2$ denote the **inner contradiction** of the tensor A,

$\Delta(\text{Anti } A)^2$ denote the **inner contradiction** of the tensor Anti A.

$\sigma(A)$ denote the **standard deviation** of A,

$\sigma(A)^2$ denote the variance of A,

$\sigma(\text{Anti } A)^2$ denote the variance of Anti A.

$\Delta(B)^2$ denote the **inner contradiction** of the tensor B,

$\Delta(\text{Anti } B)^2$ denote the **inner contradiction** of the tensor Anti B.

$\sigma(B)$ denote the **standard deviation** of B,

$\sigma(B)^2$ denote the variance of B,

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$\sigma(\text{ Anti B })^2$ denote the variance of Anti B.

$\Delta(A, B)$ denote the **inner contradiction** of the tensor A and B.
$\sigma(A, B)$ denote the **co-variance** of A and B.
κ denote the basic relationship between particle and wave.

Then

$$\kappa = 0.$$

Proof.

$$\kappa = ((a*d) - (b*c)) /((((a+b+c+d)*(a+b))-((a+b)* (a+b)))*(((a+b+c+d)* (a+c))-((a+c)*(a+c))))^{1/2} \quad (291)$$

Let us assume that the division and the square root operations are allowed.
Let us assume a world full of **pressureless "dust"**.
Let us define pressureless dust as: (a * d) = (b * c)

From this assumption immediately follows that (a * d) - (b * c) = 0
Thus, we set (a * d) - (b * c) = 0.

$$\kappa = ((a*d) - (b*c)) /((((a+b+c+d)*(a+b))-((a+b)* (a+b)))*(((a+b+c+d)* (a+c))-((a+c)*(a+c))))^{1/2} \quad (292)$$

$$\kappa = (\quad 0 \quad) /((((a+b+c+d)*(a+b))-((a+b)* (a+b)))*(((a+b+c+d)* (a+c))-((a+c)*(a+c))))^{1/2} \quad (293)$$

$$\kappa = 0. \quad (294)$$

Q. e. d.

Theorem 13. Particle - wave dualism: The unity and struggle between particle and wave.

Let

R_{ab} denote the Ricci tensor,

R denote the Ricci scalar,

g_{ab} denote the metric tensor,

T_{ab} denote the stress-energy tensor,

h denote Planck's constant, h ≈ **(6.626 0693 (11)) * 10^{-34} [J * s],**

f denote frequency,

E denote energy,

π denote the mathematical constant π, also known as **Archimedes' constant.** The numerical value of π truncated to 50 decimal places is known to be about

π ≈ 3.14159 26535 89793 23846 26433 83279 50288 41971 69399 37510,

c denote the speed of all electromagnetic radiation in a vacuum, the speed of light, where

c **= 299 792 458 [m / s],**

γ denote Newton's gravitational 'constant', where

$$\gamma \approx (6.6742 \pm 0.0010) * 10^{-11} [m^3 / (s^2 * kg)],$$

Einstein's field equation describes how a field or energy (or matter) and time changes space and vice versa. Einstein's basic field equation (EFE) for the -+++ metric sign convention, which is commonly used in general relativity, can be written in the form

$$(((4 * 2 * \pi * \gamma) * T_{ab}) / (c^4)) + ((R * g_{ab}) / 2) = (R_{ab}).$$

(-+++ metric notation)

a denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **matter in the ordinary sense** according to Albert Einstein (Einstein 1916, pp. 802-803). Let **a=m**, thus m=a=Energy/c²,

b denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **gravitational field** according to Albert Einstein (Einstein 1916, pp. 802-803),

c denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **electromagnetic field** according to Albert Einstein (Einstein 1916, pp. 802-803),

d denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **vacuum** according to Albert Einstein (Einstein 1916, pp. 802-803),

e denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **B = e = a + c**, **tertium non datur**, f denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **f = b + d**, **tertium non datur**,

g denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **A** = **g = a + b**, **tertium non datur**,

h denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness. Let **h = c + d**, **tertium non datur**,

A denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,

Anti A denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of A, the local hidden variable of A, the opposite of A, the complementary of A, the hidden part of A,

N denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of A and Anti A,

N = **A + (Anti A).**

Anti A = **N – A .**

N = a + b + c + d.

A = g a + b.

Anti A = h = c + d.

B denote a (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness,

Anti B denote a (covariant, contravariant, mixed, ...) **anti tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the other side of B, the local hidden variable of B, the opposite of B, the complementary of B, the hidden part of B,

N denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of B and Anti B too,

Anti B = **N – A .**

N = a + b + c + d.

B = **e** = a + c.

Anti B = **f** = b + d.

N = **A + B .**

Further, let the tensor product obey the distributive law (K-theory).

Let us respect **the law of the excluded middle**.
That is to say, there is no third between A and Anti A, **tertium non datur**.

The following 2x2 table gives an overview.

a	b	A
c	d	Anti A
B	Anti B	N

A = **(((4 * 2 * π * γ) / (c** ^{4} **)) * T_{ab}),**
B = **((R* g_{ab}) / 2),**
N = **(R_{ab}).**

$\Delta(A)^2$ denote the **inner contradiction** of the tensor A,
$\Delta(\text{Anti } A)^2$ denote the **inner contradiction** of the tensor Anti A.

$\sigma(A)$ denote the **standard deviation** of A,
$\sigma(A)^2$ denote the variance of A,
$\sigma(\text{Anti } A)^2$ denote the variance of Anti A.

$\Delta(B)^2$ denote the **inner contradiction** of the tensor B,
$\Delta(\text{Anti } B)^2$ denote the **inner contradiction** of the tensor Anti B.

$\sigma(B)$ denote the **standard deviation** of B,
$\sigma(B)^2$ denote the variance of B,
$\sigma(\text{Anti } B)^2$ denote the variance of Anti B.

$\Delta(A , B)$ denote the **inner contradiction** of the tensor A and B.
$\sigma(A, B)$ denote the **co-variance** of A and B.
κ denote the basic relationship between particle and wave.

Then

$$\left(\left[\frac{(Energy*R_{ab})}{(c*c)}-\left(\frac{(4*2*\pi*\gamma*T_{ab})*(R*g_{ab})}{(c*c*c*c)\ \ *\ \ 2}\right)\right]*\left[\frac{(Energy*R_{ab})}{(c*c)}-\left(\frac{(4*2*\pi*\gamma*T_{ab})*(R*g_{ab})}{(c*c*c*c)\ \ *\ \ 2}\right)\right]\right)$$

$$=(\kappa*\kappa)*\left(\left[\left(\frac{(R_{ab}*(4*2*\pi*\gamma*T_{ab}))}{(c*c*c*c)}\right)-\left(\frac{(4*2*\pi*\gamma*T_{ab})*(4*2*\pi*\gamma*T_{ab})}{(c*c*c*c)*(c*c*c*c)}\right)\right]*\left[\left(\left(\frac{R_{ab}*(R*g_{ab})}{2}\right)-\left(\frac{(R*g_{ab})*(R*g_{ab})}{2*2}\right)\right)\right]\right) \quad (295)$$

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Proof.

$$a = a \qquad (296)$$

$$a + b = a + b \qquad (297)$$

$$a + b + c = a + b + c \qquad (298)$$

$$a + b + c + d = a + b + c + d \qquad (299)$$

$$N = N \qquad (300)$$

$$(N*N) = (N*N) \qquad (301)$$

$$(N*N)*(N*N) = (N*N)*(N*N) \qquad (302)$$

Recall, $(N*N) = \Delta(A, B)/\sigma(A,B)$.
Let us assume, that it is allowed and possible to divide by $\sigma(A,B)$.

$$(\Delta(A, B)/\sigma(A,B))*(\Delta(A, B)/\sigma(A,B)) = (N*N)*(N*N) \qquad (303)$$

Recall, $(N*N) = \Delta(A)^2 / \sigma(A)^2$.
Let us assume, that it is allowed and possible to divide by $\sigma(A)^2$.

$$(\Delta(A, B)/\sigma(A,B))*(\Delta(A, B)/\sigma(A,B)) = (\Delta(A)^2 / \sigma(A)^2)*(N*N) \qquad (304)$$

Recall, $(N*N) = \Delta(B)^2 / \sigma(B)^2$.
Let us assume, that it is allowed and possible to divide by $\sigma(B)^2$.

$$(\Delta(A, B)/\sigma(A,B))*(\Delta(A, B)/\sigma(A,B)) = (\Delta(A)^2 / \sigma(A)^2)*(\Delta(B)^2 / \sigma(B)^2) \qquad (305)$$

$$((N*a)-(A*B))/\sigma(A,B))*(((N*a)-(A*B))/\sigma(A,B)) = ((((N*A)-(A*A))/\sigma(A)^2)*(((N*B)-(B*B))/\sigma(B)^2)) \qquad (306)$$

$$(((N*a)-(A*B))*((N*a)-(A*B)))/(\sigma(A,B)*\sigma(A,B)) = (((N*A)-(A*A))*((N*B)-(B*B)))/(\sigma(A)^2*\sigma(B)^2) \qquad (307)$$

$$(((N*a)-(A*B))*((N*a)-(A*B)))/(((N*A)-(A*A))*((N*B)-(B*B))) = (\sigma(A,B)*\sigma(A,B))/(\sigma(A)^2*\sigma(B)^2) \qquad (308)$$

$$(((N*a)-(A*B))*((N*a)-(A*B)))/(((N*A)-(A*A))*((N*B)-(B*B))) = (\sigma(A,B)/(\sigma(A)*\sigma(B))*(\sigma(A,B)/(\sigma(A)*\sigma(B)) \qquad (309)$$

Recall, we defined $(\kappa*\kappa) = \Delta(A,B) / (\Delta(A)*\Delta(B)) = (\sigma(A,B)/(\sigma(A)*\sigma(B)) = (((N*a)-(A*B))*((N*a)-(A*B)))/(((N*A)-(A*A))*((N*B)-(B*B)))$ (310)

$$(\kappa*\kappa) = (((N*a)-(A*B))*((N*a)-(A*B)))/(((N*A)-(A*A))*((N*B)-(B*B))) = (\sigma(A,B)*\sigma(A,B))/(\sigma(A)^2*\sigma(B)^2) \qquad (311)$$

$$(\kappa*\kappa) = (\Delta(A,B)/(\Delta(A)*\Delta(B)))*(\Delta(A,B)/(\Delta(A)*\Delta(B))) \qquad (312)$$

$$(\kappa*\kappa) = (\sigma(A,B)/((\sigma(A)*\sigma(B))))*(\sigma(A,B)/((\sigma(A)*\sigma(B)))) \qquad (313)$$

$$(\kappa*\kappa) = (((N*a)-(A*B))*((N*a)-(A*B)))/(((N*A)-(A*A))*((N*B)-(B*B))) \qquad (314)$$

$$(((N*a)-(A*B))*((N*a)-(A*B))) = (\kappa*\kappa)*(((N*A)-(A*A))*((N*B)-(B*B))) \qquad (315)$$

$$(((N*a)-(A*B))*((N*a)-(A*B))) = (\kappa*\kappa)*(((N*A)-(A*A))*((N*B)-(B*B))) \qquad (316)$$

Recall, we set

$$A = (((4*2*\pi*\gamma)/(c^4))*T_{ab}), \quad (317)$$

$$B = ((R*g_{ab})/2), \quad (318)$$

$$N = (R_{ab}), \quad (319)$$

a = mass in the ordinary sense = Energy / (c * c). (320)

$$\left(\left[\frac{(a*R_{ab})}{1}-\left(\frac{(4*2*\pi*\gamma*T_{ab})*(R*g_{ab})}{(c*c*c*c) \quad * \quad 2}\right)\right]*\left[\frac{(a*R_{ab})}{1}-\left(\frac{(4*2*\pi*\gamma*T_{ab})*(R*g_{ab})}{(c*c*c*c) \quad * \quad 2}\right)\right]\right)$$

$$=(\kappa*\kappa)*\left(\left[\left(\frac{(R_{ab}*(4*2*\pi*\gamma*T_{ab}))}{(c*c*c*c)}\right)-\left(\frac{(4*2*\pi*\gamma*T_{ab})*(4*2*\pi*\gamma*T_{ab})}{(c*c*c*c)*(c*c*c*c)}\right)\right]*\left[\left(\frac{R_{ab}*(R*g_{ab})}{2}\right)-\left(\frac{(R*g_{ab})*(R*g_{ab})}{2*2}\right)\right]\right)$$

Recall, a = mass in the ordinary sense = Energy / (c*c).

$$\left(\left[\frac{(Energy*R_{ab})}{(c*c)}-\left(\frac{(4*2*\pi*\gamma*T_{ab})*(R*g_{ab})}{(c*c*c*c) \quad * \quad 2}\right)\right]*\left[\frac{(Energy*R_{ab})}{(c*c)}-\left(\frac{(4*2*\pi*\gamma*T_{ab})*(R*g_{ab})}{(c*c*c*c) \quad * \quad 2}\right)\right]\right)$$

$$=(\kappa*\kappa)*\left(\left[\left(\frac{(R_{ab}*(4*2*\pi*\gamma*T_{ab}))}{(c*c*c*c)}\right)-\left(\frac{(4*2*\pi*\gamma*T_{ab})*(4*2*\pi*\gamma*T_{ab})}{(c*c*c*c)*(c*c*c*c)}\right)\right]*\left[\left(\frac{R_{ab}*(R*g_{ab})}{2}\right)-\left(\frac{(R*g_{ab})*(R*g_{ab})}{2*2}\right)\right]\right) \quad (322)$$

Q. e. d.

According to Einstein, gravity is more or less a manifestation of space-time curvature caused by the presence of matter. The curvature of space-time of any event, even an random one, is thus related to the energy / matter distribution at that event. Einstein's stress-energy tensor T_{ab} is thus the source of the gravitational field in general relativity and describes thus the flux and the density energy in space. According to Einstein, energy is equivalent to matter and vice versa, thus Einstein's stress-energy tensor T_{ab} describes matter too, it is a tensor of matter and energy. **Energy** is defined as the ability to change, energy because of its relation to its own other has the ability to change itself out of itself and without an urge from another. In so far, κ, the formula above, must have something to do with changes or with causation as such, since the same is about energy, space and time and much more then this. κ, the mathematical formula above, appears to be identical with the mathematical formula of the causal relationship c (Barukčić 2006a, p. 314) based on Einstein's basic field equation and expressed in the language of tensors. The following 2 by 2 table below provides some deeper insights about Einstein's basic field equation and the possible foundations of κ.

2 x 2 table	**Time**		The relationship between energy and time.	
Energy	a	b	$(8*\pi*\gamma*T_{ab})/c^4$	Stress-energy tensor
	c	d	$R_{ab} - ((8*\pi*\gamma*T_{ab})/c^4)$	
	$(R*g_{ab})/2$	$(R_{ab})-((R*g_{ab})/2)$	R_{ab}	Ricci tensor
	Ricci scalar / metric tensor	Einstein's Tensor	Ricci tensor	

3.8. General contradiction law

Particle and wave are interrelated in an other way to. Particle is the local hidden variable of a wave, the wave is the local hidden variable of the particle. This relationship is determined by the general contradiction law (Barukčić 2006e) too.

Theorem 14.
Particle - wave dualism: General contradiction law.
Let

a	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **matter in the ordinary sense** according to Albert Einstein (Einstein 1916, pp. 802-803). Let **a=m**, thus m=a=Energy/c^2,
b	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **gravitational field** according to Albert Einstein (Einstein 1916, pp. 802-803),
c	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **electromagnetic field** according to Albert Einstein (Einstein 1916, pp. 802-803),
d	denote the (covariant, contravariant, mixed, ...) tensor (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, of **vacuum** according to Albert Einstein (Einstein 1916, pp. 802-803),
N	denote a (covariant, contravariant, mixed, ...) **tensor** (of the second or higher or any ranks), a (contravariant, covariant ...) four-vectors etc., something existing independently of human mind and consciousness, the unity of A and Anti A,
N =	a + b + c + d.
Particle	denote the particle. Let us assume that **Particle = a + d**. Let
Wave	denote the wave. Let us assume that **Wave = b + c**. Let
R_{ab}	denote the Ricci tensor. Let us assume that $\mathbf{R_{ab}}$ **= Particle + Wave**.

According to the general contradiction law (Barukčić 2006e) we should obtain

$$\mathbf{((Particle)*(Wave)) \leq ((R_{ab})* (R_{ab})) / 4.}$$

The most basic and fundamental relationship between particle and wave can be seen if we take a more precisely look at the equation $\mathbf{((Particle)*(Wave)) \leq ((R_{ab})*(R_{ab}))/4}$. Let us assume, that $((R_{ab})*(R_{ab}))/4$ is not changing, let $((R_{ab})*(R_{ab}))$ = **constant**. In this case, an increase of the particle is equivalent to a decrease of the wave and vice versa. An increase of the wave is equivalent to a decrease of the particle and vice versa. The one is the local hidden variable of the other and vice versa, both are untied as opposites, the particle is anti-wave, the wave is anti-particle, the one is "feeding" itself from the other of itself, from its own other, from its own negation.

3.9. Euler's identity and κ

The formula of **Euler's identity** is known to be defined as -1 + 1 = 0,

$$\text{or } \mathbf{\cos \pi + \sin \pi = 0, or}$$

$$\mathbf{e^{(i * \pi)} + 1 = 0,}$$

where

e denote Euler's number, the base of the natural logarithm,

i denote the imaginary unit, one of the two complex numbers whose square is negative one,

π denote Archimedes' constant, the ratio of the circumference of a circle to its diameter.

Recall, **cos** π **= -1** and **sin** π **= +1**. Euler's identity is sometimes called as one of the greatest equation ever (Crease 2004). Is there a relation between **Euler's identity** and κ**.**

The κ relationship and the begin of our world

The begin of our world out of itself and without an urge from and other is possible under certain conditions. Under this point of view, something like **causation** could be of use.

Theorem.

Let

e denote Euler's number, the base of the natural logarithm,

i denote the imaginary unit, one of the two complex numbers whose square is negative one,

π denote Archimedes' constant, the ratio of the circumference of a circle to its diameter.

κ denote the basic relationship between particle and wave,

$$\mathbf{e}^{(i*\pi)} + \mathbf{1} = +|\kappa| - |\kappa| \qquad (323)$$

Proof

$$+|\kappa| = +|\kappa| \qquad -|\kappa| = -|\kappa| \qquad (324)$$

$$+|\kappa| - |\kappa| = 0 \qquad +|\kappa| - |\kappa| = 0 \qquad (325)$$

$$+|\kappa| - |\kappa| = 0 \qquad (326)$$

$$\mathbf{e}^{(i*\pi)} + \mathbf{1} = +|\kappa| - |\kappa| \qquad (327)$$

Q. e. d.

Euler's identity (Barukčić 2007a) deals about the creation of our world. According to Euler's identity, something imaginary is necessary for the creation, the begin and the further development of our word. It is important to stress, that ***i*** denotes in this context the imaginary. In accordance with Albert Einstein and κ, the mathematical formula of the causal relationship, nothing imaginary is necessary for the creation, the begin and the further development of our word. On the other hand, Archimedes' constant π, is not a mathematical constant, π, according to Euler's identity, is a natural process and has to do with the creation, the begin and the further development of our word.

In accordance with
Albert Einstein and the κ relationship,
the creation of our world out of itself and
without an urge from an other,
out of nothing (Boole 1854, p. 49),
appears to be possible.

3.10. Negation (Anti κ) - the basic natural process

Form the inequality $-1 \leq \kappa \leq +1$ it is easy to calculate that $-2 \leq 2*\kappa \leq +2$. If the CHSH inequality (Barukčić 2006h) is correct, if there is a contradiction between locality in general relativity and locality in quantum mechanics, then the inequality $-2 \leq (2*\kappa) \leq +2$ must be violated too. The variance of the |κ| relationship (Barukčić 2006a, p. 336) can be calculated as

$$\sigma(|\kappa|)^2 = | \kappa |*(1 - | \kappa |) \leq (1 / 4).$$

The **variance of the** | κ | **relationship** is one of the few fundamental equations in nature and present everywhere around us. Physically it is based on **the unity of gravitation and electromagnetism**, philosophically this equation is equivalent with notion **dialectical contradiction**. The negation (Barukčić 2006a, p. 354), according to Hegel, the basic process of nature, can be expressed in accordance with Einstein and | κ | as

$$\textbf{Negation} = \textbf{Anti } |\kappa| = (1 - | \kappa |).$$

Negation an Einstein's relativistic correction are familiar with each other.

Negation. The general form of Einstein's relativistic correction.

Let

| k |	denote the k relationship,
(Anti | k |)	denote the k relationship,
c =	| k | + (Anti | k |) = 1,
(Anti | k |)	c - | k |,
General negation	denote the general form of negation, the basic natural process.

Then

$$(\text{General negation})^2 = 1 - ((k)^2 / c^2) = 1 - (k)^2. \quad (328)$$

Proof.

$$| k | + (\text{Anti} | k |) = c \quad (329)$$

$$(\text{Anti} | k |) = c - | k | \quad (330)$$

$$(| k | + (\text{Anti} | k |))^2 = c^2 \quad (331)$$

$$(| k |)^2 + (\text{Anti} | k |))^2 = c^2 \quad (332)$$

$$(| k |)^2 + (2*(| k |)*(\text{Anti} | k |)) + (\text{Anti} | k |)^2 = c^2 \quad (333)$$

$$(| k |)^2 + (2*(| k |)*(\text{Anti} | k |)) + (\text{Anti} | k |)^2/c^2 = c^2/c^2 \quad (334)$$

$$(| k |)^2 + (2*(| k |)*(\text{Anti} | k |)) + (\text{Anti} | k |)^2/c^2 = 1 \quad (335)$$

$$+ ((2*(| k |)*(\text{Anti} | k |)) + (\text{Anti} | k |)^2/c^2 = 1 - ((| k |)^2 / c^2) \quad (336)$$

$$((\text{Anti} | k |) *(2*(| k |) + (\text{Anti} | k |)))/c^2 = 1 - ((| k |)^2 / c^2) \quad (337)$$

$$((\text{Anti} | k |) *(2*(| k |) + (c - | k |)))/c^2 = 1 - ((| k |)^2 / c^2) \quad (338)$$

$$((\text{Anti} | k |) *(| k | + | k | + c - | k |))/c^2 = 1 - ((| k |)^2 / c^2) \quad (339)$$

$$((\text{Anti} | k |) *(c + | k | + 0))/c^2 = 1 - ((| k |)^2 / c^2) \quad (340)$$

$$((c + | k |)* (\text{Anti} | k |))/c^2 = 1 - ((| k |)^2 / c^2) \quad (341)$$

$$((c + | k |)* (c - | k |))/c^2 = 1 - ((| k |)^2 / c^2) \quad (342)$$

$$((c^2 - (| k |)^2)/c^2 = 1 - ((| k |)^2 / c^2) \quad (343)$$

$$1 - ((| k |)^2 / c^2) = 1 - ((| k |)^2 / c^2) \quad (344)$$

$$1 - ((k)^2 / c^2) = 1 - ((k)^2 / c^2) \quad (345)$$

$$1 - ((k)^2 / c^2) = 1 - ((k)^2 / (c = 1)^2) \quad (346)$$

$$1 - ((k)^2 / c^2) = 1 - (k)^2 \quad (347)$$

$$(\text{General negation})^2 = 1 - ((k)^2 / c^2) = = 1 - (k)^2. \quad (348)$$

Let us assume, a square root operation is allowed. We obtain the next relationship

$$(1 - ((k)^2 / c^2))^{1/2} = (1 - (k)^2)^{½} \quad (349)$$

Q. e. d.

In general, if there is a relationship between **negation, the general form of Einstein's relativistic correction** as expressed above and the simple **relativistic correction** denoted by $(1-(v^2 / c^2))^{1/2}$ as proposed by Albert Einstein, where v is the velocity and c is the velocity of light, then it should be possible to reduce to one to the other. Thus, let us define the following in this respect.

Let

$$A^2 = \left(\left[\frac{(Energy*R_{ab})}{(c*c)} - \left(\frac{(4*2*\pi*\gamma*T_{ab})*(R*g_{ab})}{(c*c*c*c) \quad * \quad 2}\right)\right] * \left[\frac{(Energy*R_{ab})}{(c*c)} - \left(\frac{(4*2*\pi*\gamma*T_{ab})*(R*g_{ab})}{(c*c*c*c) \quad * \quad 2}\right)\right]\right) \quad (350)$$

$$B^2 = \left[\left(\frac{(R_{ab}*(4*2*\pi*\gamma*T_{ab}))}{(c*c*c*c)}\right) - \left(\frac{(4*2*\pi*\gamma*T_{ab})*(4*2*\pi*\gamma*T_{ab})}{(c*c*c*c)*(c*c*c*c)}\right)\right] * \left[\left(\left(\frac{R_{ab}*(R*g_{ab})}{2}\right) - \left(\frac{(R*g_{ab})*(R*g_{ab})}{2*2}\right)\right)\right] \quad (351)$$

κ^2 = denote the k relationship, (352)

Then

$$B^2 * (1 - \kappa^2) = B^2 - A^2 \quad (353)$$

Proof.

$$A^2 = \kappa^2 * B^2 \qquad (354)$$

$$B^2 + A^2 = (\kappa^2 * B^2) + B^2 \qquad (355)$$

$$B^2 - (\kappa^2 * B^2) + A^2 = B^2 \qquad (356)$$

$$B^2 - (\kappa^2 * B^2) = B^2 - A^2 \qquad (357)$$

$$B^2 * (1 - \kappa^2) = B^2 - A^2 \qquad (358)$$

$$B^2 * (\text{General Negation})^2 = B^2 - A^2 \qquad (359)$$

Q. e. d.

In so far, negation, general negation, the general form of Einstein's relativistic correction should be valid in classical logic too. Consequently, Albert Einstein must have made the proof, that Baruch (or Benedictus) **Spinoza** at the end is right,

omnis determinatio est negatio.

Energy is not a dead thing, energy is developing, energy is changing, energy has many different forms. One form of energy can often be readily transformed into another and vice versa. The conversion of energy into different forms, the negation of one form by its own other is determined by negation. Energy as negation that is relating itself negatively as to its own other does not remain the same, it is changing. Energy as a negation is a process of continuity of itself in its other.

The energy of itself and its own opposite passes into a higher form that is higher and richer than its predecessor, into the negation of the negation. The negated within itself equally preserves itself in the negative of its determinate, preserves itself within its own negation. The quantitative alteration of energy and its own other is equally not identical with the creation of a new something, a new quality.

The quantitative alteration of energy and its own other remains to some extent indifferent to this quantitative alteration. The relationship between energy and its own other is determined by the fact, that there is a point, where this quantitative alteration of both shows itself as specifying, **natura facit saltus**, something new is created, the altered energy and its own other are converted into a new something. The conversion of energy, the transition of energy and its own other into something new is a leap. In this new, the difference of energy and its own other has found its own completion (Hegel 1988, p. 424).

Negation is the basic natural process of development of energy, time and space, the basis for the conversion of energy and the basis for the fact that **natura facit saltus**. It is the way how energy, time and space are renewing or regenerating itself, it is the way how the one passes over into its own other and vice versa. Negation as a process of development of energy, time and space is equally the basis for the continuity of the development of space since everything that is has within itself its own negation.

4. Discussion

Pierre-Simon, Marquis de Laplace (March 23, 1749 – March 5, 1827), a French mathematician and astronomer born in Beaumont-en-Auge, Normandy, sometimes referred to as a French Newton, strongly believed in causal determinism. Laplace's, one of the greatest scientists of all time, is known because of his mechanical and static world view. His famous remarks in this sense are:

>>We must thus envisage the present state of the universe as the effect of its previous state, and as the cause of the following state. An intelligence who, for a given instance, knows all the forces by which nature is animated and the respective situation of the realities that compose nature, if she were vast enough to analyse these data, she can include motions of the biggest celestial bodies and those of the lightest atom into the same formula: nothing would be uncertain, and the future as well as the past would be present before her eyes.<< (Laplace 1820, p. 3).

Laplace had probably had God in mind as the powerful intelligence (Laplace 1820, p. 3). The formula of the κ relationship (assumed a division is allowed), based on Einstein's field equation, as

$$\left(\left[\frac{(Energy * R_{ab})}{(c*c)} - \left(\frac{(4*2*\pi*\gamma*T_{ab})*(R*g_{ab})}{(c*c*c*c) \quad * \quad 2}\right)\right] * \left[\frac{(Energy * R_{ab})}{(c*c)} - \left(\frac{(4*2*\pi*\gamma*T_{ab})*(R*g_{ab})}{(c*c*c*c) \quad * \quad 2}\right)\right]\right)$$
$$= (\kappa*\kappa)*\left(\left[\left(\frac{(R_{ab}*(4*2*\pi*\gamma*T_{ab}))}{(c*c*c*c)}\right) - \left(\frac{(4*2*\pi*\gamma*T_{ab})*(4*2*\pi*\gamma*T_{ab})}{(c*c*c*c)*(c*c*c*c)}\right)\right] * \left[\left(\left(\frac{R_{ab}*(R*g_{ab})}{2}\right) - \left(\frac{(R*g_{ab})*(R*g_{ab})}{2*2}\right)\right)\right]\right) \quad (360)$$

could meet is some sense and to some extent **Laplace's demon.** Only, is it possible for human being at all to know "all the forces by which nature is animated and the respective situation of the realities that compose nature" (Laplace 1820, p. 3)? Is there something like randomness? Further, it is necessary to distinguish between **causation** and **determinism**. Something could be highly predictable in some senses but must not be deterministic (Barukčić 2006a, p. 455).

Laplace's demon in the realm of quantum mechanics, quantum mechanics is widely regarded as nondeterministic, is besides of all deeply connected with our understanding of the physical sciences.

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