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General contradiction law.

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Abstract

Matter and antimatter or in general X_t and Anti X_t as distinguished from each other are at the same time unseparated and inseparable, X_t is equally itself and its other, the Anti X_t. X_t is that what it is only through its own other, through its own Anti X_t. The Anti X_t of any X_t is as necessary as the latter itself. In so far, X_t is only insofar as its opposite, the Anti X_t is. The transition of one into the other, of X_t into its opposite, into Anti X_t and vice versa is possible. Both are related to an other and determinate against one another. X_t and Anti X_t can cancel one another in their relation thus that the result $+X_t$ + Anti $X_t = 0$. But there is present in them another basic relation that is indifferent to their opposition itself. This publication will proof, that the relationship between matter and antimatter or in general between X_t and Anti X_t is governed by the general contradiction law which states that

$$(X_t * (\text{Anti } X)_t) \leq C_t^2 / 4.$$

Key words: Tensors, General relativity, Matter, Antimatter, X, Anti X, Contradiction, Law.

1. Background

Our present understanding of the richness and complexity of our universe as such is based on some various physical (Einstein, 1916) theories (Heisenberg, 1927), but despite of all, none of them explained the fundamental relationship between matter and antimatter or X_t and Anti X_t to a necessary extent. In so far, one of the unsolved questions in theoretical physics today is the most fundamental relationship between matter and antimatter or in general between X_t and Anti X_t. But this fundamental relationship between matter and antimatter or X_t and Anti X_t belongs to the most important phenomena in nature, since everything seems to be build upon it. Heisenberg's (Heisenberg, 1927) strongly non-deterministic uncertainty principle in some sense is one contribution to explain the relationship between X_t and Anti X_t. The discovery of cp violation in 1964 by **James Cronin** and **Val Fitch** is an other contribution. The dominance of matter over antimatter in the present universe at the end is based on the fundamental relationship between X_t and Anti X_t. Only, what does constitute the fundamental relationship between X_t and Anti X_t?

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2. Material and Methods

Logic investigates the most fundamental laws of nature. In so far, our starting point is classical bivalent logic too. It is possible that the same has to do with matter and antimatter.

2.1. Classical logic - a short overview.

Logic as mind-independent and nature grounded investigates and classifies the most basic laws of nature. In so far, we must find a path to tensors. The three classic laws of thought according to Aristotle are the law of identity, the law of contradiction and the law of the excluded middle.

2.1.1. Law of identity

The law of identity or **lex identitatis** according to Barukčić (Barukčić 2006a1, pp. 55-60) states that something like $\mathbf{A_t}$ at a (space) time t is identical only to itself, it is only itself and without anything else, it is the 'purity' as such, it is without the other of itself, it is without any form of a hidden variable (Barukčić 2006a1, pp. 55-60; Barukčić, 2006b) or

$$\mathbf{A_t = A_t.}$$

Theorem 1. Law of identity.

Let

A_t	denote something, a Bernoulli random variable, that is either true (=1) or false (=0) at the (space)time t,
t	denote the (space)time t,

then

$$(A_t) = (A_t) .$$

Proof.

(A_t)	(A_t)	$(A_t) = (A_t)$	Equation
1	1	true	(1)
0	0	true	(2)

Q. e. d.

2.1.2. Law of Negation

In mathematics and classical logic, negation is an operation on logical values like 0 and 1 that converts true (=1) to false (=0) and false (=0) to true (=1). The following table of Not A_t (also written as ~ A_t or ¬ A_t) is a proof of the equivalence of **Not** $\mathbf{A_t = 1 - A_t}$.

Theorem 2. Law of negation.

Let

A_t	denote something, a Bernoulli random variable, that is either true (=1) or false (=0) at the (space)time t,
Not A_t	denote the logical negation of A_t that is either true (=1) or false (=0) at the (space)time t,
t	denote the (space)time t,

then

$$\mathbf{(Not\ A_t) = 1 - A_t .}$$

Proof.

A_t	**(Not A_t)**	**(1 - A_t)**	Equation
1	0	0	(3)
0	1	1	(4)

Q. e. d.

No matter how the logical negation is notated, in bivalent logic it is equally true that **Not A_t = (1 - A_t)**. It is important to stress that the logical negation converts **either** 0 to 1 **or** 1 to 0, something in its own other.

Theorem 3.
The logical negation can be defined in terms of algebra.

Theorem 3. Logical negation and algebra.

Let

A_t	denote something that is either true (=1) or false (=0) at the (space)time t,
Not A_t	denote logical negation of A_t that is either true (=1) or false (=0) at the (space)time t,
C_t	denote something other at the (space)time t,
t	denote the (space) time t,

then

$$\mathbf{A_t + (Not\ A_t) = 1.}$$

Proof.

Equation

$$\mathbf{A_t = A_t} \quad (5)$$

$$A_t - A_t = 0 \quad (6)$$

$$A_t - A_t = C_t - C_t \quad (7)$$

$$C_t + A_t - A_t = C_t \quad (8)$$

$$A_t + C_t - A_t = C_t \quad (9)$$

Set $C_t - A_t = \text{Not } A_t$. We obtain

$$\mathbf{A_t + Not\ A_t = C_t} \quad (10)$$

Set $C_t = 1$ we obtain

$$A_t + 1 - A_t = 1 \quad (11)$$

Recall, that **Not A_t = 1 - A_t** thus we obtain

$$\mathbf{A_t + (Not\ A_t) = 1.} \quad (12)$$

Q. e. d.

2.1.3. Law of contradiction

The law of contradiction (also called the law of non-contradiction) states that it is not possible that one and the same something (**is and equally is not**) at the same (space) time. The law of contradiction can be expressed as:

$$\mathbf{A_t * (Not\ A_t) = 0}$$
or
$$1 - (A_t * (Not\ A_t)) = 1$$
or
$$Not\ (A_t\ and\ (Not\ A_t)) = 1$$
or
$$Not\ (A_t \wedge (Not\ A_t)) = 1.$$

Theorem 4. Law of contradiction.

Let

A_t	denote something that is either true (=1) or false (=0) at the (space)time t,
Not A_t	denote logical negation of A_t that is either true (=1) or false (=0) at the (space)time t,
t	denote the (space)time t,

then

$$\mathbf{(A_t * (Not\ A_t)) = 0 .}$$

Proof. Equation

$$\mathbf{A_t = A_t} \qquad (13)$$

$$A_t - A_t = 0 \qquad (14)$$

Recall that $1^2 = 1$ or $0^2 = 0$. Since A is either 0 or 1 it is equally true that $A^2 = A$. We obtain

$$A_t - (A_t)^2 = 0 \qquad (15)$$

$$A_t - (A_t * A_t) = 0 \qquad (16)$$

$$A_t * (1 - (A_t)) = 0 \qquad (17)$$

Recall, that **Not A_t = 1 - A_t** thus we obtain

$$\mathbf{A_t * (Not\ A_t) = 0.} \qquad (18)$$

Q. e. d.

We started with **the identity law** and used **the law of negation** to derive the law of contradiction. It seems to me, the law of negation and the identity law are the two basic laws of nature.

2.1.4. Law of the excluded middle

The law of the excluded middle, one of the laws of classical bivalent logic, states that something is either true or false, a third between the both is not given, a third between two opposites is impossible, tertium non datur.

Theorem 5. Law of the excluded middle.

Let

A_t denote something that is either true (=1) or false (=0) at the (space)time t,

Not A_t denote logical negation of A_t that is either true (=1) or false (=0) at the (space)time t,

t denote the (space)time t,

then

$$\mathbf{1 - ((1 - A_t)*(1 - Not\ A_t)) = 1.}$$

Proof. Equation

$$\mathbf{A_t = A_t} \quad (19)$$

$$A_t - A_t = 0 \quad (20)$$

$$1 + A_t - A_t = 1 \quad (21)$$

$$A_t + 1 - A_t = 1 \quad (22)$$

Recall, that **Not A_t = 1 - A_t** thus we obtain

$$A_t + (Not\ A_t) = 1 \quad (23)$$

$$A_t + (Not\ A_t) - 0 = 1 \quad (24)$$

According to the law of contradiction, it is true that **(A_t * (Not A_t)) = 0**. Thus we obtain

$$\mathbf{A_t + (Not\ A_t) - (A_t * (Not\ A_t)) = 1} \quad (25)$$

$$0 + A_t + (Not\ A_t) - (A_t * (Not\ A_t)) = 1 \quad (26)$$

$$1-1 + A_t + (Not\ A_t) - (A_t * (Not\ A_t)) = 1 \quad (27)$$

$$1 - (1 - A_t - Not\ A_t +(A_t * (Not\ A_t))) = 1 \quad (28)$$

$$\mathbf{1 - ((1 - A_t) * (1 - (Not\ A_t))) = 1} \quad (29)$$

Q. e. d.

We started with the identity law and derived the law of the excluded middle too. The identity, the equivalence of

$$\mathbf{(A_t \vee (Not\ A_t)) = 1 = (1 - ((1 - A_t) * (1 - (Not\ A_t))))}$$

is already proofed to be true (Barukčić 2006c).

The law of the excluded middle does not comment on what truth values A_t itself in bivalent logic may take, the total **(A_t v (Not A_t))** has to be true**.** It is necessary to point out, that there are systems of logic that reject bivalence. Some of this systems of logic allow more than two truth values. In ternary logic, something may be true, false or unknown, in fuzzy logic something may be true, false or somewhere in between.

2.2. Tensors

William Rowan **Hamilton** introduced the word tensor 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. **Einstein**'s theory of general relativity (1916) is formulated completely in the language of tensors.

A **tensor** is an mathematical object **in and of itself**, a tensor is independent of any chosen frame of reference, a tensor is independent of human mind and consciousness. A tensor 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. The equations of transformation of the components of tensors are homogeneous and linear. Consequently, if all the components of a tensor in the original system vanish, all the components in the new system vanish too. Tensors are more or less functions of space and time. There are a set of tensor rules. Following this tensor rules, it is possible to build tensor expressions that will preserve tensor properties of co-ordinate transformations. A **tensor term** $A_i B^j C_k^l D_{mn}$ ... is a product of tensors A_i B^j C_k^l and D_{mn} ... . A **tensor expression** is a sum of tensor terms $A_i B^j$ + $C_k^l D_{mn}$ ... . The terms in the tensor expression may come with plus or minus sign. Addition, subtraction and multiplication are the only allowed algebraic operations in tensor expressions, divisions are allowed for constants.

The metrical properties of space-time are more or less defined by the gravitational field. Gravitation, the metrical properties of space-time or a laws of nature as such are thus generally covariant if they can be expressed by equating all the components of a tensor to zero. With this in view, it is possible formulating generally covariant laws by examining the laws of the formation of tensors. It is not my purpose in this discussion to represent an introduction into the general theory of tensors that is as simple and logical as possible. My main object is to give a quick introduction into this theory in such a way that the reader can follow the next chapters in this publication and to be able to find a path to logic and thus to probability theory to. Closely related to tensors is Einstein's general relativity (1916) which is formulated completely in the language of tensors. 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

$$dx'_\sigma = \left(\sum_v \frac{(\partial x'_\sigma)}{(\partial x_v)} dx_v \right) \tag{30}$$

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

$$A'^\sigma = \left(\sum_v \frac{(\partial x'_\sigma)}{(\partial x_v)} A^v \right) \tag{31}$$

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}

$$\left(\sum_{v} A_{v} \; B^{v}\right) = \text{Invariant} \tag{32}$$

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

$$\left(\sum_{\sigma} A'_{\sigma} \; B'^{\sigma}\right) = \left(\sum_{v} A_{v} \; B^{v}\right) \tag{33}$$

by an expression which is resulting from the inversion of (31),

$$\left(\sum_{\sigma} \frac{(\partial x_{v})}{(\partial x'_{\sigma})} \; B'^{\sigma}\right) \tag{34}$$

thus we obtain

$$\left(\sum_{\sigma} B'^{\sigma}\right) * \left(\sum_{v} \frac{(\partial x_{v})}{(\partial x'_{\sigma})} \; A_{v}\right) = \sum_{\sigma} B'^{\sigma} A'_{\sigma} \tag{35}$$

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

$$A'_{\sigma} = \left(\sum_{v} \frac{(\partial x_{v})}{(\partial x'_{\sigma})} \; A_{v}\right) \tag{36}$$

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

$$A^{\mu v} = A^{\mu} B^{v} . \tag{37}$$

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

$$A'^{\sigma\tau} = \left(\frac{\partial x'_{\sigma}}{\partial x_{\mu}}\right) * \left(\frac{\partial x'_{\tau}}{\partial x_{\nu}}\right) A^{\mu\nu} \tag{38}$$

Something satisfying the law of transformation (38) 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_{v} denote the components of two covariant four-vectors

$$A_{\mu v} = A_{\mu} B_{v} . \tag{39}$$

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

$$A'_{\sigma\tau} = \left(\frac{\partial x_{\mu}}{\partial x'_{\sigma}}\right) * \left(\frac{\partial x_{\nu}}{\partial x'_{\tau}}\right) A_{\mu\nu} \tag{40}$$

This law of transformation (30) 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

$$A^{v}{}_{\mu} = A_{\mu} B^{v} . \tag{41}$$

The law of transformation of the mixed tensor is

$$A'^{\tau}_{\sigma} = \left(\frac{\partial x'_{\tau}}{\partial x_{\nu}}\right) * \left(\frac{\partial x_{\mu}}{\partial x'_{\sigma}}\right) A^{\nu}_{\mu} \tag{42}$$

2.2.2.5 Symmetrical Tensors

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

$$A_{\mu v} = A_{v \mu} \tag{43}$$

or respectively,

$$A_{\mu v} = A_{v \mu} . \tag{44}$$

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

$$A^{\mu \nu} = - A^{\nu \mu} \tag{45}$$

or respectively,

$$A_{\mu \nu} = - A_{\nu \mu} \tag{46}$$

or

$$A^{\mu \nu} = - A^{\nu \mu} . \tag{47}$$

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.

$$C_{\mu \nu \sigma} = A_{\nu \mu} B_{\sigma} \tag{48}$$

$$C^{\mu \nu \sigma \tau} = A^{\nu \mu} B^{\sigma \tau} \tag{49}$$

$$C^{\mu \nu}{}_{\sigma \tau} = A^{\nu \mu} B_{\sigma \tau} \tag{50}$$

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 and Mixed Multiplication of Tensors

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

3. Results

3.1. Algebra

Theorem 6. The identity and the difference between X_t and Anti X_t .

Let

X_t denote something existing independently of human mind and consciousness, f. e. a measurable random variable, a quantum mechanics object, σ(..) etc. at the (space) time t,
X_t be opposed to $(\text{Anti } X)_t$,

Anti X_t denote the other side of X_t, the opposite of X_t, the complementary of X_t, the hidden part of X_t (Barukčić 2006b), a random variable, at the (space) time t,
Anti X_t be opposed to X_t,

t denote the (space) time,

$\mathbf{C}_t$ denote the unity of X_t and $(\text{Anti } X)_t$.
Let us respect **the law of the excluded middle**. That is to say, there is no third between X_t and Anti X_t at the same (space) time t. In so far, we obtain equally

$$\mathbf{X_t + (\text{Anti } X)_t = C_t}$$

$$\text{or } (\text{Anti } X)_t = C_t - X_t .$$

Further,

$(\text{Anti } X)_t = (X)_t$ denote our assumption that $(\text{Anti } X)_t$ is not dominant over $(X)_t$ and vice versa. Equally $(X)_t$ is not dominant over $(\text{Anti } X)_t$,

then

$$\mathbf{X_t * (\text{Anti } X)_t = C_t^2 / 4.}$$

Proof.

$$\mathbf{(\text{Anti } X)_t = X_t} \quad (51)$$

$$(\text{Anti } X)_t + (\text{Anti } X)_t = (\text{Anti } X)_t + X_t \quad (52)$$

$$2 * (\text{Anti } X)_t = (C_t) \quad (53)$$

$$\mathbf{(\text{Anti } X)_t = (C_t)/2} \quad (54)$$

$$(\text{Anti } X)_t - ((C_t)/2) = 0 \quad (55)$$

$$((\text{Anti } X)_t - ((C_t)/2))^2 = 0^2 \quad (56)$$

$$((\text{Anti } X)_t)^2 - ((\text{Anti } X)_t*(C_t)) + ((C_t)/2))^2 = 0^2 \quad (57)$$

$$\mathbf{((\text{Anti } X)_t)^2 - ((\text{Anti } X)_t*(C_t)) = -((C_t)/2))^2} \quad (58)$$

$$\mathbf{-((\text{Anti } X)_t)^2 + ((\text{Anti } X)_t*(C_t)) = +((C_t)/2))^2} \quad (59)$$

$$+((\text{Anti } X)_t*(C_t)) - ((\text{Anti } X)_t)^2 = +((C_t)/2))^2 \quad (60)$$

$$(\text{Anti } X)_t*(C_t) - (\text{Anti } X)_t^2 = C_t^2/4 \quad (61)$$

$$\mathbf{(\,Anti\,X\,)_t * (\;C_t\; - \;(\,Anti\,X\,)_t\;)\;=\;C_t{}^2/4} \tag{62}$$

$$(\,C_t - X_t\,) * (\;C_t\; - \;(\,C_t - X_t\,)\;)\;=\;C_t{}^2/4 \tag{63}$$

$$(\,C_t - X_t\,) * (\;C_t\; - \;C_t + X_t\,)\;)\;=\;C_t{}^2/4 \tag{64}$$

$$(\,C_t - X_t\,) * (\;0\; + X_t\,)\;)\;=\;C_t{}^2/4 \tag{65}$$

$$(\,C_t - X_t\,) * (\; + X_t\,)\;)\;=\;C_t{}^2/4 \tag{66}$$

$$X_t * (\,C_t - X_t\,)\;=\;C_t{}^2/4 \tag{67}$$

$$\mathbf{X_t * (\,Anti\,X\,)_t\;=\;C_t{}^2/4} \tag{68}$$

Q. e. d.

Anti X_t and X_t must not be equal to each other or symmetrical. The one can be dominant over the other. How can this be ruled out in the same relation? On the other hand, why should the one allow the other to be dominant over its own self?

Theorem 7. X_t is dominant over Anti X_t. The opposition between X_t and Anti X_t.

Let

X_t	denote something existing independently of human mind and consciousness, f. e. a measurable random variable, a quantum mechanics object, σ(..) etc. at the (space) time t,
	X_t be opposed to (Anti X $)_t$,
Anti X_t	denote the other side of X_t, the opposite of X_t, the complementary of X_t, the hidden part of X_t, a random variable, at the (space) time t,
	Anti X_t be opposed to X_t,
t	denote the (space) time t,
$\mathbf{C_t}$	denote the unity of X_t and (Anti X $)_t$,
	us respect **the law of the excluded middle**. That is to say, there is no third between X_t and Anti X_t at the same (space) time t. In so far, we obtain equally

$$\mathbf{X_t + (\,Anti\,X\,)_t = C_t\,,}$$

$$\text{or } (\,Anti\,X\,)_t = C_t - X_t.$$

	Further, let
$(X)_t \geq (\text{Anti } X)_t$	denote our assumption that $(X)_t$ is **dominant** over (Anti X$)_t$ or equally (Anti X $)_t$ is not dominant over (X $)_t$,

then

$$\mathbf{X_t * (\,Anti\;\;X\,)_t\;\leq\;C_t{}^2\,/\,4.}$$

Proof.

$$\mathbf{X_t \geq (Anti\ X)_t} \quad (69)$$

$$X_t + X_t \geq X_t + (Anti\ X)_t \quad (70)$$
$$2X_t \geq X_t + (Anti\ X)_t \quad (71)$$
$$2X_t \geq C_t \quad (72)$$
$$\mathbf{X_t \geq C_t/2} \quad (73)$$
$$(X_t/C_t) \geq 1/2 \quad (74)$$
$$\mathbf{(X_t/C_t) - (1/2) \geq 0} \quad (75)$$
$$\mathbf{((X_t / C_t) - 0.5)^2 \geq 0^2} \quad (76)$$
$$((X_t/C_t)^2 - (X_t/C_t) + (1/4)) \geq 0 \quad (77)$$
$$\mathbf{-(X_t/C_t)^2 + (X_t/C_t) - (1/4) \leq 0} \quad (78)$$
$$-(X_t/C_t)^2 + (X_t/C_t) \leq (1/4) \quad (79)$$
$$(X_t/C_t) - (X_t/C_t)^2 \leq (1/4) \quad (80)$$
$$(X_t/C_t) * (1 - (X_t/C_t)) \leq (1/4) \quad (81)$$
$$(X_t/C_t) * ((C_t/C_t) * - (X_t/C_t)) \leq (1/4) \quad (82)$$
$$((X_t) * (C_t - X_t)) / (C_t * C_t) \leq (1/4) \quad (83)$$
$$((X_t) * (C_t - X_t)) \leq ((C_t * C_t)/4) \quad (84)$$
$$X_t * (C_t - X_t) \leq C_t^2 / 4 \quad (85)$$

$$\mathbf{X_t * (Anti\ X)_t \leq C_t^2 / 4} \quad (86)$$

Q. e. d.

On the other hand, Anti X_t could equally be dominant over X_t. This is difficult to rule out in one and the same relation.

Theorem 8. Anti X_t is dominant over X_t. The opposition between X_t and Anti X_t.

Let

X_t	denote something existing independently of human mind and consciousness, f. e. a measurable random variable, a quantum mechanics object, σ(..) etc. at the (space) time t, X_t be opposed to (Anti X $)_t$,
Anti X_t	denote the other side of X_t, the opposite of X_t, the complementary of X_t, the hidden part of X_t, a random variable, at the (space) time t, Anti X_t be opposed to X_t,
t	denote the (space) time t,
$\mathbf{C_t}$	denote the unity of X_t and (Anti X $)_t$,

us respect **the law of the excluded middle**. That is to say, there is no third between X_t and Anti X_t at the same (space) time t. In so far, we obtain equally

$$\mathbf{X_t + (Anti\ X)_t = C_t}$$

or $(\text{Anti } X)_t = C_t - X_t$.

Further, let

$(\text{Anti } X)_t \geq (X)_t$ denote our assumption that $(\text{Anti } X)_t$ is **dominant** over $(X)_t$ or equally $(X)_t$ is not dominant over $(\text{Anti } X)_t$,

then

$$\mathbf{X_t * (Anti\ X)_t \leq C_t^2 / 4.}$$

Proof.

$$\mathbf{(Anti\ X)_t \geq X_t} \tag{87}$$

$$(\text{Anti } X)_t + (\text{Anti } X)_t \geq (\text{Anti } X)_t + X_t \tag{88}$$

$$2 * (\text{Anti } X)_t \geq (C_t) \tag{89}$$

$$(\text{Anti } X)_t \geq (C_t)/ 2 \tag{90}$$

$$(\text{Anti } X)_t \geq (C_t)/ 2 \tag{91}$$

$$(\text{Anti } X)_t - ((C_t)/ 2) \geq 0 \tag{92}$$

$$((\text{Anti } X)_t - ((C_t)/ 2))^2 \geq 0^2 \tag{93}$$

$$((\text{Anti } X)_t)^2 -((\text{Anti } X)_t *(C_t)) + ((C_t)/2))^2 \geq 0^2 \tag{94}$$

$$((\text{Anti } X)_t)^2 -((\text{Anti } X)_t *(C_t)) \geq - ((C_t)/2))^2 \tag{95}$$

$$-((\text{Anti } X)_t)^2 +((\text{Anti } X)_t *(C_t)) \leq + ((C_t)/2))^2 \tag{96}$$

$$+((\text{Anti } X)_t *(C_t)) - ((\text{Anti } X)_t)^2 \leq + ((C_t)/2))^2 \tag{97}$$

$$(\text{Anti } X)_t *(C_t) - (\text{Anti } X)_t^{\ 2} \leq C_t^{\ 2}/4 \tag{98}$$

$$(\text{Anti } X)_t *(C_t - (\text{Anti } X)_t) \leq C_t^{\ 2}/4 \tag{99}$$

$$(C_t - X_t) *(C_t - (C_t - X_t)) \leq C_t^{\ 2}/4 \tag{100}$$

$$(C_t - X_t) *(C_t - C_t + X_t)) \leq C_t^{\ 2}/4 \tag{101}$$

$$(C_t - X_t) *(0 + X_t)) \leq C_t^{\ 2}/4 \tag{102}$$

$$(C_t - X_t) *(+ X_t)) \leq C_t^{\ 2}/4 \tag{103}$$

$$X_t * (C_t - X_t) \leq C_t^{\ 2}/4 \tag{104}$$

$$\mathbf{X_t * (Anti\ X)_t \leq C_t^{\ 2} / 4.} \tag{105}$$

Q. e. d.

In general, since (=) is part of (≤), we are allowed to state that the relationship between $\mathbf{X_t}$ and $(\text{Anti } X)_t$ is governed by the inequality

$$\mathbf{X_t * (Anti\ X)_t \leq C_t^{\ 2} / 4,}$$

which is termed as the **general contradiction law**.

The general contradiction law is very familiar with the logical contradiction law.

Theorem 9. The relation between the logical contradiction law and the general contradiction law.

Let

X_t denote something existing independently of human mind and consciousness, f. e. a measurable random variable, a quantum mechanics object, σ(..) etc. at the (space) time t, which can take only the values **either** 0 **or** 1,
X_t be opposed to $(\text{Anti } X)_t$,

Anti X_t denote the other side of X_t, the opposite of X_t, the complementary of X_t, the hidden part of X_t , a random variable, at the (space) time t,
Anti X_t be opposed to X_t,

t denote the (space) time t,

$\mathbf{C_t}$ denote the unity of X_t and $(\text{Anti } X)_t$,
us respect **the law of the excluded middle**. That is to say, there is no third between X_t and Anti X_t at the same (space) time t. In so far, we obtain equally

$$\mathbf{X_t + (\text{Anti } X)_t = C_t}$$

$$\text{or } (\text{Anti } X)_t = C_t - X_t .$$

Further, let us assume that a division by $\mathbf{C_t}$ is allowed and possible.

Then

$$\mathbf{X_t * (\text{Anti } X)_t \leq 1 / 4.}$$

Proof.

X_t	$(\text{Anti } X)_t$	$X_t \cap (\text{Anti } X)_t$	$C_t = X_t + (\text{Anti } X)_t$	$(C_t)^2 / 4$	$X_t*(\text{Anti } X)_t \leq (C_t)^2/ 4$	**Eq.**
(1)	(2)	(3)	(4)	(5)	**(3) ≤ (5)**	
1	0	0	1	$1^2/4$	**True!**	(106)
0	1	0	1	$1^2/4$	**True!**	(107)

Q. e. d.

The things don't change that much in the case of symmetry: $- X_t -$ Anti $X_t = - C_t$. The general contradiction law is the general form of the logical contradiction law.

3.2. Tensors

Theorem 10. The identity and the difference between A and Anti A .

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,
A be opposed to (Anti A),

B — denote the other side of A, the opposite of A, the complementary of A, the hidden part of A, the Anti A, the anti tensor,
B = Anti A be opposed to A,

C — denote the unity of A and (Anti A) .

Let us respect **the law of the excluded middle**. That is to say, there is no third between A and Anti A. Further, let the tensor product obey the distributive law (K-theory). In so far, we obtain

$$\mathbf{A + (Anti\ A) = C}$$

or

$$\mathbf{A + B = C}$$

or

$$\mathbf{B = (Anti\ A) = C - A.}$$

Further, let

n(A) — denote the determinatedness of A, the necessity of A. Let us assume that the division by C is allowed. Let us define n(A) = A / C.

n(B) — denote the randomness, the indeterminatedness of A, the necessity of B. Let us assume that the division by C is allowed. Let us define n(B) = B / C. Let

$$n(A) + n(B) = 1.$$ Let

$\sigma(A)^2$ — denote the variance of A. Let $\boldsymbol{\sigma(A)^2 = n(A)*n(B)=n(A)*(1- n(A)) \leq (1/4).}$ Let

(Anti A) = (A) — denote our assumption that (Anti A) is not dominant over (A) and vice versa. Equally (A) is not dominant over (Anti A) ,

then

$$\mathbf{A * (Anti\ A) = ((C)* (C))/4.}$$

Proof.

$$\mathbf{(Anti\ A) = A} \tag{108}$$

$$(Anti\ A) + (Anti\ A) = (Anti\ A) + A \tag{109}$$

$$2 * (Anti\ A) = (C) \tag{110}$$

$$\mathbf{(Anti\ A) = (C)/ 2} \tag{111}$$

$$(Anti\ A) - ((C)/ 2) = 0 \tag{112}$$

$$((\text{Anti } A) - ((C)/2))*((\text{Anti } A) - ((C)/2)) = 0 \quad (113)$$
$$((\text{Anti } A)*(\text{Anti } A)) - ((\text{Anti } A)*(C)) + ((C)*(C))/4 = 0 \quad (114)$$
$$((\text{Anti } A)*(\text{Anti } A)) - ((\text{Anti } A)(C)) = -((C)*(C))/4 \quad (115)$$
$$-((\text{Anti } A)*(\text{Anti } A)) + ((\text{Anti } A)*(C)) = +((C)*(C))/4 \quad (116)$$
$$+((\text{Anti } A)(C)) - ((\text{Anti } A)(\text{Anti } A)) = +((C)*(C))/4 \quad (117)$$
$$((\text{Anti } A)*(C)) - ((\text{Anti } A)(\text{Anti } A)) = ((C)*(C))/4 \quad (118)$$

$$(\text{Anti } A)*(C - (\text{Anti } A)) = ((C)*(C))/4 \quad (119)$$

$$(C - A)*(C - (C - A)) = ((C)*(C))/4 \quad (120)$$
$$(C - A)*(C - C + A) = ((C)*(C))/4 \quad (121)$$
$$(C - A)*(0 + A) = ((C)*(C))/4 \quad (122)$$
$$(C - A)*(+A) = ((C)*(C))/4 \quad (123)$$
$$A*(C - A) = ((C)*(C))/4 \quad (124)$$
$$A*B = ((C)*(C))/4 \quad (125)$$

$$\mathbf{A*(\text{Anti } A) = ((C)*(C))/4} \quad (126)$$

Q. e. d.

Anti A and A can be equal to each other but this is not necessary. It is possible that the one is dominant over the other.

Theorem 11. A is dominant over Anti A . The opposition between A and Anti A .

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,
A be opposed to (Anti A),

B denote the other side of A, the opposite of A, the complementary of A, the hidden part of A, the Anti A,
B = Anti A be opposed to A,

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

Let us respect **the law of the excluded middle**. That is to say, there is no third between A and Anti A. Further, let the tensor product obey the distributive law (K-theory). In so far, we obtain

A + (Anti A) = C

or

A + B = C

or

B = (Anti A) = C - A.

Further, let

n(A) denote the determinatedness of A, the necessity of A. Let us assume that the division by C is allowed. Let us define

$$n(A) = A / C.$$

n(B) denote the randomness, the indeterminatedness of A, the necessity of B. Let us assume that the division by C is allowed. Let us define

$$n(B) = B / C.$$ Let

$$n(A) + n(B) = 1.$$ Let

$\sigma(A)^2$ denote the variance of A. Let $\boldsymbol{\sigma(A)^2 = n(A)*n(B)=n(A)*(1- n(A)) \leq (1/4)}$. Let

$(A) \geq (\text{Anti } A)$ denote our assumption that (A) is dominant over (Anti A) and not vice versa. Equally (Anti A) is not dominant over (A) ,

then

$$\mathbf{A * (Anti\ A) \leq ((C)*(C))/4.}$$

Proof.

$$\mathbf{A \geq (Anti\ A)} \tag{127}$$

$$A + A \geq A + (\text{Anti } A) \tag{128}$$

$$2A \geq A + (\text{Anti } A) \tag{129}$$

$$2A \geq C \tag{130}$$

$$\mathbf{A \geq C/2} \tag{131}$$

$$(A /C) \geq 1/2 \tag{132}$$

$$\mathbf{A - (C / 2) \geq 0} \tag{133}$$

$$\mathbf{(A - (C / 2))^2 \geq 0^2} \tag{134}$$

$$(A * A) - (A * C) + ((C)* (C))/4 \geq 0 \tag{135}$$

$$-(A * A) + (A * C) - ((C)* (C))/4 \leq 0 \tag{136}$$

$$-(A * A) + (A * C) \leq +((C)* (C))/4 \tag{137}$$

$$(A * C) - (A * A) \leq +((C)* (C))/4 \tag{138}$$

$$A * (C - A) \leq ((C)* (C))/4 \tag{139}$$

$$\mathbf{A * (Anti\ A) \leq ((C)* (C))/4} \tag{140}$$

$$(C - \text{Anti } A) * (C - A) \leq ((C)* (C))/4 \tag{141}$$

$$(C - \text{Anti } A) * (\text{Anti } A) \leq ((C)* (C))/4 \tag{142}$$

$$((C)* (C))/4 \geq (C - \text{Anti } A) * (\text{Anti } A) \tag{143}$$

$$(((C)* (C))/4) - ((C - \text{Anti } A) * (\text{Anti } A)) \geq 0 \tag{144}$$

$$(((C)* (C))/4) - ((A) * (C - A)) \geq 0 \tag{145}$$

Q. e. d.

On the other hand, Anti A could equally be dominant over A . Thus, we obtain the next theorem.

Theorem 12. Anti A is dominant over A . The opposition between A and Anti A .

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,
A be opposed to (Anti A),

B — denote the other side of A, the opposite of A, the complementary of A, the hidden part of A, the Anti A,
B = Anti A be opposed to A,

C — denote the unity of A and (Anti A) .

Let us respect **the law of the excluded middle**. That is to say, there is no third between A and Anti A. Further, let the tensor product obey the distributive law (K-theory). In so far, we obtain

$$\mathbf{A + (Anti\ A) = C}$$

or

$$\mathbf{A + B = C}$$

or

$$\mathbf{B = (Anti\ A) = C - A.}$$

Further, let

n(A) — denote the determinatedness of A, the necessity of A. Let us assume that the division by C is allowed. Let us define

$$n(A) = A / C.$$

n(B) — denote the randomness, the indeterminatedness of A, the necessity of B. Let us assume that the division by C is allowed. Let us define

$$n(B) = B / C.$$ Let

$$n(A) + n(B) = 1.$$ Let

$\sigma(A)^2$ — denote the variance of A. Let $\boldsymbol{\sigma(A)^2 = n(A)*n(B)=n(A)*(1- n(A)) \le (1/4).}$ Let

(Anti A) ≥ (A) — denote our assumption that (Anti A) is dominant over (A) and not vice versa. Equally (A) is not dominant over (Anti A) ,

then

$$\mathbf{A * (Anti\ A) \le C^2 / 4.} \tag{146}$$

Proof.

$$\mathbf{(Anti\ A) \ge A} \tag{147}$$

$$(Anti\ A) + (Anti\ A) \ge (Anti\ A) + A \tag{148}$$

$$2 * (Anti\ A) \ge (C) \tag{149}$$

$$(Anti\ A) \ge (C)/ 2 \tag{150}$$

$$(Anti\ A) \ge (C)/ 2 \tag{151}$$

$$(Anti\ A) - ((C)/ 2) \ge 0 \tag{152}$$

$$((Anti\ A) - ((C)/ 2))* ((Anti\ A) - ((C)/ 2)) \ge 0 \tag{153}$$

$$((\text{Anti A})*(\text{Anti A})) -((\text{Anti A})*(C)) + ((C)*(C)) /4 \geq 0 \quad (154)$$

$$((\text{Anti A})*(\text{Anti A})) - ((\text{Anti A})*(C)) \geq - ((C)*(C)) /4 \quad (155)$$

$$-((\text{Anti A})*(\text{Anti A})) + ((\text{Anti A})*(C)) \leq + ((C)*(C)) /4 \quad (156)$$

$$((\text{Anti A})*(C)) - ((\text{Anti A})*(\text{Anti A})) \leq + ((C)*(C)) /4 \quad (157)$$

$$(\text{Anti A})*(C - (\text{Anti A})) \leq + ((C)*(C)) /4 \quad (158)$$

$$(C - A)*(C - (\text{Anti A})) \leq + ((C)*(C)) /4 \quad (159)$$

$$(C - A)*(C - (C - A)) \leq + ((C)*(C)) /4 \quad (160)$$

$$(C - A)*(C - C + A)) \leq + ((C)*(C)) /4 \quad (161)$$

$$(C - A) *(0 + A)) \leq + ((C)*(C)) /4 \quad (162)$$

$$(C - A) *(+ A)) \leq + ((C)*(C)) /4 \quad (163)$$

$$A * (C - A) \leq + ((C)*(C)) /4 \quad (164)$$

$$\mathbf{A * (\text{Anti A}) \leq + ((C)*(C)) /4.} \quad (165)$$

Q. e. d.

It is known, that (=) is part of the inequality (≤). In so far, the relationship between **A** and (Anti A) expressed under some assumptions in the language of tensors is governed too by the same inequality

$$\mathbf{A * (\text{Anti A}) \leq C_t^{\,2} / 4,}$$

which was already termed as the general contradiction law. Note, our understanding of an **anti tensor** is not identical with the term **antisymmetrical tensor**. As long as the law of the excluded middle is respected and when ever the addition of two tensors A and B yields a third tensor C thus that A + B = C, an anti tensor A in our understanding can be defined as

Anti A = B = C – A,

while an antisymmetrical tensor is defined in the way as discussed before. Under certain circumstances it appears possible to obtain the identity of an

anti tensor = antisymmetrical tensor.

Theorem 13. The inner contradiction of a tensor A.

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,
A be opposed to (Anti A),

B denote the other side of A, the opposite of A, the complementary of A, the hidden part of A, the Anti A, the anti tensor of A,
B = Anti A be opposed to A,

C denote the unity of tensors A and (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**! Further, let the tensor product obey the distributive law (K-theory). In so far, we obtain the basic relationship as

A + (Anti A) = C

Or

A + B = C

Or

B = (Anti A) = C - A.

Further,

n(A) denote the determinatedness of A, the necessity of A. Let us assume that the division by C is allowed. Let us define

$$n(A) = A / C.$$

n(B)= n(Anti A) denote the randomness, the indeterminatedness of A, the necessity of B. Let us assume that the division by C is allowed. Let us define

$$n(B)= n(Anti\ A) = (B / C) = ((Anti\ A) / C).$$ Let

$$n(A) + n(Anti\ A) = 1.$$ Let

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

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

Then

$$\Delta(A)^2 = A * (Anti\ A) = (C* A) - (A*A) . \tag{166}$$

Proof.

$$A = A \tag{167}$$

$$A + (Anti\ A) = A + (Anti\ A) \tag{168}$$

$$C = A + (Anti\ A) \tag{169}$$

$$(C - A) = (Anti\ A) \tag{170}$$

$$A * (C - A) = (Anti\ A)*A \tag{171}$$

$$(C*A) - (A * A) = (Anti\ A)*A \tag{172}$$

$$\Delta(A)^2 = (C*A) - (A * A) = (Anti\ A)*A \tag{173}$$

Q. e. d.

The anti tensor may be determined by an different inner contradiction.

Theorem 14. The inner contradiction of an anti tensor Anti A.

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,
A be opposed to (Anti A),

B denote the other side of A, the opposite of A, the complementary of A, the hidden part of A, the Anti A, the anti tensor of A,
B = Anti A be opposed to A,

C denote the unity of tensors A and (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**! Further, let the tensor product obey the distributive law (K-theory). In so far, we obtain the basic relationship as

A + (Anti A) = C

Or

A + B = C

Or

B = (Anti A) = C - A.

Further, let

n(A) denote the determinatedness of A, the necessity of A. Let us assume that the division by C is allowed. Let us define

n(A) = A / C.

n(B)= n(Anti A) denote the randomness, the indeterminatedness of A, the necessity of B. Let us assume that the division by C is allowed. Let us define

n(B)= n(Anti A) = (B / C) = ((Anti A) / C). Let

n(A) + n(Anti A) = 1. Let

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

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

Then

$$\Delta(\text{Anti } A)^2 = (C*(\text{ Anti } A)) - ((\text{Anti } A)* (\text{Anti } A)) = (\text{Anti } A)*A \quad (174)$$

Proof.

A	=	A	(175)
A + (Anti A)	=	A + (Anti A)	(176)
C	=	A + (Anti A)	(177)
(C - (Anti A))	=	A	(178)
(Anti A)*(C - (Anti A))	=	(Anti A)*A	(179)
(C*(Anti A)) – ((Anti A)* (Anti A))	=	(Anti A)*A	(180)
$\Delta(\text{Anti } A)^2$ = (C*(Anti A)) – ((Anti A)* (Anti A))	=	(Anti A)*A	(181)

Q. e. d.

The inner contradiction of a tensor is that what both, the tensor and its own anti tensor, have in common.

Theorem 15. The equivalence of the inner contradiction of a tensor and an anti 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,
A be opposed to (Anti A),

B denote the other side of A, the opposite of A, the complementary of A, the hidden part of A, the Anti A, the anti tensor of A, B = Anti A be opposed to A,

C denote the unity of tensors A and (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**! Further, let the tensor product obey the distributive law (K-theory). In so far, we obtain the basic relationship as

$$\mathbf{A + (Anti\ A) = C}$$

Or

$$\mathbf{A + B = C}$$

Or

$$\mathbf{B = (Anti\ A) = C - A.}$$

Further, let

n(A) denote the determinatedness of A, the necessity of A. Let us assume that the division by C is allowed. Let us define

$$n(A) = A / C.$$

n(B)= n(Anti A) denote the randomness, the indeterminatedness of A, the necessity of B. Let us assume that the division by C is allowed. Let us define

$$n(B)= n(Anti\ A) = (B / C) = ((Anti\ A) / C).$$ Let

$$n(A) + n(Anti\ A) = 1.$$ Let

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

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

Then

$$\mathbf{\Delta(Anti\ A)^2 = \Delta(A)^2} \quad (182)$$

Proof.

A	**=**	**A**	(183)
A + (Anti A)	=	A + (Anti A)	(184)
C	=	A + (Anti A)	(185)
(C - (Anti A))	=	A	(186)
(Anti A)*(C - (Anti A))	=	(Anti A)*A	(187)
(C*(Anti A)) – ((Anti A)* (Anti A))	=	(Anti A)*A	(188)
(C*(Anti A)) – ((Anti A)* (Anti A))	=	(C - A)*A	(189)
(C*(Anti A)) – ((Anti A)* (Anti A))	=	(C * A) - (A * A)	(190)
Δ(Anti A)²	=	**Δ(A)²**	(191)

Q. e. d.

The inner contradiction of something and its own other, its own local hidden variable, is identical. Since the inner contradiction can but must not be divided by something else, the inner contradiction of a tensor can be used widely.

Theorem 16. The inner contradiction and the Pythagorean theorem.

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,
A be opposed to (Anti A),

B — denote the other side of A, the opposite of A, the complementary of A, the hidden part of A, the Anti A, the anti tensor of A,
B = Anti A be opposed to A,

C — denote the unity of tensors A and (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**! Further, let the tensor product obey the distributive law (K-theory). In so far, we obtain the basic relationship as

A + (Anti A) = C

Or

A + B = C

Or

B = (Anti A) = C - A.

Further, let

n(A) — denote the determinatedness of A, the necessity of A. Let us assume that the division by C is allowed. Let us define

n(A) = A / C.

n(B)= n(Anti A) — denote the randomness, the indeterminatedness of A, the necessity of B. Let us assume that the division by C is allowed. Let us define

n(B)= n(Anti A) = (B / C) = ((Anti A) / C). Let

n(A) + n(Anti A) = 1. Let

Δ(A)² — denote the inner contradiction of the tensor A,

Δ(Anti A)² — denote the inner contradiction of the tensor Anti A.

Then

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

Proof.

A	**=**	**A**	(192)
A + (Anti A)	=	A + (Anti A)	(193)
A + (Anti A)	=	C	(194)
(A + (Anti A)) * C	=	(C * C)	(195)
(A + (Anti A)) * (A + (Anti A))	=	(C * C)	(196)
(A*A)+(A*(Anti A)) +(A*(Anti A))+ ((Anti A)*(Anti A))	=	(C * C)	(197)

Q. e. d.

According to classical bivalent logic, something cannot equally be itself and its other too. We obtain the next 2x2 table as an overview of this basic relationship.

The relationship between A and Anti A.		Anti A		
		1	0	
A	1	A*(Anti A)	(A)*(A)	(C * A)
	0	(Anti A) * (Anti A)	A*(Anti A)	(C*(Anti A))
		(C*(Anti A))	(C * A)	(C * C)

According to eq. (180) it is true that

$$(C*(\text{Anti } A)) – ((\text{Anti } A)* (\text{Anti } A)) = ((\text{Anti } A)*A). \tag{198}$$

We obtain the next equation.

$$(C*(\text{Anti } A)) = ((\text{Anti } A)*A) + ((\text{Anti } A)* (\text{Anti } A)). \tag{199}$$

According to eq. (172) it is true that

$$\mathbf{(C*A) - (A * A) = ((\text{Anti } A)*A).} \tag{200}$$

We obtain the next equation from this relationship.

$$\mathbf{(C*A) = ((\text{Anti } A)*A) + (A * A).} \tag{201}$$

Let us assume that the division by the tensor C is allowed. We obtain in this case the variance of a tensor A as

$$\mathbf{\sigma(A)^2 = ((C*A) - (A * A)) / (C*C) = (A * (\text{Anti } A)) / (C*C).} \tag{202}$$

According to the general contradiction law (eq. (165)), it is equally true that

$$\mathbf{\sigma(A)^2 = ((C*A) - (A * A)) / (C*C) \le (1 / 4).} \tag{203}$$

$$\mathbf{\sigma(A)^2 = (A * (\text{Anti } A)) / (C*C) \le (1 / 4).} \tag{204}$$

Thus, $\mathbf{0 \le \sigma(A)^2 \le (1 / 4)}$. The division by the tensor C is not all the time possible or allowed. In so far, it is more useful to use the inner contradiction of a tensor instead the variance of a tensor.

3.3. Dialectical tensor logic

Let us assume, that the division by the tensor C is allowed.

Theorem 13. The logic of tensors A and D under the assumption of independence.

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,
A be opposed to (Anti A),

B denote the other side of A, the opposite of A, the complementary of A, the hidden part of A, the Anti A,
B = Anti A be opposed to A,

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

Let us respect **the law of the excluded middle**. That is to say, there is no third between A and Anti A. Further, let the tensor product obey the distributive law (K-theory). In so far, we obtain

$$\mathbf{A + (Anti\ A) = C}$$

or

$$A + B = C$$

or

$$\mathbf{B = (Anti\ A) = C - A.}$$

Further, let

n(A) denote the determinatedness of A, the necessity of A. Let us assume that the division by C is allowed. Let us define n(A) = A / C.

E 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,
E be opposed to (Anti E),

F denote the other side of E, the opposite of E, the complementary of E, the hidden part of E, the Anti E,
F = Anti E be opposed to E,

G denote the unity of E and (Anti E) .

Let us respect **the law of the excluded middle**. That is to say, there is no third between E and Anti E. Further, let the tensor product obey the distributive law (K-theory). In so far, we obtain **E + (Anti E) = G** or **E + F = G,**

n(E) denote the determinatedness of A, the necessity of A. Let us assume that the division by G is allowed. Let us define n(E) = E / G.

Definitions

Abbreviation	Symbol	Formula	Language
NOT	$\neg$ A	$\neg$ A = 1 - n(A)	Negation: Not A.
AND	(A $\cap$ E)	n(A $\cap$ E) = ((A*E)/(C*G))	Conjugation: A and E.
NAND	(A $\mid$ E)	n(A $\mid$ E) = 1 - n(A $\cap$ E)	A excludes E and vice versa.

OR	$(A \cup E)$	$n(A \cup E) = 1 - ((1 - n(A))*(1- n(E)))$	Disjunction: A or E.
NOR	$(A \downarrow E)$	$n(A \downarrow E) = ((1 - n(A))*(1- n(E)))$	Rejection: Neither A Nor E.
EQV	$(A \leftrightarrow E)$	$n(A \leftrightarrow E)= ((1-((1- n(A))*(n(E))))*(1-((n(A)))*(1-n(E)))))$	A is equal to E.
NEQV	$(A \succ\!\!-\!\!\prec E)$	$n(A \succ\!\!-\!\!\prec E)=1- ((1-((1-n(A))*(n(E))))*(1-((n(A)))*(1-n(E)))))$	Either A or E.
SINE	$(A \leftarrow E)$	$n(A \leftarrow E) = (1-((1- n(A))*(1-(1- n(E)))))$	Without A no E.
NSINE	$(A -\!\!\prec E)$	$n(A -\!\!\prec E) = (((1- n(A))*(1-(1- n(E)))))$	Not (without A no E).
IMP	$(A \rightarrow E)$	$n(A \rightarrow E) = (1-((1- (1- n(A))) * (1- n(E))))$	If A then E.
NIMP	$(A \succ\!\!- E)$	$n(A \succ\!\!- E) = (((1- (1- n(A))) * (1- n(E))))$	Not (If A then E).

4. Discussion

This publication has proofed that the relationship between matter and antimatter or between A and Anti A is governed by the general contradiction law, the most basic law of nature and is not dependent on the language used to express this law.

The other fundamental consequence of the general contradiction law is that it is compatible with quantum theory and general relativity. The consequent use of the general contradiction law will enable us to develop one theory, the unified field theory, that describes both, quantum theory and general relativity, using the same fundamental equations.

A new mathematical framework for classical logic and probability theory appears to be possible.

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References

Barukčić, Ilija. (1989). Die Kausalität. First Edition. Wissenschaftsverlag, Hamburg, pp. 218.
Barukčić, Ilija. (1997). Die Kausalität. Second Edition. Scientia, Wilhelmshaven, pp. 374.
Barukčić, Ilija. (2005). Causality. New Statistical Methods. First Edition. Books on Demand, Hamburg. pp. 488.
Barukčić, Ilija. (2006a1). Causality. New Statistical Methods. Second Edition. Books on Demand, Hamburg. pp.488.
Barukčić, Ilija. (2006a2). Photon electron telescope. First Edition. Books on Demand, Hamburg. pp. 76.
Barukčić, Ilija. (2006b1). New Method For Calculating Causal Relationships, Montréal: XXIII International Biometric Conference, July 16 - 21 2006.
Barukčić, Ilija (2006b). "Local hidden variable theorem, " *Causation* **1,** 11-17.
Barukčić, Ilija (2006c). "Bell's Theorem - A fallacy of the excluded middle," *Causation* **2,** 5-26.
Einstein, Albert. (1905). "Zur Elektrodynamik bewegter Körper," *Annalen der Physik* Bd. XVII, p. 891-921.
Einstein, Albert. (1916). "Die Grundlage der allgemeinen Relativitätstheorie," *Annalen der Physik*, Vierte Folge, Vol. 49, **7**, 769 - 822.
Einstein, Albert. (1908). "Über das Relativitätspnnzip und die aus demselben gezogenen Folgerungen," *Jahrbuch der Radioaktivität und Elektronik* **4**, 411-462.
Einstein, Albert. (1908). "Berichtigungen zu der Arbeit: Über das Relativitätspnnzip und die aus demselben gezogenen Folgerungen," *Jahrbuch der Radioaktivität und Elektronik* **5**, 98-99.
Hegel, G. W. H. *Hegel's science of logic*, Edited by H. D. Lewis, Translated by A. V. Miller (New York: Humanity Books, 1998), pp. 844.
Heisenberg, W. (1927). "Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik," *Zeitschrift für Physik* **43**, 172-198.
Thompson, M. E. (2006). "Reviews. Causality. New Statistical Methods. I. Barukčić," Editor Dr. A. M. Herzberg, International Statistical Institute. *Short Book Reviews*, Volume 26, No. 1, p. 6.