On spacetime-signature --- and why the answer to the question of the answer is 42!

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Abstract:

Discussed is the signature of Spacetime of the universe according to the modus of Special Relativity resp. General Relativity. This signature can be derived from a single polynomial equation, which, with zero-solutions of coordinate axes, causes the metric tensor-components of a tangential spacetime TM to the whole manifold („Minkowski-spacetime“) and its counterpart, the „Anti-Minkowski-metric“ (ATM) with constant, negative metric tensorcomponents. Also the question comes clear, why the answer to the onotological sense of the universe is 42.

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1. Introduction:

Since the time of Minkowskis mathematical description of four-universe [1.], signature (and rank) of the metric fundamental at the base in Relativity Theories according to Einstein [2.] is a well-known term and this term is concret pictured in the metric-tensor of gravity field-equations, describing spacetime. For this signature of universe there can be derived a simple, polynomyal equation, which cross-points to the axes of a rectangular cartesian coordinate system (CCS) can be interpreted as the components of the metric tensor including its multiplicity in two ways. Chosen is the signature-description of $(+1/+1/+1/-1)$.

2. Calculation:

If the following polynomial function is constructed and solved, an interpretation of the components of metrical tensor can be made as crosspoints with the axes of a CCS:

$$f(x)=49\cdot x^{16}-56\cdot x^{15}-48\cdot x^{14}+56\cdot x^{13}-1\cdot x^{0} \qquad (1.)$$

Then the zero-cross-points with the x-axis can be interpreted as the signature-terms of flat, uncurved spacetime in form of diagonal metric tensorcomponents

$$g_{\mu\nu}; \mu=\nu \quad , \tag{2a.}$$

which leads to the classical tangential spacetime metric of Minkowski-spacetime:

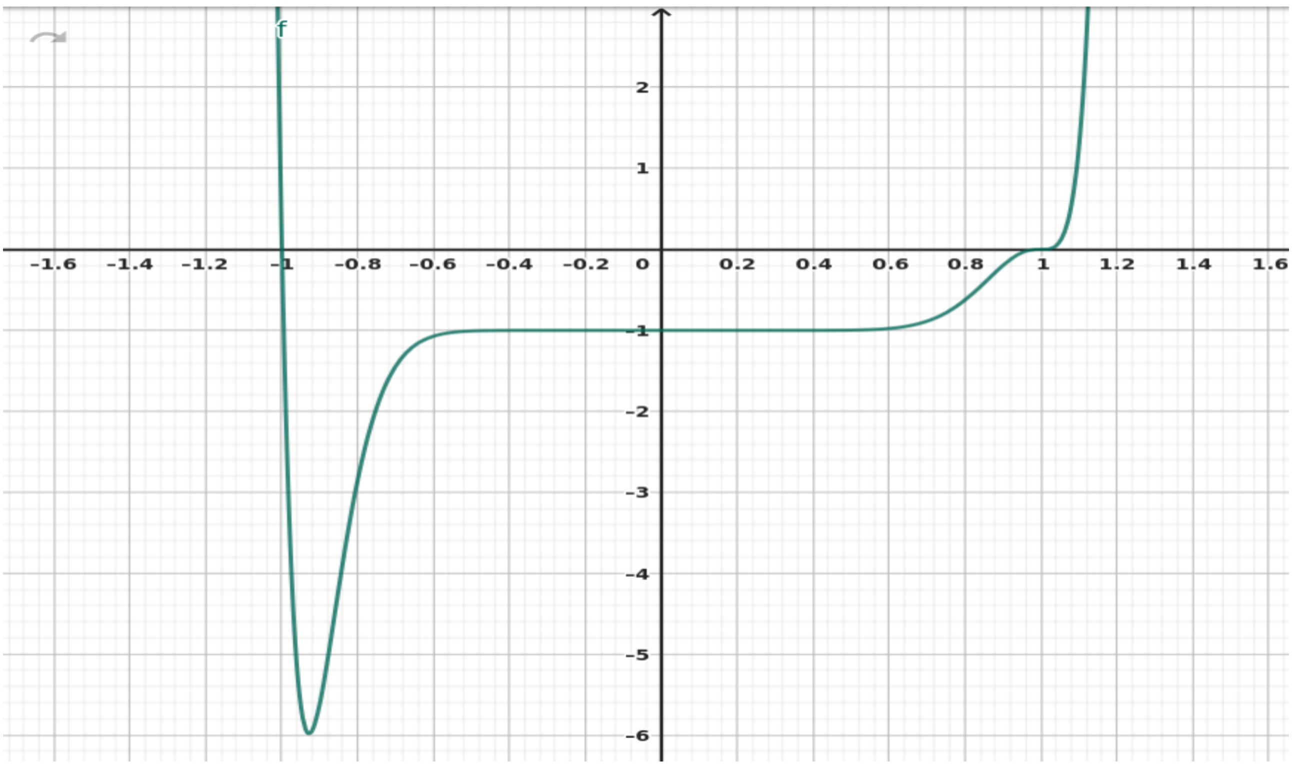
$$g_{\mu\nu}=\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & -1 \end{pmatrix} \tag{2b.}$$

The zero-crosspoint with the ordinate-axis describes the other 12 metric components with the constant curved values of -1 and the condition of:

$$g_{\mu\nu}; \mu\neq\nu \quad . \tag{3a.}$$

This condition then leads to the Anti-Minkowskian metric with constant metric coefficients of -1 and the metric tensor of:

$$g_{\mu\nu}=\begin{pmatrix} 0 & -1 & -1 & -1 \\ -1 & 0 & -1 & -1 \\ -1 & -1 & 0 & -1 \\ -1 & -1 & -1 & 0 \end{pmatrix} \tag{3b.}$$



Graph 1: Shown is the curve of signature polynom with its signature/rank zeropoints and its ordinate crosspoint. The multiplicity at x=1 in its saddlepoint at the abscissa, which represents the spacelike dimension-number, can be clearly seen.

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3. Conclusion and summary:

A simple polynomial equation can describe the signature of classical, non-quantized spacetime according to GRT. Solutions of this equation leads to metric description of uncurved tangential spacetime and to anti-flat spacetime with constant curved metric coefficients. Iff all foresigns are changed in signature from $(+1/+1/+1/-1)$ to its inverse terms, then also the signs of the spaces TM and ATM changes. The signature of spacetime is seen in the graph above of the also above described assigned polynomial function for spacetime signature.

These two states lead to the metric-descriptions in lineelements of:

$$ds^2 = x_1^2 + x_2^2 + x_3^2 - (c_0 \cdot t)^2 \qquad (4a.)$$

for case one, and for a symmetrical announced tensor of case two to:

$$ds^2 = -2 \cdot (dx_1 \cdot dx_2 + dx_1 \cdot dx_3 + dx_2 \cdot dx_3) - 2\, c_0 \cdot dt \cdot (dx_1 + dx_2 + dx_3) \qquad (4b.)$$

This metric could be the base for a nonlocal quantum description of spacetime, because it is a solution of GRT but non-causal of coupling timelike and spacelike dimension-terms together. May be, it is scale-based with size of length or changes abruptly with a delta-function.

4. Discussion:

The polynomial function can be written in the form of:

$$f(x) = 7 \cdot (7 \cdot x^{16} - 8 \cdot x^{15}) + 8 \cdot (-6 \cdot x^{14} + 7 \cdot x^{13}) - 1 \qquad (5a.)$$

The sum of all norms of coefficients including the forefactors but without the norm of the last are:

$$7 + 7 + |-8| + 8 + |-6| + 7 - 1 = 42 \qquad (5b.)$$

Since also the sum of the exponents of polynom function without the first exponent, which represents the square of dimension number of spacetime $(4\, x\, 4)$, describing spacetime nature, leads to the value of :

$$15 + 14 + 13 + 0 = 42 \quad , \qquad (5c.)$$

the question to the answer in [3.] can be given:

Proposition 1:
The sum of all norms of coefficients including the forefactors but without the norm of the last term in spacetime describing polynom is fortytwo.

Proof: see above (5b.). []

Proposition 2: What is the sum of exponents of the function, describing the fundamental systems of spacetime signature outspanning the whole universe without its first exponent, representing the squared dimension number?

Proof: 42 *(5c.)* □

5.References:

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. [2.] Einstein, A., [**1979**[21]], Über die spezielle und allgemeine Relativitätstheorie,Vieweg-Verlag, Braunschweig, WTB, No.59,

. [3.] Adams, D.,[**2005**], The hitchhikers guide through the galaxy, Del Rey books, first published in [**1979**].

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