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SCALING WITHOUT CONFORMAL INVARIANTS AND THE CAUSALITY IN THE NON-LOCAL RELATIVISTIC QUANTUM SYSTEMS IN LIVING CELLS

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Abstract

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Following the classical Einstein's gravitational theory Weyl in 1918 attempt to incorporate electromagnetism into the theory by gauging the metric tensor i.e. by letting:

$$g_{ií} = \exp(-ã\int dx^{ì}W_{м}(x))g_{ií},$$

where г was a constant and the vector field $W_{м}$ was to be identified with the electromagnetic vector potential. Although this idea was attractive, following Einstein, it was physically untenable because it would imply that the spacing of spectral lines would depend on the history of the emitting atoms, in manifest disagreement with experiment to this time by the quantum understandings of the nature. However, after the advent of Wave Mechanics in 1926, the idea was resurrected by application to other physical situations. This new observation that the usual electromagnetic differential minimal principle was equivalent to the integral minimal principle and that this was the correct version of Weyl's proposal in which the constant was chosen pure imaginary ã = i/ž, where ž is the Planck constant h divided by 2ð and the electromagnetic factor was chosen to multiply more the Schrödinger wave functional $\Psi^*_{\alpha ê''}(\varphi_{к''}, t)$ understanding mathematical as an operator acting on everyone function which described the relativistic quantum field systems considered for simplicity by us only for relativistic scalars particles systems:

$$\Psi^{+}_{\varphi áê}(\alpha_{к}, t_{-2(n-½j)}+0))\exp(-ã_{ê'}\int_{ê} dôx^{ì}A_{м}(ôx))\Psi^*_{\alpha ê''}(\varphi_{к''}, t_{-2(n-½j)}),$$

where j = 0, 1, …, 2n is the number of the virtual ("potential") scalar Fermi particles called by us scalarino fulfilled non commutative relations and occupied the local place localized by the neighbourhood of the 4-ponts $y^{ì}_{-2(n-½j)}$ in the coordinate Minkowski space-time for n = 0, 1, …

Since the 1948 the mathematical description of the so-called Casimir world as a part of the physical observed space-time i.e. oriented in the relativistic sense in the time is to be considered by the help of the Hamiltonian quantum field's theory and furthermore even it is based on the fine play between the continuity and the discrete too. The axiomatic-physical methods of the local quantum fields theory has given us the other possibility than the Lagrange quantum field's theory and precisely on this rigorously mathematical way to understand the singularities theory of the zero point energy and the black holes, also the dark energy and the dark matter from one uniformly point of view.

By the living cells and organisms as an object of the fundamental cryobiological researches i.e. in this case the metabolisms is minimal and fossils e.g. the mystery by the mammoth baby Lyuba it is possible to be taken in the account the problem of a "time's arrow" at the microscopic level by the help of the axiomatic-physical methods in the relativistic theory of quantum fields systems by the contemporary considerations of the quantum vacuum as a ground state of anyone relativistic quantum fields system e.g. j = 0. This can be defined by anyone field operator algebra becomes a fixture by the lyophilized elementary living cells and fossils. So the possibility to understand the geometrical quantum functional theory of the indefinite metric for the further considerations i.e. in this case we consider only relativistic quantum system and the word elementary understands a one structure idealization of the living cells and fossils is to be used the Hilbert functional methods of the indefinite functional metrics (Bogolubov et al., 1987).

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Also the many miracle properties of so defined living cells and fossils apparent enchanting by consideration of his functions yet are putting besides in the molecules but in the fundamental quantum field interactions between the quantum vacuum of anyone quantum fields system in the Microsoft matter and the molecules but taken in the Minkowski space-time or in the flat space-time defined by so called oriented in the time global Lorenzian geometry too. So also it is possible to be solving the many body problems by our so called Gedanken experiment with hyperbolic turns and reflections for Casimir world defined by two mirrors moving parallel to another i.e. the one can be at the rest and the other move with a constant velocity v.

Aside from this, the essential difference is that external forces other than gravity, e.g. such as Casimir force, play a major role in the phenomena, i.e. remember there is not observed in our seeing world a local classical relativistic electromagnetic field potential $A_1(x)$ caused this force. And also it is possible to describe the fundamental interactions between anyone concrete fundamental relativistic quantum field system with someone other or with the external and innerness material objects as a additional boundary conditions by the proving of the fulfilling of the causality conditions and consider they as an external classical fields and everyone internal background fields. At the first in his famous work "To the Electrodynamics of moved bodies", Leipzig, 1905, Einstein has proved the possibility to understand the nature from the relativistic point of view in the classical physics.

Moreover it can be represented the symmetrical selfadjoint field operator ÖÞ taken for simplicity for the relativistic quantum scalar fields by definition obtained as functional virtual (potential) vector valued state in the Hilbert functional state space with indefinite metric. That is the quantum field operator obtained by everyone wave fields solution at the fixed time known as a virtual or "potential" quantum field operator. This is acting on the virtual vacuum vector valued functional states as a local entities of the Hilbert functional space with indefinite metric, e.g. the Minkowski space-time has a indefinite quadrate of the interval between events points and is Lorenz invariant. So we have in this case the vacuum state which has global properties too and also can be understand better by definition in the global Lorenzian geometry for the events points connected in pairs by the seeing time like or may be at least one seeing non space like geodesic line with a length non less as the length of every other non space like curve. So also it is realizable the possibility to be obtained the local or non local quantum force currents by the help of the ensembles of the so called virtual current particles e.g. scalars and his scalarino. They interacts minimal local or global by phase integration over the field potential with the field force carrier knowing as the so called virial current (vis via as a quantum point source in three dimensional space or quantum sink in two dimensional space at a given time) i.e. that impact near local or global by interactions with the classical local neighborhood in the Microsoft matter in the Minkowski space-time at the distance. The probability interpretation of the spectral family give us the physical interpretation of the observed quantum invariant entity by the relativistic quantum systems even for the dynamically (not thermodynamically) fine structure of the ground state as potential state also as virtual vector valued functional state, i.e. as the element of the Hilbert functional state space with indefinite metric by the vacuum interactions in the Casimir world. It knows yet the Casimir force today is measured with exactness by 5%.

Precisely the impact of this force on the molecular biology (genetics) is still not clear, i.e. there is a new situation of the so called quantum cryobiology. The additional boundary conditions must be taken under account, e.g. in the cosmogony models it is not possible to consider additional boundary conditions. So also it is possible to understand better the molecules by the molecular biology as a classical object interacting with the ground state of the every one relativistic quantum field system. So also by definition it is considered the relevant operator valued functional Banach algebra or in the Schrödinger picture the vacuum wave functional as a solution of the wave equation describing the same relativistic quantum system in the Minkowski space-time or oriented in the time space-time, e.g. the so called global Lorenz geometry. With other words as in the non relativistic case (see B.C. Goodwin, 1963), by the help of the so called S-matrix theory in the quantum mechanics where this theory is very gut proved we hope to understand better the nature under consideration in the relativistic sense of the axiomatically S-matrix theory by the quantum field systems in the living cells and the fossils too.

So also the Casimir vacuum in the asymptotic past at the left "ℓ" side of the one perfectly conductor plate at the rest contains then from the micro-causal point of view propagation of the virtual particles for the initial observer understanding as referent system (a map). In the asymptotic future at the right "r" side of the same plate and the left side of the second parallel moved perfectly conductor plate towards the plate at the rest with a constant velocity v contains the propagation of some see massive particles for the late-time observer, e.g. the Maxwell demon for the events point bounded with time or non space like geodesic line. Moreover at the right side of the moved plate anew there is a propagation of the relativistic quantum virtual particles system, e.g. the Maxwell demon for the events point bounded with time or non space like causal geodesic paths. In mathematical sense it is possible to be defined the topology of Aleksandrov on the everyone space-time (M, g) – also a topology, that can be given in M by the choice of them as base of the topologies of the all sets in the form $V_{k'x\text{Þ}}^{+} \cap V_{kx\text{Þ}}^{-}$ where the non local events points kx^m, $k'x^m$ Î M are defined in the past and future cone of the space-time.

Precisely the massless relativistic quantum field systems give us then that his local operators algebras are unitary equivalent in the bounded domains of the locally algebras by the matter field and also they have the same structure properties which is from more great importance for the theory than the definiteness of the metric of the Hilbert or Banach functional vector valued state space. So it is possible to be defined the double singularities which will be given by the ground state of local relativistic quantum field system too. The symmetries and structure properties are mathematical described by the Banach algebra of the operators valued field's defined in the Hilbert functional vector valued state space with indefinite metric.

Farther the ground state is defined over the Banach algebra but it can be negative too as remember from the indefinite metric of the Hilbert functional state space. However then there are a number of additional properties generated from the physical distinctions by the massless systems: his scale i.e. the group of the scale transformations represented by the dilatations and special conformal transformations and conformal symmetries also obtained by the group of the conformal transformations give a double singularities of the quantum systems and the vacuum vector valued state, but scale invariance does not imply necessary a conformal invariance and as well the infrared effects leaded to manifest the global structure of the relativistic quantum systems and the vacuum state. Quantum Field Theory QFT and the Renormierungs groups theory RG-groups are classified by scale invariant, Infrared IR fixed point (Wilson's philosophy). In the Doctor paper (G. Petrov, 1978) it is showed that the scaling behaviors of the some quantum entities are destroyed in longitudinal and conserved in the cross section's direction by fulfilling the causality condition for non forward deep inelastic scattering of leptons and hadrons. Also the scale invariance is not from the same nature as the conformal invariance by the massless quantum fields and the scale invariance lead yet not necessarily to the conformal invariance. Also it is possible to consider in the double cone with Alexandrov topology in the Lorenz manifold by the help of the mirror reflections and hyperbolical turns between two mirror one at the rest and the second parallel moved with a constant velocity v at the face a domain of the sequence of fixed events points in Minkowski space-time without accumulative point. So in this case it is remarkable to understand the possibility to distinguish the chronology and the causality by the ensemble from assembling and folding surfaces of bounded events points in the space-time for $n \to \infty$ where n is the number of the mirror reflections at the moved mirror.

Furthermore by means of the space of the test functions from his completion by anyone norm the Hilbert functional space understands the possibility of the definition of the Casimir quantum vacuum state as well a ground state of the relativistic quantum field system in the Schrödinger picture over the involutes Banach algebra of the operators valued fields defined in the Hilbert functional state space with indefinite metric. Then so one virtual ("potential") functional vector valued vacuum state can be negative as remember of the indefinite metric by definition but this is not from anyone significance for the theory. This question precisely spoken is a pure algebraically formulations of anyone relativistic quantum systems in the Hilbert functional state spaces with indefinite metric.

It can be shown that, on scaling-invariant time like or causally non space like paths of the virtual quantum point or sink sources, e.g. current particles, there is a redefinition of the dilatation current by the virial current that leads to virtual generators of dilatations operators.

Key words: Casimir effect, time's arrow, living cells, lyophilization, fossils, causal and scaling principle

Introduction

Following this thought it is to remark that the physical phenomena on the light cone are relativistic in the classical sense by the understanding of the geodesic isotropic path of the real photons. From the quantum point of view it is possible the directionality at a given domain's time arrow by interactions e.g. space parameter with a broken scaling behavior of the time like or non space like paths of the virtual relativistic particles is described by Einstein's relativistic theory. Therefore the classical electromagnetic potential is not observable also virtual (potentially). This is researched by the help of the Minkowski space-time whish described simultaneously both the geometry of the special relativistic theory, and the geometry, induced on the every tangential space of anyone Lorenz manifold. So also the Minkowski space-time plays the same role for the Lorenz manifold as the Euclidian space for the Riemannian manifold. Furthermore the time parameter by definition in Minkowski space-time precisely is not so gut understanding without Lorenz transformations in the sense of the Einstein's special relativistic theory. Then the causality principle applied just on the Minkowski space-time structure on the manifold, defined by the geometry induced on the every tangential space of the anyone Lorenz manifold i.e. the time oriented manifold called traditional space-time give us the possibility to solve the boundary value problem from the relativistic point of view e.g. by the help of the so called Cushy hyper plane. However the gut understanding thermodynamically "time's flow arrow" as a physical phenomena is conversely non relativistic and the time is then absolutely and precisely in the non relativistic quantum mechanics too. So also in force is the so-called Galileo transformation in the created by the Euclidian structure on the geometry, induced on the every tangential space of everyone Riemann manifold.

Also then from the geometric principles of symmetry in Minkowski space-time manifold M in our case the events points are to be thought as the radius 4-vectors with respect to the initial observer at the rest locally by a scale units f(t) in the every fixed events points for:

t Î $(t_{-2(n-½j)}, t_{2(n-½j)}]$, n = 0,1,2, ...,

j = 0, 1, 2... 2n and $j \leq 2n$.

The event 4-points:

$y_{2(n-½j)}$(M, f), n = 0,1, 2,…; j = 0,…,2n,

where $y_{-2(n-½j)}{}^2 = y_{2(n-½j)}{}^2 = y_0{}^2$ are obtained in the Minkowski space-time.

Then in this points it is even measured at the fixed time $t_{2(n-j/2)}$ right from the mirror at the rest or at the fixed time left from the mirror at the rest for $t_{-2(n-j/2)} + 0$ obtained by time independent scale function f^+. This fulfill the differential equation:

df(t)/dt = $x^2/(2({}^\ell xÞy_{-2(n-½j)}) + y_0{}^2 f^+) - f^+ = 0$, by:

$t = t_{-2(n-j/2)}$ for the time t Î $(t_{-2(n-j/2)}, t_{2(n-j/2)}]$.

Further:

x^i = (ct,`x), $y_0{}^i$ =($ct_0$,`y), ${}^r xÞ^\mu$ =($xÞ^0$,`$x_\perp$, ${}^r xÞ^3$),

${}^\ell xÞ^\mu$ = ($xÞ^0$, `$x_\perp$, ${}^\ell xÞ^3$),

are obtained by the Euclidian radius 3-vektors:

`x = ($x^1$, $x^2$, $x^3$), `y = (y^1, y^2, y^3) for y^3, x^3 Î (0, L),

for L = vt_0, and v is the constant velocity of the moved mirror.

Further let's be that there is a jump described in the cases of the so called "generalized level" of the projective plane (the sides of the mirror at the rest) of the event 4-points $y_{2(n-½j)}$ (M, f) and the mirror plane by the so called Whitney fold and assembly singularity with or without a cusp obtained by the projection of the fold surface on the left or right side of the mirror at the rest so also by:

$x^1 = y^3{}_{-2(n-j/2)} = (x'x^3)^3 + x'x^3x^2$, parallel to the mirror plane at the rest and the surface given by the right winding coordinates system obtained for:

`x = ($y^3{}_{-2(n-j/2)}$, x^2, $x'x^3$) where $t = t_{-2(n-j/2)} + 0$, or left winding coordinate system for:

$t = t_{2(n-(j+1)/2)}$ will be projected on the mirror plane at the rest with the coordinates:

`$x_\wedge$ = ($y^3{}_{-2(n-j/2)}$, y^2) by $y^2 = x^2$.

Yet then the time independent scale unit f^+ is obtained for:

${}^\ell xÞ^0$ = (`$x_\wedge{}^2$ + ${}^\ell xÞ^{32}$)^{½} and df/dt = 0 for $t = t_{-2(n-j/2)}$ by the equation:

$f^+ = (({}^\ell xÞy_{-2(n-½j)})y_0{}^{-2})((1+x^2y_0{}^2({}^\ell xÞy_{-2(n-½j)})^{-2})^{½} - 1)$.

Even it is to be understood that the boundary value problem can be taken as solved by the measurements in the case of the local coordinates with respect to the observer. Also it is to be understands both the initially coordinate system (a map e.g. referent) by someone scale choice under given initially conditions for the considered physical theory and the geometry following the geometric principles by referent systems with respect to the causality conditions by the supposed additional boundary conditions. It is to be remarked that the mathematical meaning of the manifold is introduced in the physics at the first in the General Relativistic Theory from Einstein in his famous work.

Moreover it knows that the Minkowski space-time M^4 describe simultaneously both the Einstein special relativistic theory published at the first 1905 in Leipzig in the famous paper "To the electrodynamics of the moved bodies" and the geometry, induced by the every tangential space on anyone Lorenz manifold without a consideration of the boundary value problem. Conversely in the non relativistic theories the Euclidian space describe simultaneously both the Newton mechanics and the geometry, induced by the every tangential space on anyone Riemann manifolds. In this case the time is only one parameter.

So this is obtained e.g. by the scaling behaviors at a time t Î $(t_{-2(n-½j)}, t_{2(n-½j)}]$, or by the measurement at a time $t_{2(n-j/2)}$ for the space group structure obtained by:

$R^1(t_{2(n-j/2)}) \times R^3$(`$y_\wedge$, $y^3{}_{2(n-j/2)}$) and scale units f^+ at the same time. Precisely furthermore in the local cense the Lorenz structure and the Riemann structure on the manifold are equally but globally yet it must be considered of a distinct manner.

The Casimir quantum vacuum is not connected with anyone charge. Moreover his structure and symmetries are no more so narrow connected to the structure and the symmetries of the relativistic quantum system. The classes of the vacuum structure will be obtained by the dynamically classical definitions of the Casimir world and symmetrically by additionally causal and boundary conditions. The global structure of the Casimir vacuum state of anyone local relativistic quantum field system defined in a local coordinate system must be considered also in the global Lorenz geometry by fulfilling of the additional causality and boundary conditions without anyone innerness contradictoriness. The local scalar relativistic wave quantum fields even obtained in the Minkowski space-time fulfills the internal non contradictoriness too. Moreover then the observer is to be understood as a local coordinate referents system (a map), e.g. observer stayed on the mirror at the rest or on the parallel moved inertial mirror with the velocity v/c < 1 towards the unmoved at the rest obtained by the Lorenz transformations in the space-time manifold M.

The space-time interval is a dimensionless distance between two events points measured in anyone units and moreover the causal conditions are as well fulfilled by:

$dI = (dy_{2(n-j/2)} \,.\, dy_{2(n-j/2)})^{½}f$.

In the case of the Minkowski space-time the distance is obtained by the indefinite scalar product of the Minkowski radius 4-vectors described a time or non space like curve in the Minkowski many fold defined by the hyperbolic turns and reflections on the mirrors by the Casimir's effect in the so called from us "Gedanken" experiment. So also it is indefinite:

$y_{-2(n-j/2)}{}^2 = y_{2(n-j/2)}{}^2 = y_0{}^2 = (ct_0)^2$ - $`y_{\wedge}{}^2$ - y^{32} with respect to the initial observer and remained invariant at the same time when the Lorenz transformations are fulfilled. Also logarithmic ln-function in this case is groundless if we have a global Lorenz geometry i.e. the case of the Casimir world.

Moreover the events points $y_{-2(n-j/2)}{}^{\mu}$ left and $y_{2(n-j/2)}{}^{\mu}$ right at the mirror at the rest obtained by the radius 4-vectors $y_{-2(n-j/2)}{}^{\mu}$ and $y_{-2(n-j/2)}{}^{\mu}$ builds a sequence without accumulative point and the distances fulfills:

$d(0, y_{-2(n-j/2)}{}^{\mu}) \rightarrow 0$ and $d(0, x^{\mu})$ = å, or:

$d(0, y_{2(n-j/2)}{}^{\mu}) \rightarrow 0$ and $d(0, x^{\mu})$ = å, for:

$n \rightarrow \infty$, $j < 2n$ by the isotropy geodesic light like line described by the Minkowski radius 4-vectors ϕʳxЮ$^{\mu}$ and ϕᶠxЮ$^{\mu}$, ϕʳxЮ^2 = ϕᶠxЮ^2 = ϕᶠxЮ^{02} - $`x_{\wedge}{}^2$ - xЮ$^{32}$ = 0. Further $`x_{\wedge} = (y^3{}_{-2(n-j/2)}$, xЮ^2) it is for xЮ^1 = $y^3{}_{-2(n-j/2)}$ + 0 and ϕᶠxЮ^0 = ($`x_{\wedge}{}^2$ + xЮ^{32})^S

xЮ^3 = (ϕᶠxЮ^{02} - $`x_{\wedge}{}^2$)^S = ϕᶠxЮ^0 + const for:

lim(-($`x_{\wedge}$)$^2$)/2ϕᶠxЮ$^0$ = const Î [0, 1] for $`x_{\wedge}{}^2 \rightarrow \infty$ and ϕᶠxЮ^0 →-∞.

Further with respect to the initial observer is by:

$(y_{-2(n-j/2)}{}^{\mu}$ - ½(x'x$^{\mu}$ + ô$_j$ᶠxÞ$^{\mu}$))($y_{-2(n-j/2)\mu}$ + ½(x'x$_{\mu}$ + ô$_j$ᶠxÞ$_{\mu}$)) = ¼($y_{\mu\, -2(n-j/2)}$ - ô$_j$ᶠxÞ$_{\mu}$)^2 = 0

for x'x$^{\mu} \rightarrow y^{\mu}{}_{-2(n-j/2)}$.

Moreover by the locality condition for ê' → 0 i.e.:

|$`x_{\wedge}$| = ($`x_{\wedge}{}^2$)^{½} = ((ê'x^0)^2 - (ê'x^3)^2 – ê'^{2}x^2)^{½} = ((ê'x^0)^2 – (ê'x^3)^2)^{½} and except for the const > 0 is

|$`x_{\wedge}$| = ê'|x^0|+ const by the:

lim (-(ê'x^3)^2)/2ê'x^0 = const Î [0, 1] for:

(ê'x^3)$^2 \rightarrow \infty$ and ê'x$^0 \rightarrow -\infty$.

In the case of ê'x^0 = $y^0{}_{-2(n-j/2}$ + 0 i.e. by fulfilling of the locality follows:

|$`x_{\wedge}$| = ((ê'x^0)^2 – (ê'x^3)^2 – ê'^{2}x^2)^{½} =

($y^0{}_{-2(n-j/2)}{}^2$ – (ê'x^3)^2)^{½}.

Than for $y^2 = x^2$ it is:

($y^0{}_{-2(n-j/2)}{}^2$ – (ê'x^3)^2)^{½} = |y^0|+ const by the:

lim (-(ê'x^3)^2)/2$y^0{}_{-2(n-j/2)}$ = const Î [0, 1] for:

(ê'x^3)$^2 \rightarrow \infty$ and $y^0{}_{-2(n-j/2)} \rightarrow -\infty$.

Further it is by:

|$`x_{\wedge}$| = ($`x_{\wedge}{}^2$)^{½} = ((ê'x^0)^2 - (ê'x^3)^2 – ê'^{2}x^2)^{½} = ($y^0{}_{-2(n-j/2)}{}^2$ – (ê'x^3)^2– ê'^{2}x^2)^{½}.

Also it is – = ($y^{02}{}_{-2(n-j/2)}$–|$`x_{\wedge}$|^2–ê'^{2}x^2)^{½}=

($y^{02}{}_{-2(n-j/2)}$–$y^3{}_{-2(n-j/2)}{}^2$–x^{22}–ê'^{2}x^2)^{½}=

($y^{02}{}_{-2(n-j/2)}$–|$`y_{\wedge}$|^2–ê'^{2}x^2)^{½}=

(y^{02}–y^{32}–y^{22}–ê'^{2}x^2)^{½} =

(y^{02}– |$`y_{\wedge}$|^2)^{½} +const by the:

lim(-ê'^{2}x^2)/2(y^{02}– |$`y_{\wedge}$|^2)^{½} =

const Î [0, 1] for fixed ê' is:

ê'^{2}x$^2 \rightarrow -\infty$ and (y^{02}– |$`y_{\wedge}$|^2)$^{½} \rightarrow \infty$.

Moreover for fixed $x^2 < 0$ and t is:

ê'^{2}x$^2 \rightarrow -0$ and (y^{02}– |$`y_{\wedge}$|^2)$^{½} \rightarrow 0$.

Moreover it is:

ê'^{2}x^2 = ($y^{02}{}_{-2(n-j/2)}$–|$`y_{\wedge}$|^2–(ê'x^3)^2) = (ê'x$^{\mu}$)^2

The equally describing from other observer following the relativistic principles correspond to self mapping of the space-time scale manifold conserved the interval dI. By the fixed scale in the Minkowski space-time the transformation group conserved the distance d:

$d(x, y_{2(n-j/2)}) = ((x - y_{2(n-j/2)})(x - y_{2(n-j/2)}))^{½}$,

by fixed points $y_{2(n-j/2)}$ is isomorphic to the half direct product $T^{3,1}$ ×) O(3,1) group of transformations and the full homogeny Lorenz transformations on the Minkowski space-time with respect to naturally action of the O(3,1) group on M.

Also then from the causality and the additional boundary conditions can be supposed the solving of the boundary value problem in the relativistic sense without to consider the initially conditions for the initial observer. With other words just the question what occurs for the two plates at the time t = 0 is groundless.

But by hook or crook in the relativistic quantum field's theory e.g. experimentally by the quantum electrodynamics QED as a experimentally gut proved theory precisely in the domains of high energy physics the utilization of the fundamental field's equations is not from major significance. It knows that in the domain of high energy physics the number of the model understandings is significant and also the role of the mathematics in this case is not to clear the bounds between the mathematical-physical phenomenological models but more to obtain anyone physical theory i.e. still from the physical-axiomatically point of view QED is to be understand as a model than instead of a theory of the relativistic quantum fields systems in domains of high energy physics. The so called Standard model is from the same nature as by the QED. Also just that is from significant importance by the understanding of the Casimir world in the lyophilized elementary living cells and the fossils from the theoretical point of view by the proving of the quantum field theory, e.g. QED and the Standard Model.

Yet in the same way by fulfilling of the following naturally statements defined as early as from the ancient nature-philosophy by Syrian, Egyptian and Grecian in the nature-philosophical axiomatically (also it is conferred, universal taken proposition) sense of the unity of the opposite entities:

- boundary and infinity
- odd and even
- oneness and infinity aggregate
- right and left
- manly and womanly
- unmoved and moved
- straight and curve
- light and darkness
- blessing and disguise
- quadrate and parallelogram,

it is possibly to describe the interacting quantum relativistic field's systems.

In the Casimir world (boundary and infinity) becomes a fixture to the roundabout environment in lyophilized living cells and systems and fossils from the point of view of the usual axiomatic physical theory. Moreover by utilization of the idea of the vacuum as a functional ground state of the axiomatically constructed concrete fundamental relativistic quantum system in the Schrödinger picture can be considered the so-called micro causality. Moreover then the "time's arrow" can be understand micro causal from microscopically stand point of view by the quantum causality and localizability of the quantum entities seeing from the observer e.g. the Maxwell demon at the past $t > t_{-2n} = t_{2n-1}$ and at the future time at $t = t_{2n}$ from the late-time observer for $n \rightarrow \infty$. Even then it takes not into account the thermodynamically entropies character of the time. It knows then that this has his cause for the Casimir effect by the Einstein's macro causality i.e. the Casimir force in the vacuum impact over every particle (seeing or virtual) as external force. Also it is the phenomena from the same nature as by the electron moved in the external classical electromagnetic field by broken vacuum symmetries of the QED e.g. the scaling behaviour of the vacuum state of the massless Dirac fundamental electron field lead to polarisation (electron-positron pair) of the vacuum by acting of the electric force on the localized massive electron.

For the light propagation in the vacuum at the microscopically level the geometrical understanding of causality Lorenz manifolds is practical from one and the same nature described by local quantum wave field systems. The former was physically understood very gut as phenomena of the quantum electrodynamics QED but not so gut from the so-called axiomatically pure physics-mathematical point of view. Furthermore following the quantum character of the causality properties of the observed physical quantum entities in the domains of the high energy physics it is clear that the application of the usual mathematical analysis of the 19. Century by the necessarily analyticity representation of the causality of the quantum entities is not more sufficiently to describe this by the help of the fundamental equations for the quantum vacuum state of the relativistic quantum systems. The fundamental equations are more of no utility because just the nature of the vacuum state besides the locality is globally and it needs also the global Lorenz geometry too.

The generalized functions and more special the tempered distributions make possibly the understanding of the nature by those physical phenomena from the mathematical point of view too, e.g. without to consider the set of the measures zero as by Lebesgue's integrations. The entity of the distributions consist in them that by dropping the knowledge of the functions which define the Lebesgue's set of measure zero it is possibly to define wide class of generalized functions, included different Dirac ä-functions and his derivations. Also the physical conditions as additional causality and boundary conditions for the solution of the boundary value problem are necessary but not sufficient if there are the innerness contradictoriness bounded with the observer (also the measurements problems) and the scaling problems of the group of the scale transformations in the Minkowski space-time.

At the molecular level (Mitter and Robaschik, 1999) the thermodynamic behaviour is considered by quantum electromagnetic field system with additional boundary conditions as well by the Casimir effect between the two parallel, perfectly conducting quadratic plates (side L, distance d, $L > d$), embedded in a large cube (side L) with one of the plates at face and non moved towards the other, i.e. also the case of so called Casimir effect under consideration in the sense of the local case when the Minkowski space-time is equally of 4-dimensional Euclidian space but without the considerations of the causality properties of the relativistic quantum entities given a share in the effect, e.g. relativistic supplement to the Casimir force $v/c < 1$ where v is the relative velocity of the moved mirror and c is the light velocity (M. Bordag et al., 1984; G. Petrov, 1985, 1989). Then the boundary value problem must be considered with respect to the additional causal conditions and not implicit to be considered the initially conditions. So the time's arrow and the causality have a new understanding in the relativistic quantum physics, e.g. the Casimir energy ù → -∞ for $t_0 \to 0$.

Following the classical Einstein's gravitational theory Weyl in 1918 attempt to incorporate electromagnetism into the theory by gauging the metric tensor i.e. by letting:

$g_{ii} = \exp(-\tilde{a}\int dx^i W_м(x)) g_{ií,}$

where г was a constant and the vector field $W_м$ was to be identified with the electromagnetic vector potential. Although this idea was attractive, following Einstein, it was physically untenable because it would imply that the spacing of spectral lines would depend on the history of the emitting atoms, in manifest disagreement with experiment to this time by the quantum understandings of the nature. However, after the advent of Wave Mechanics in 1926, the idea was resurrected by application to other physical situations. This new observation that the usual electromagnetic differential minimal principle was equivalent to the integral minimal principle and that this was the correct version of Weyl's proposal in which the constant was chosen pure imaginary ã = i/ž, where ž is the Planck constant h divided by 2ð and the electromagnetic factor was chosen to multiply more the Schrödinger wave-function but for the relativistic quantum systems described by the Schrödinger wave functional $\Psi_{\varphi á ê'}(\alpha_{\kappa'}, t)$ whish itself has not so clear physical meaning rather then Einstein metric. This observation was quite profound because it laid not the foundations for modern gauge theory but brought electromagnetism into the realm of geometry.

Our interests is the relativistic more realistic Casimir effect without the innerness contradictoriness when the one of the plates is at the rest and the other moved inertial with a constant velocity v towards the non moved plates imbedded in the Minkowski space-time.

So the thermodynamic behavior of the elementary living cells and fossils under consideration must be considered globally by the relativistic quantum systems in the so called Casimir world too which can be better understand in the light of the considered problem in the famous paper by Einstein Zur Electrodynamik der bewegten Körper, 1905, Leipzig, (for further considerations see Dodonov, 2001).

Further it has long been presumed that, under mild assumptions, scale invariance:

${}^{r}xÞ'^{i} \to êx^{i}$, ${}^{\ell}xÞ'^{i} \to ê'x^{i}$ e.g.

$kx^m = t_j{}^{r}xÞ^m + y_{2(n-½j)}{}^{m}f_k$,

$k'x^m = t_j xÞ^m + y_{-2(n-½j)}{}^{m}f_{k'}$,

implies conformal invariance in relativistic quantum field theory. Although no proof is known by the dimensions d > 2 in the flat space-time of the Lorenz manifolds, until very recently a credible counterexample was lacking (Fortin et. al.).

At the first it is to be considered the fixed event 4-points in the Minkowski space-time obtained by the radius 4-vectors with respect to the initial observer at the rest:

$y^m_{2(n-½(j+1))}, y^m_{-2(n-½j)}, y^m_{2(n-½j)}, y^m_{-2(n-½(j-1))},$

m = 0, 1, 2, 3,

and which are obtained by the reflections and the hyperbolical turns (odd and even, right and left) of the fixed event 4-point:

$y^m_0 = (ct_0,`y)$,

at the fixed time t_0 and the second event 4-point without reflections and hyperbolical turns $x^m = (ct,`x)$ for the every one fixed time t between the two perfectly conductor plates in the coordinate Minkowski space-time M^4. This described both the geometry of the Einstein special relativistic theory where c is the light velocity and the geometry induced on everyone tangential space of anyone Lorenz manifold. This is the knowing fact that the time oriented Lorenz globally geometry of the space-time give us the possibility to understand the time's arrow between the manifold's event points of the special relativistic theory in the light of the Lorenz global geometry. Moreover so it can be thought micro causal for the time belonging to this geometry where:

t Î $(t_{-2(n-½j)}, t_{2(n-½j)}]$, n = 0,1,2, ...,

j = 0,1,2,...,2n, by y^3, x^3 Î $(0, d_0]$,

or y^3, x^3Î $[d_0, L)$, (quadrate and parallelogram) and n is the reflecting number of the fixed event 4-point $y_0{}^m$ of the Minkowski space-time M whish describe the geometry induced by the tangential space in this point of the Lorenz manifold between the unmoved and the parallel moved plate towards the plate at the rest with the constant velocity v and be seeing (light and darkness) e.g. from the demon of Maxwell (blessing and disguise) at the time:

$t_{-2(n-½j)} = c^{-1}(y_0{}^2 + `y_{\wedge}{}^2 + y_{-2(n-½j)}{}^{32})^{½} =$
$c^{-1}(-(y_0{}^{32} - y_0{}^{02}) + y_{-2(n-½j)}{}^{32})^{½}$,

so that the moved plate is placed by:

$L = vt_0$.

Furthermore for the mirror fixed 4-points $y^m_{-2(n-½j)}$ and $y^m_{2(n-½j)}$ it can be defined a light like vectors ${}^{r}xÞ^m$ and ${}^{\ell}xÞ^m$ in the Minkowski space-time by the distinguishing marks "ℓ" = left and "r" = right obtained by the following relations:

${}^{r}xÞ^m = x^m + y^m_{2(n-½j)}f$

${}^{\ell}xÞ^m = x^m + y^m_{-2(n-½j)}f'$,

where:

$f = ((xy_{2(n-½j)})y_0{}^{-2})((1 - x^2y_0{}^2(xy_{2(n-½j)})^{-2})^{½} - 1)$,

for t const and for the fixed time $t_{2(n-½j)}$.

Moreover by setting:

0 ≤ ê' ≤ t ≤ ê ≤ 1,

it can be defined explicitly by the fulfilling of the dilatation's invariance the Minkowski space-time non local radius 4-vectors by the following relations:

$kx^{m} = t_{j}^{r}x\text{Þ}^{m} + y_{2(n - ½j)}{}^{m}f_{k}$,
where:
$f_{k} = y_{0}^{-2}(y_{2(n - ½j)}t_{j}^{r}x\text{Þ})((1+k^{2}x^{2}y_{0}^{2}(y_{2(n - ½j)}t_{j}^{r}x\text{Þ})^{-2})^{½}-1)$

Furthermore in the impulse Minkowski space-time and fixed heat impulse 4-vector $k^{m} = (\omega/c, \`0_{\perp}, k^{3})$ and the impulse 4-vector $q^{m} = (q^{0}, \`q_{\perp}, q^{3})$ as that was the case by Casimir energy $\omega = 0$ in the dissertation paper (Petrov, 1978) by studying of the causality properties of the form factors in the case of non forward Compton scattering by deep inelastic scattering of leptons and hadrons by means of the following relation $q_{k'}{}^{m} = q^{m} - k^{m}$ and $q_{k}{}^{m} = q^{m} + k^{m}$ so that $dq_{k}{}^{m} = dq_{k'}{}^{m} = dq^{m}$ by fixed k^{m} it can be defined by impulse scale unit function f:

${}^{r}q\text{Þ}^{m} = q^{m} + k^{m}f$ with if $q^{2} = m_{d}{}^{2}c^{2}$
$f = k^{-2}(kq)((1 - m_{d}{}^{2}c^{2}k^{2}/(kq)^{2})^{½} - 1)$.

So that moreover:
$(k^{r}q\text{Þ}) = ((kq)^{2} - m_{d}{}^{2}c^{2}k^{2})^{½}$, and
$(k^{r}q\text{Þ})^{2} + m_{d}{}^{2}c^{2}k^{2} = (kq)^{2}$,
$(kq) = (k^{r}q\text{Þ})(1 + m_{d}{}^{2}c^{2}k^{2}/(k^{r}q\text{Þ})^{2})^{½}$, so that:
$q^{m} = {}^{r}q\text{Þ}^{m} + k^{m}f$, with:
$f = k^{-2}(k^{r}q\text{Þ})((1 + m_{d}{}^{2}c^{2}k^{2}/(k^{r}q\text{Þ})^{2})^{½} - 1)$.

Moreover:
$q^{2} = 2k^{-2}(k^{r}q\text{Ю})^{2}((1 + m_{d}{}^{2}c^{2}k^{2}/(k^{r}q\text{Ю})^{2})^{½} - 1) +$
$k^{-2}(k^{r}q\text{Ю})^{2}((1+m_{d}{}^{2}c^{2}k^{2}/(k^{r}q\text{Ю})^{2})^{½} - 1)^{2} = m_{d}{}^{2}c^{2}$.

The quadrate of the heat impulse 4-vector in the referent system of the mirror at the rest is:

$k^{2} = \hat{I}\ (-\infty, \infty)$ by $t \rightarrow t_{0}$. Also by $|\`q_{\perp}| = 0$ and fixed virtual heat mass $m_{j} = c^{-1}(E_{j}^{2}/c^{2} - k^{32})^{½}$ it can be chosen by $E_{j} \rightarrow -\infty$ and $k^{32} \rightarrow \infty$ the so called virtual mass equally of the vacuum Energy and negative in the referent system at the rest except for the const Î [0, 1]. Also the dark energy in the referent system at the rest is:

$m_{d}c^{2} = E_{d}$ + const, where for:
$q^{32} \rightarrow \infty$ and $E_{d} = mc^{2} \rightarrow -\infty$.
By $q^{3} = m¿$ and $m = m_{d}/(1 – (¿/c)^{2})^{½}$, the:
$\lim (-q^{32}c^{2}/2E_{d})$ = const Î [0, 1],
is the kinetically energy $m¿^{2}/2$ of the virtual scalar particles in the Casimir vacuum state defined as a virtual state in the Hilbert functional space with indefinite metric. So also the kinetic impulse $q^{3} = k^{3}$ obtained by the Casimir force of this relativistic quantum system is consisted by the particles number $n \rightarrow \infty$ of the virtual scalars. So it can be obtained in this case that the mass of the virtual scalar particles on the moved mirror is $m = m_{d}/(1 - v^{2}/c^{2})^{½}$.

Moreover also the number of the virtual scalars so that also $m_{d}c^{2} = i(E_{d} + F_{C}V_{d})$ in the case of the heat relativistic quantum system whish consist from this scalars particles and his impulse in the referent system at the rest can be considered rather as the invariant quantitative parameters of the heat relativistic quantum systems where E_{d} is the inner dark energy and F_{C} is the Casimir force per unit surface area and the V_{d} is the volume of the system.

Furthermore for the vacuum fluctuations the Casimir energy can by obtained by:
$ù = c(k^{2} + k^{32})^{½}$,
where the Casimir vacuum energy ù is calculated by the Casimir effect for the relativistic quantum field system and can be positive or negative in dependence from the topology of the additional boundary conditions to the initial conditions i.e. by solving the boundary value problem. It can be obtained also by the definition:
$ù = ½(E_{k} - E_{k'}) = ½(E_{áê} - E_{áê'})$.

Further the zero point energy ZPE is:
$m_{0}c^{2} = (ù^{2} – c^{2}k^{32})^{½} = |ù|$ + const and even by $k^{32} \rightarrow \infty$, $ù = \rightarrow -\infty$,
where by the longitudinal impulse k^{3} of the virtual scalars is the $\lim(-c^{2}k^{32}/2ù)$=const Î [0, 1]. Also the ZPE is equally to the Casimir energy ù for impulse k^{3} in the longitudinal direction except for the const.

Further on compact subsets of the domain ${}^{t}D$ it can be obtained the function:
$ö(q_{\kappa}) = òd^{4}\kappa x \exp[iq_{\kappa}\kappa x]/((\kappa x)^{2} - \kappa^{2}x^{2})\text{-iå})$,
so that for $ê \rightarrow 0$ and that is also $\kappa^{2}x^{2} = 0$ it is:
$ö(q_{\kappa}) = òd^{4}\kappa x \exp[iq_{\kappa}\kappa x]/(\kappa x)^{2}\text{-iå})$,
and $kx^{m} \rightarrow êx\text{Þ}^{m}$.

Also for $ê' \rightarrow 0$ and that is also $\kappa'^{2}x^{2} = 0$ it is further:
$ö(q_{\kappa'}) = òd^{4}\kappa' x \exp[iq_{\kappa'}\kappa' x]/(\kappa' x)^{2}\text{-iå})$,
and $k'x^{m} \rightarrow ê'x\text{Þ}^{m}$.

At the first it can be reviewed the circumstances for the non local quantum field theory also precisely the scaling behaviors without to consider conformal invariance. The most general form of the non local dilatation current operator $D_{i}(êx)$ is obtained by the operator equation for the non-local operators fulfilled on the light cone for $ê' \rightarrow 0$ and $ê'^{2}x^{2} = 0$,

also by:
$D_{i}(êx) = ê'x^{i}T_{ii}(êx, ê'x) - V_{i}(êx)$,
where $T_{ii}(êx, ê'x)$ is the non local operator of anyone symmetric energy-momentum tensor of the relativistic quantum scalar field system and $V_{i}(êx)$, the non local operator of the virial current.

Also for the vacuum expectation value of the tensor of the averaged energy-momentum, the dilatation current and the virial current between the scalar field states at the fixed 4-points it can be obtained:

$T_{\mu\nu}(\kappa x, \kappa' x) =$
$<y_{-2(n - ½j)}|:T_{\mu\nu}(\kappa x, \kappa' x):|y_{2(n - ½j)}ñ$,
$D^{i}(êx) = <y_{-2(n - ½j)}|:D^{i}(êx):|y_{2(n - ½j)}ñ$ and
$V^{i}(êx) = <y_{-2(n - ½j)}|:V^{i}(êx):|y_{2(n - ½j)}ñ$,
$t\ \hat{I}\ (t_{-2(n - ½j)}, t_{2(n - ½j)}]$, n = 0,1,2, ...,
j = 0,1,2, ..,2n and $t \rightarrow \infty$ for

$n \rightarrow \infty$ and $j = 0$.

And further for consideration of the energy-momentum tensor of the relativistic scalar quantum field just must be obtained the quantum scalar mass field.

If it is supposed that the energy must be positive then the solution of the non local scalar field is restricted on the zero point mass hyperboloid i.e. following for the positive time also as well by the Casimir effect the dark impulse $m_d c = (q_{ak}^2)^{½}$ in the referent system at the rest. Further the kinetics impulse k^3, by the given dark energy E_d and the Casimir energy ù:

$k^0 = ù/c = ½(q^0_{ak} - q^0_{ak'})$,

$k^3 = ((ù/c)^2 – k^2)^{½} = ½(q^3_{ak} - q^3_{ak'})^{½}$

$q_{ak}{}^0 = (E_d + ù)/c$, $q_{ak'}{}^0 = (E_d - ù)/c$, also:

$q_{ak} = (q_{ak}{}^0, 0, 0, k^3)$, $q_{ak} = (q_{ak'}{}^0, 0, 0, -k^3)$,

so that it is to be defined the 4-vektor in the impulse Minkowski space by the dark energy $q_a = (E_d, 0, 0, 0)$, can be negative or positive for $k^2 \rightarrow -\infty$ and $ù \rightarrow \infty$ or $ù \rightarrow -\infty$ what is depending from the topology of the boundaries too.

Also by definition:

$å(\kappa x^0) = q(\kappa x^0) - q(-\kappa x^0)$, where:

$q(\kappa x^0) = 1$ for $\kappa x^0 > 0$

$\varphi(q_\kappa) = òd^4\kappa x\varepsilon(\kappa x^0)\delta((\kappa x)^2-\kappa^2 x^2)\exp[-iq_\kappa \kappa x]\varphi(\kappa x)$, is:

$(\partial_{q\kappa}{}^2 - \kappa^2 x^2)\varphi(q_\kappa) = 0$.

Moreover for the fixed time it can be obtained for the state vector $|\alpha_\kappa> = |q_{ak}>$ the scale function for the 4-impulse q_{ak} in the impulse Minkowski space by defined:

$\alpha_\kappa(q_{ak}) = òd^4y_{2(n-½j)}\varepsilon(y^0_{2(n-½j)})\delta(y_{2(n-½j)}{}^2 – xt_j{}^r xÞ)$

$\exp[iq_{ak}y_{2(n - ½j)}]\alpha_\kappa(y_{2(n - ½j)})$,

so that it is fulfilled the equation:

$(\partial_{qak}{}^2 - xt_j{}^r xÞ)\alpha_\kappa(q_{ak}) = 0$.

Moreover for the Hilbert functional state space with indefinite metric it is obtained for the fixed event 4-point $y_{2(n-½j)}$ in the Minkowski space-time the one field vector valued state:

$|ö_j> = |y_{2(n-½j)}> = òd_4 q_a \varepsilon(q_a{}^0)(\exp[-iq_a y_{2(n - ½j)}]|q_a> + \exp[iq_a y_{2(n - ½j)}]|q_a>^*)$,

where $n = 0, \ldots$ and $j = 0, \ldots, 2n-1$.

Moreover under n can be understood the Number of the elementary cells in the Minkowski space and under j the Number of the Fulfilling of this cells with the virtual scalars.

So also it is possible to development the further extrapolation of the thought that the causality condition is to be extrapolating as a new understanding of the initial condition without to development the causality in the case in the so called cone singularity of the quantum field theory.

So also for the non-local Wick's operator product ê = ê' or ê→ ê' for it can be obtained the non local normal ordered operator product if:

$:\varphi(q_\kappa)\varphi(q_{\kappa'}): = òd^4\kappa x d^4\kappa' x \exp[-iq_\kappa \kappa x - iq_{\kappa'}\kappa' x]:\varphi(\kappa x)\varphi(\kappa' x):$

The Wick's non-local operator of the tensor of energy-momentum $T_{\mu\nu}$ for the quantum relativistic scalar field system can be defined by the non local normal ordered operator product:

$:T_{\mu\nu}(q_\kappa, q_{\kappa'}): = òd^4\kappa x d^4\kappa' x$

$\exp[-iq_\kappa \kappa x - iq_{\kappa'}\kappa' x] :T_{\mu\nu}(\kappa x, \kappa' x):$.

Moreover the non local tensor $T_{\mu\nu}(\kappa x, \kappa' x)$ of energy momentum is obtained by the invariant entities T's and the localization for the $T_{\mu\nu}(\kappa x, \kappa' x)$ is obtained for κ and κ' tended towards zero also the localizability must be proven for the invariant entities T's explicit determined the averaged tensor $T_{\mu\nu}$ of energy-momentum by the follows definition:

$T_{\mu\nu}(\kappa x, \kappa' x) = (g_{\mu\alpha} - \kappa x_\mu \kappa x_\alpha/(\kappa x)^2)$

$(g_{\nu\beta} – \kappa' x_\nu \kappa' x_\beta/(\kappa' x)^2)(g^{\alpha\beta}T_0 + y_{2(n - ½j)}{}^\alpha y_{2(n - ½j)}{}^\beta T_1 + y_{-2(n - ½j)}{}^\alpha y_{-2(n - ½j)}{}^\beta T_2 + ½(y_{2(n - ½j)}{}^\alpha y_{-2(n - ½j)}{}^\beta + y_{-2(n - ½j)}{}^\alpha y_{2(n - ½j)}{}^\beta)T_3)$,

$t\ Î\ (t_{-2(n - ½j)}, t_{2(n - ½j)}]$,

$n = 0,1,2, \ldots, j = 0,1,2, \ldots,2n$.

Moreover vice versa the localizability condition in the coordinate Minkowski space-time for the energy-momentum tensor will be fulfilled if T's fulfils the so called analytically conditions and are localized for the vacuum without particles by κ and κ' tended towards zero also the following conditions for the Minkowski space-time radius 4-vectors are fulfilled by definition:

$ê' x^i T_{ii}(êx, ê' x) = êx^i T_{ii}(êx, ê' x) = 0$,

or in the impulse Minkowski space-time it follows:

$\partial^\mu{}_{q\kappa} T_{\mu\nu}(q_\kappa, q_{\kappa'}) = \partial^\nu{}_{q\kappa'} T_{\mu\nu}(q_\kappa, q_{\kappa'}) = 0$.

Also it is clear that by averaging of the operators in this case the non local dilation current fulfill the equation:

$D_i(êx) = -V_i(êx)$.

Then $T_{0\nu}(q_\kappa, q_{\kappa'})$ are a 4-impulse and $T_{00}(q_\kappa, q_{\kappa'})$ is the Hamiltonian of the relativistic quantum fields system obtained by the invariant entities T's.

The connection between the non local energy-momentum tensor and the Einstein's equation of the space-time curvedness is to be considered as a physical prove for the research of the Lorenz manifolds as a supposition that the gravitations field can be modelled effective by the help of everyone Lorenz metric g defined in a suitable 4-dimensional manifold M. In this case every manifold supposed one Lorenz metric suppose infinitely number of Lorenz metrics then it is necessary to solve which one Lorenz metric can be taken so that anyone gravitation problem will be formulated. This question lead to the Einstein's equations connected the metrical tensor g, Ric curvedness of Ricci and the scalar curvedness with the energy-momentum tensor T in non local coordinates.

Also,

$Ric – ½\ Rg + Ëg = 8ðT$,

where Ë is the so knowing cosmological constant.

Then for $g = (g_{\mu\alpha} - \kappa x_\mu \kappa x_\alpha/(\kappa x)^2)(g_{\nu\beta} – \kappa' x_\nu \kappa' x_\beta/(\kappa' x)^2)g^{\alpha\beta}$, it follows for the non space like (causality conected) Ric curvedness:

ê'xRic(êx, ê'x) = êxRic(êx, ê'x) = 0.

Moreover it is possibly to consider a case where the surface S as the kind of the domain of definition for the development of the boundary scale function:

á(`x^, êx³, êx⁰) = f(|`x^|)u(y^l, $y^0_{2(n - ½j)}$) Î ^lD,

is time independent for:

t Î ($t_{-2(n - ½j)}$, $t_{2(n - ½j)}$],

n = 0,1,2, ..., j < n, y^lÎ (- ∞, 0],

$y^l = x^{13} + x^lx^2$ and $f(|`x_\wedge|)_{y1',ct2(n-j/2)}$,

is time independent by fixed x^3, t on the remaining boundary kind of the domain.

Furthermore by means of the following relation and fixed Minkowski space impulse 4-vector k^m = (ù/c, `k^, k^3), where ù is the Casimir energy characterised by the spectre of the energy by so called "zero fluctuations" and fixed:

$ck^3 = (ù^2 – c^2`k_\wedge^2 - c^2k^2)^S$ = ù + const for |`k^| → 0, and |`y^| → ∞, and lim[$(-k^2)$/2ù] = const Î [0, 1] for k^2 → ∞, ù → -∞, for t_0 → 0, obtained by the calculation of the Casimir energy. Precisely the impulse k^3 is equally of the Casimir energy except of a const.

Actually, the only in this way it is to be possible the extension of the symmetry of the theory to the super symmetry without renouncing to the analyticity of the entities to be proved theoretical of the so called analyticity of the quantum entities as a effect of the analytical representation of the causality properties by fulfilled kinematical relations between the same entities, e.g. for the dark mass m_d and dark energy E_d, so that $q^2 = m_d^2c^2$ analogously to the form factors too. So the extra boson super symmetry is an effect of the causality properties of the theory. In the relativistic S-matrix theory it was defined rigorously by the axiomatic way from N. N. Bogolubov, and then the local quantum field theory is analytic since it is causal everywhere except by restriction for the discrete values selected by the fulfilled kinematical relations between the theoretical entities as effect of his causal properties by the high energy scattering processes and describing the observed quantities by the experiments too. Also at the time:

t → $t_{-2(n - ½j)}$ + 0, n → ∞,`$x_\wedge^2$ → ∞, x^0 ≥ 0, for $êx^3$ = ¿$t_{-2(n - ½j)}$, and

$êx^0 = ct_{-2(n - ½j)}$,

|`x^| = $((ct_{-2(n - ½j)})^2 – (¿t_{-2(n - ½j)})^2 – ê^2x^2)^S = ct_{-2(n - ½j)}(1 – ¿^2/c^2)^S$ + const, and:

lim($-ê^2x^2/(2ct_{-2(n - ½j)}(1 – ¿^2/c^2)^S$) =

const Î [0, 1] for x^2 → ∞, n → ∞, i.e.

$t_{-2(n - ½j)}$ → -∞, it can be defined the quadrate for the 4-impulse q^i in the referent inertial system:

$q^2 = (m_dc)^2$ = ¼(($êq_k^m + ê'q_{k'}^m)^2 + (êq_k^m - ê'q_{k'}^m)^2$),

and the Casimir vacuum energy (calculated for the relativistic scalar quantum field system by Bordag et al.,1984; G. Petrov, 1989, where the Casimir energy ù ~ t_0^{-3}) is also:

ù/c = ½(($êq_k^m + ê'q_{k'}^m)^2 - (êq_k^m - ê'q_{k'}^m)^2)^{½} = ((m_0c)^2 - k^2)^{½}$.

Then it is possible to be defined the quadrate of the heat 4-vector k in the inertial referent system by `$y_\wedge^2$ → ∞ and `$k_\wedge^2$ → 0 and where the Casimir vacuum energy is zero and the zero point energy ZPE, i.e. $k^2 = -k^{32}$ for:

$q_k^m = (q^0$, `q^ $q^3 + k^3$), and:

$q_{k'}^m = (q^0$, `q^ $q_3 - k_3$), by:

0 = ù/c = $((m_0c)^2 + k^{32})^{½}$.

Moreover by Casimir energy:

ù → -∞, also ù/c = $((m_0c)^2 + k^{32})^{½}$, i.e. for:

$m_0 = ((ù/c)^2 - k^{32})^{½}/c = |ù|/c^2$ + const by lim($-k^{32}$/2ù) = const Î [0, 1],

for k^{32} → ∞ and ù → -∞ is the ZPM at the rest $m_0 = |ù|/c^2$ equal to the module from the infinity Casimir energy except for the const. Here k^3 is the impulse in the longitudinal direction of the scalar particles (Pterophyllum scalare) at the time t_0 and c is the light velocity in vacuum. By the fixed Casimir energy ù and obtained from the masses as effect of the super selections principle by the introduction of the "fermionic" symmetries, i.e. symmetries whose generators are anticommuting objects but neutral and called by us scalarino also furthermore it can be spoken from the super symmetric point of view about a "fermionization" and "bosonization"of relativistic scalar quantum field system.

The arbitrariness of the phase of vector valued one quantum field's functional state obtained by the quantization of the field function ö(x) is the usual method to obtain the reel existing interactions taken in account the invariance. The partly ordered events can be introduced by the help of the relations given by $x^i > y^m_{2(n-½j)}$ then and only then if $x^0 > y^0_{2(n-½j)}$ and the indefinite product:

$(x - y_{2(n-j/2)} . x - y_{2(n-j/2)}) > 0$,

i.e. the event 4-point x^i is "more latest" than the fixed event 4-point $y^i_{2(n-j/2)}$ and the relative 4-vector $(x - y_{2(n-j/2)})^i$ is time-like. The transformation in the time-space manifold ö(x): M → M for them the relations above means ö(x) > ö($y_{2(n-j/2)}$), by fixed point $y_{2(n-j/2)}$ and vice versa is called causal automorphism of the space-time with respect to the local coordinate system. The causal automorphismes forms a group for them it is fulfilled the so called Zeman's theorem for the group of the full causal automorphismes of the Minkowski space-time the so called half direct product $T^{3,1}$ ×) (Ë↑ × D) where Ë↑ is the orthochronic Lorenz transformations and D the dilatations group x^i → êx^i, for x^i Î M^4, ê belong to the multiplicity group of the reel numbers different from zero.

There is a dynamic equilibrium in which the mass at the rest of the virtual scalar particles at the fixed time stabilizes the so called Higgs boson which has a mass in classes of vacuum ground-state orbit in the Casimir world. It seems that the very stability of matter itself in this case appears to depend on an underlying sea of scalar field energy by the "zero vacuum fluctuations" of the Casimir quantum field state. The Casimir effect has been posited as a force produced solely by interaction of the quantum field ground state in the vacuum with additional causal and boundary conditions. The vacuum fluctuations are fundamentally based upon the interaction of the relativistic quantum fundamental field system with the classical objects, which has been predicted to be "signed into law" someday soon, since so far no violations have been found.

Further the Hilbert functional space is constructed by the anyone number of the fundamental field function vector valued states:

öÞ($y_{-2(n-½j)}$)|0_1, …, 0_j …. > = |$ö_j$> = |$y_{-2(n-½j)}$> for n = 0, 1, … and j < n,

defined in the space-time by the event 4-point $y_{-2(n-½j)}$ for the geometry described by the Minkowski space-time. Moreover anyone vector valued states obtained in the event 4-point $x^ì$ with ì = 0,1,2,3 by the relation:

áÞ(x)|0> = |x> = |á> = |$ö_j$>$á^j$,

which is to be considered by the definition as a field operator valued functional á acting on the anyone virtual vector valued state |á> Î H where H is the so called Hilbert functional space with indefinite metric. Also by definition:

∂_tö(á) = (äö(á)/äá(`x, t))$\partial_t$á(`x, t) = $(2ð)^{-4}$

$\int d^4y_{-2(n-Sj)}$д(x-$y_{-2(n-Sj)}$)∂_tá(x)|ö($y_{-2(n-Sj)}$)>=

$(2ð)^{-3}\int d^3$`$y_{-2(n-Sj)}$д(`x-`$y_{-2(n-Sj)}$)

∂_tá($t_{-2(n-Sj)}$,`x)|ö($y_{-2(n-Sj)}$)> = 0 for

∂_tá($t_{-2(n-½j)}$,`x) = 0 or á($t_{-2(n-½j)}$,`x) = const,

by the summation over the repetitions of the above and down indices. Further it is also possible to be defined by integration over the functional measure Dá:

|$ö_j$> = ∫|á, t>D$á^j$<á, t |$ö_j$> =

∫|á><$ö_j$, t|á >D$á^j$ = ∫|á>$Ø^*_á$($ö_j$, t)D$á^j$,

where $Ø^*_á$($ö_j$, t) is the conjugate Schrödinger wave functional. Moreover |á(t, `x)> = |$ö_j$>$á^j$ can be considered as a scale function fulfilled by time condition:

t - $t_{-2(n - ½j)}$ = 0 the equation |∂_tá(t,`x)>=

‖ö(x)‖²/(2(φ(xÞ)φ($y_{-2(n-½j)}$))+φ²(y_0)|$á^+$>)-|$á^+$> = 0,

where $á^+$ = $á^+$($t_{-2(n - ½j)}$+0,`x) is rime independent by t Î ($t_{-2(n - ½j)}$, $t_{2(n - ½j)}$], n = 0,1,2, ..., j < n and ∂_t =∂/∂t. So also by the fixed time $t_{-2(n-½j)}$ the time independent components of the anyone vector valued state:

|$á^+$> = ∫d^3`yд(`x-`$y_{-2(n-½j)}$)|$ö_j$>$á^{+j}$,

by $x^µ$ = ($t_{-2(n - ½j)}$, `x) are obtained:

|$á^+$> =$ö^{-2}$(y_0)(ö(ℓxÞ)ö($y_{-2(n-½j)}$))

((1+(‖ö(x)‖²φ²(y_0))(ö(ℓxÞ)ö($y_{-2(n-½j)}$))$^{-2}$)^{½}–1).

Also it can be defined:

|ö(x)> = |ö(ℓxÞ)>+|ö($y_{-2(n-Sj)}$)>|$á^+$> and |ö(x)>² = ‖ö(x)‖²,

|ö($y_{-2(n-½j)}$)>² = φ²(y_0), |ö(ℓxÞ)>² = 0.

Moreover for ∂_tá(t, **x**) ≠ 0 and by definition:

ð(x)|0> = ∂_tö(t, `x)|0> = |ð> ,

and further by: t - $t_{-2(n - ½j)}$ = 0, and:

|∂_tá> = Ó$\partial_t$$á^j$|$ð_j$> for ∂_tö($y_{-2(n-½j)}$)|0> = |$ð_j$> ~,

where over j must be summed by repetition of the above and down indices. The fundamental vector states |$ð_j$> create the Hilbert functional state with indefinite metric. So also n must be at least enough great e.g. n → ∞ and j < n.

Main Result

Let it be given the virtual (potential) vector valued functional one quantum field state in the Hilbert functional space obtained on the coordinate Minkowski space-time. Then the virtual one field state:

Φ$Ю_{áê}$|0> = ö($á_ê$)|0> = |$á_ê$> ,

is obtained by the acting of the scalar field operator Ö$Þ_{áê}$ on the virtual vacuum vector valued functional state of Hilbert state space with indefinite metric.

Also it is obtained by definition:

|$á_ê$> = ∫$d_4$kexp[$y_{-2(n - Sj)}$]$á_ê$(k)|0>.

Then |$á_ê$> is a anyone state vector of the functional Hilbert space with indefinite metric building by the help of anyone number of the fundamental state vectors:

ЦÞ($ö_j$)|0> = ö($y_{-2(n-½j)}$)|0> = ∫$d_4$kexp[k$y_{-2(n-½j)}$]ö(k)|0>,

where $d_4k = d^4k/(2ð)^4$.

So also in this case the function:

exp[k$y_{-2(n-½j))}$] can be generalized by functions:

$á^{+}_{ê}{}^{j}$ = <$ö^j$|$á_ê$> , or:

Ц$Ю_ê$($á_ê$)|0>=ö($á_ê$)|0> = ∑∫∫d_4k<$ö^j$|$á_ê$>ö(k)|0>.

The entities $á_ê{}^j$ are called the counter invariant components of anyone virtual (potential) vector valued state |$á_ê$>. Further it is obtained by equations:

∂_tö($á_ê$) = (äö($á_ê$)/ä$á_ê$(x))$\partial_t$$á_ê$(x) =

∫d^3`$y_{-2(n-½j)}$ä(`x-`$y_{-2(n-½j)}$)ö($y_{-2(n-½j)}$)|0>$\partial_t$$á_ê$(`x, $t_{-2(n-½j)}$) = 0,

after the integration over $y^0_{-2(n-½j)}$.

Than by the condition:

$\partial_t$$á_ê$(`x, $t_{-2(n-½j)}$) = 0 ist $á_ê$($t_{-2(n-½j)}$,`x) = const,

where the Dirac function is by definition:

ä(x - $y_{-2(n-½j)}$) = ä$á_ê{}^j$/ä$á_ê$(x).

Moreover it is, however, often useful to permit singularities of one kind or another to occur as an idealization of, or approximation to, certain physical situation. Perhaps the most useful such singularities are the point source or sink which is given by the harmonic functional throughout the convolution integrals:

ö($α_ê$) = ∫d^3`x$d^3$`y(|ö(|`y|, $y^0_{-2(n-½j)}$)>*((`x)²)$^{-½}$)(`y),

in three dimensions for |`y| = ((`y)²)^{½} and by:

ö($α_ê$) = ∫d^2`$x_⊥$ $d^2$`$y_⊥$ (|ö(|`y|,$y^0_{-2(n-½j)}$)>*ℓn((`$x_⊥$)²)$^{-½}$)(`$y_⊥$),

in the two dimensions for |`$y_⊥$| = ((`$y_⊥$)²)^{½}. Both of these functionals yield virtual quantum flows which are radially outward from the origin, and for the flux per unit time across a closed surface for the first convolutions integral or a closed curve for the second surrounding the origin has the value of an time independent constant integral and fulfilling a kinematical conditions following the causality if $ö(á_{ê'}) = 0$ defined outside the surface and readily verifies since:

$`\partial_x ö(\alpha_{\kappa'}) = `\partial_\perp ö(\alpha_{\kappa'}) = d_r ö(\alpha_{\kappa'})$ for $r = |`x|$ or $r = |`x_\perp|$, and is const.

Furthermore the mathematical quantum vacuum functional vector valued state is defined by the Casimir energy of the "vacuum fluctuations" of the so called "zero point energy" ZPE of the Hilbert space vector valued one quantum field state at the fixed time:

$t \hat{I} (t_{-2(n-½j)}, t_{2(n-½j)}]$, $n = 0,1,2, ..., j < n$, for $`q_\wedge \neq 0$.

Moreover by $\partial_i = \partial_{ôxi} = \partial/\partial(ôxÞ_i)\, d\alpha(ôxÞ_i) = dôxÞ^i \partial_i \alpha(ôxÞ_i) = dôxÞ^i A_i(ôxÞ_i)$ by $A'_i(ôxÞ_i) = A_i(ôxÞ_i) - \partial_i \alpha(ôxÞ_i) = 0$

$d^2\alpha(ôxÞ_i) = (\partial_i \alpha(ôxÞ_i)\partial_i \alpha(ôxÞ_i) - (\partial_i \alpha(ôxÞ_i)\partial_i \alpha(ôxÞ_i))\, dôxÞ^i dôxÞ^i = F_{ii} dôxÞ^i dôxÞ^i$.

Also for Coulomb gauge condition:

$A_0(ôxÞ_i) = \partial_0 \alpha(ôxÞ_i) = 0$, it follows for:

$\alpha_\tau = const\ \partial_0 \alpha(ôxÞ_i) = (ê\partial^i \varphi(x))^2 (2(\partial_i \varphi(y_{2(n-½j)})\partial^i \varphi(êx))) + (\partial^i \varphi(y_0))^2 \alpha_\tau)^{-1} - \alpha_\tau = 0$.

Also it is obtained for:

$\alpha_\tau^2 - 2\alpha_\tau(\partial_i \varphi(y_{2(n-½j)})\partial^i \varphi(êx)))/(\partial^i \varphi(y_0))^2 + (ê\partial^i \varphi(x))^2 = 0$, the following:

$\alpha_\tau = (\partial^i \varphi(y_0))^{-2}(\partial_i \varphi(y_{2(n-½j)})\partial^i \varphi(êx)))\, ((1 - ê^2(\partial^i \varphi(x))^2(\partial^i \varphi(y_0))^2)(\partial_i \varphi(y_{2(n-½j)})\partial^i \varphi(êx))^{-2})^{½} - 1)$.

It is also:

$|\partial^i \varphi(ôxÞ_i)> = |\partial^i \varphi(êx)> + |\partial^i \varphi(y_{2(n-Sj)})> \alpha_\tau$, and also for $|(\partial^i \varphi(ôxÞ_i)>^2 = 0$ it is:

$|(\partial^i \varphi(êx))>^2 = ê^2 |\partial^i \varphi(x)>^2$.

Also for $|\partial^i \varphi(ôxÞ_i)> = |\partial^i \varphi(x)> - |\partial^i \varphi(y_{-2(n-½j)})>$ is $\alpha_\tau + 1 = 0$, and vice versa.

Even it is obtained by:

$|\partial^i \varphi^\tau_j> = \partial^i \varphi(ôxÞ_i)|0>$,

$\alpha(ôxÞ_i)|0> = |\alpha_\tau> = Ó\alpha_\tau^{\ j} |\partial^i \varphi^\tau_j>$, for $j < n$,

where the vector valued functional state $|\alpha_\tau>$ is anyone state of the Hilbert functional space with indefinite metric. Moreover $\alpha_\tau^{\ j}$ are his counter invariants components and the non local functional state $|\partial^i \varphi^\tau_j>$ create this space.

Further the non local symmetries vacuum averaged Wicks product can be obtained by $\kappa \to 0$ and $êx^0 \to y^0_{2(n-j/2)})$, for the fixed Minkowski space-time 4-point coordinate:

$y^i_{2(n-½j)}(<\partial_i \varphi(êx)|\partial_i \varphi(y_{2(n-½j)})>) = ((g_{\mu\nu} - \kappa x_\mu \kappa x_\nu/(\kappa x)^2)(- i/4ð^2)(êx^i - y^i_{2(n-½j)})^{-2}$,

so that for the local case when $ê \to 0$ follows the singularity by:

$\kappa x^i \to \tau xÞ^i = êx^i - y^i_{2(n-½j)}$, at that:

$(êx^i - y^i_{2(n-½j)})^2 = 0$.

Further although by fulfilling the causality condition follows:

$\kappa x^i(\partial_i \varphi(êx)\partial_i \varphi(y_{2(n-½j)})) = 0$.

Moreover the virtual vector valued functional quantum one field state $|ö_j>$ with invariant field components $ö_j$ is obtained by the vacuum Ø-functional $Ø^*_{áê'}(\text{ц}_j, t)$ defined over the Banach algebra of the quantum field operators valued functional obtained by the following relation:

$\varphi(y_{-2(n-½j)})|0> = |y_{-2(n-½j))}> = |ö_j> =$
$\int|t, á_{ê'}>Dá_{ê'}<á_{ê'}, t\, |y^i_{-2(n-½j)}> =$
$\int|t, á_{ê'}><t, ö_j|á_{ê'}>Dá_{ê'} =$
$\int|t, á_{ê'}>Ø^*_{áê'}(ö_j, t)Dá_{ê'}$, where:
$0 \leq ê' \leq ô \leq ê \leq 1$,

$\alpha_{\kappa'} = \alpha_{\kappa'}(`x_\perp)_{y1-2(n-½j)',\ ct-2(n-½j)}$, for the functional integral measure:

$Dá_{ê'} = \prod d^2`x_\perp, `y_\perp$

So $Ø^*_{áê'}(ö, t) = <t, ö|á_{ê'}>$, and also i.e.:

$Ø_ö(á_{ê'}, t) = <á_{ê'}, t|ö>$, so that from:

$|á_{ê'}, t> = \int|ö>Dö<ö|á_{ê'}, t> =$
$\int<á_{ê'}, t|ö>Dö<ö| = \int Ø_ö(á_{ê'}, t)Dö<ö|$,

where ö are defined by the so called invariant components of anyone vector valued states $|\alpha_{\kappa'}> = \sum ö_j|\alpha^+_{\kappa'}>$.

Moreover the:

$ö_j = ö_j(`y_\perp, y^3_{-2(n-j|2)}, ct_{-2(n-j|2)})$,

are used as test functions by convolutions integrals for the fulfilled causal conditions by time independent scale functions for ` fixed $\kappa' x^3 = y^l$, $\kappa' x^0 = y^0_{-2(n-Sj)}$.

Furthermore for a time:

$t \hat{I} (t_{-2(n-½j)}, t_{2(n-½j)}]$,

there are in force the relations:

$ö(\kappa' x) = ö(\alpha_{\kappa'})$, $ð(\kappa' x) = ð(\partial_{ct}\alpha_{\kappa'})$,

and for $\kappa' \to 0$ $ö(\kappa' x) = ö(\tau_j^{\ \ell} xÞ)$ for the time independent scale functions states:

$|\alpha_{\kappa'}> = \alpha_{\kappa'}(`x_\perp)_{y3-2(n-½j)\ ct-2(n-½j)} = f^1_{\kappa'}(`x_\perp) = 0$,

and $ð(\kappa' x) = ð(\tau_j^{\ \ell} xÞ)$, for the time independent scale functions:

$|\partial_{ct}\alpha_{\kappa'}> = \partial_{ct}\alpha_{\kappa'}(`x_\perp)_{y3-2(n-½j)\ ct-2(n-½j)} = f^2_{\kappa'}(`x_\perp) = 0$, and:

$`f_{\kappa'}(`x_\perp) = (f^1_{\kappa'}(`x_\perp), f^2_{\kappa'}(`x_\perp)) = 0$,

by the additional causality properties and boundary condition for $t = t_{-2(n-½j)} + 0$

$\kappa' x^3 \hat{I} (-\infty, y^3_{-2(n-½j)}]\ U\ (y^3_{-2(n-½j)}, 0]$,

$`x_\perp = (x^1, x^2) \hat{I}\ \delta\Omega_t = S$,

and moreover for $`x_\perp \hat{I}\ \Omega_t \grave{I}\ \mathbf{R}^2$ follows $`\partial_\perp \mathbf{f}_\kappa(`x_\perp) = 0$ too, and $`\partial_\perp = (\partial_{x1}, \partial_{x2})$.

Moreover if on the boundary surface S for $\kappa' x^0 = ct$, and the fulfilled additional causality condition $(y^{02} - y^{32})^{½} > |`y_\perp|$ can be supposed:

$\alpha_{\kappa'}(`x_\perp, \kappa' x^3, ct) = const$ or $ð(\partial_{ct}\alpha_{\kappa'}) = \partial_{ct}ö(\alpha_{\kappa'}) = (äö(\alpha_{\kappa'})/ä\alpha_{\kappa'}(\kappa' x))\partial_{ct}\alpha_{\kappa'}(`x_\perp, \kappa' x^3, ct) = 0$,

so that for $t = t_{-2(n-½j)}$ it follows:

$\partial_{ct}\alpha_{\kappa'}(\grave{}x_\perp, \kappa' x^3, ct) = 0,$ (1)

and the same follows for:

$\partial_{ct}\alpha_{\kappa'}(\grave{}y_\perp, \kappa' x^3, ct) = const$, or:

ð($\partial_{ct}\alpha_{\kappa'}$) = const, so that for:

$\kappa' x^3 = x^3$, ∂_{ct}ð($\partial_{ct}\alpha_{\kappa'}$)=(äð($\partial_{ct}\alpha_{\kappa'}$)/ä$\alpha_{\kappa'}$(`$x_\perp$,$x^3$,ct))

$\partial^2_{ct}\alpha_{\kappa'}(\grave{}x_\perp, x^3, ct) = 0$, so that:

$$\partial^2_{ct}\alpha_{\kappa'}(\grave{}x_\perp, \kappa' x^3, ct) = 0. \quad (2)$$

Moreover by definition from:

∂_{ct}ö(κ'x) = ð(κ'x) and ∂_{ct}ð(κ'x) - Äö(κ'x) = 0, i.e. Äö(κ'x) = 0 by `$\partial_\perp^2 + \partial_{x3}^2$ = Ä,

is fulfilled too.

Yet $\partial_{ct}\alpha^+_{\kappa'}(\grave{}y_\perp, y^3_{-2(n-\frac{1}{2}j)}, ct_{-2(n-\frac{1}{2}j)}) =$
$(\partial_{ct}+v\partial_{x3})\alpha_{\kappa'}(\grave{}y_\perp, y^3_{2(n-\frac{1}{2}(j+1))}, ct_{-2(n-\frac{1}{2}(j+1)})$.

Furthermore from the following equation for the non free simple connected vacuum surface of the relativistic quantum fields system given above and from the fulfilled eq. (1) and eq. (2) follows the following equation by definition:

$\partial_{ct}\alpha_{\kappa'}(\grave{}y_\perp, \kappa' x^3, ct) =$
$\kappa'^2\|\varphi(x)\|^2/(2(\varphi(y_{-2(n-\frac{1}{2}j)})\varphi(\tau x Þ)) + \varphi^2(y_0)\alpha^+_{\kappa'}) - \alpha^+_{\kappa'} = 0$, and:

$$\partial^2_{ct}\alpha_{\kappa'}(\grave{}y_\perp, \kappa' x^3, ct) = \kappa'^2\|\pi(x)\|^2/(2(\pi(y_{-2(n-\frac{1}{2}j)})\pi(\tau x Þ))+\pi^2(y_0)\partial_{ct}\alpha^+_{\kappa'}) - \partial_{ct}\alpha^+_{\kappa'} = 0 \quad (3)$$

`$y_\perp$Î R^2 and (ôxÞ$_i$)^2 = 0, $(\kappa' x)^2 = ê'^2x^2$,

$(\kappa x)^2 = ê^2x^2$, $y_{-2(n-\frac{1}{2}j)}{}^2 = y_{2(n-\frac{1}{2}(j+1))}{}^2 = y_0{}^2$, and :

$\varphi^2(y_{-2(n-\frac{1}{2}j)}) = \varphi^2(y_0)$, $\pi^2(y_{-2(n-\frac{1}{2}j)}) = \pi^2(y_0)$.

Then also from eq. (1) can be obtained:

$$f^1_{\kappa'}(\grave{}y_\perp) = \alpha_{\kappa'}(\grave{}y_\perp)_{y3-2(n-\frac{1}{2}(j-ê)),\ ct-2(n-\frac{1}{2}(j-ê))} = \varphi^{-2}(y_0)(\varphi(y_{-2(n-\frac{1}{2}j)})\varphi(ôxÞ_i)) ((1+(\kappa'^2\|\varphi(x)\|^2\varphi^2(y_0))\ (\varphi(y_{-2(n-\frac{1}{2}j)})\varphi(ôxÞ_i))^{-2})^{\frac{1}{2}} - 1), \quad (4)$$

and from eq. (2):

$$f^2_{\kappa'}(\grave{}x_\perp) = \partial_{ct}\alpha_{\kappa'}(\grave{}y_\perp)_{y3-2(n-\frac{1}{2}(j-ê)),\ ct-2(n-\frac{1}{2}(j-ê))} = \pi(y_0)^{-2}(\pi(y_{-2(n-\frac{1}{2}j)})\pi(ôxÞ_i)) ((1 + (\kappa'^2\|\pi(x)\|^2\pi^2(y_0))\ (\pi(y_{-2(n-\frac{1}{2}j)})\pi(ôxÞ_i))^{-2})^{\frac{1}{2}} - 1). \quad (5)$$

$\partial_{ct}\alpha(ôxÞ_i) = \|\varphi(x)\|^2/(2(\varphi(y_{-2(n-\frac{1}{2}j)})\varphi(x)) - \varphi^2(y_0)\alpha_\tau)^{-1} - \alpha_\tau$,

$á_\tau$ = ö$^{-2}$(y_0)(ö(x)ö($y_{2(n-\frac{1}{2}j)}$))((1 - ||ö(x)||$^2\varphi^2(y_0)$) (ö(x)ö($y_{2(n-\frac{1}{2}j)}$))$^{-2}$)$^{\frac{1}{2}}$ – 1), and for :

$\partial^2_{ct}\alpha(ôxÞ_i) = \|\pi(x)\|^2/(2(\pi(y_{-2(n-\frac{1}{2}j)})\pi(x)) + \pi^2(y_0)\partial_{ct}\alpha_\tau) - \partial_{ct}\alpha_\tau = 0.$

$\partial_{ct}\alpha_\tau$ = ð$^{-2}$(y_0)($\pi(y_{-2(n-\frac{1}{2}j)})\pi(x)$))
((1 – (||ð(x)||^{2}ð^2(y_0))(ð(x)ð($y_{-2(n-\frac{1}{2}j)}$))$^{-2}$)$^{\frac{1}{2}}$ – 1).

Moreover the function $\mathbf{f}_{\kappa'}(\grave{}y_\perp)$ is taken from potential theory by `$x_\perp \to$ `$y_\perp$ and from:

$\partial_{ct}\alpha_\tau(\grave{}y_\perp, \kappa' x^3, ct) = \kappa'^2\|\varphi(x)\|^2/(2(\varphi(y_{-2(n-\frac{1}{2}j)})\varphi(ôxÞ_i))+ \varphi^2(y_0)\alpha_{\kappa'}{}^j)^{-1} - \alpha_{\kappa'}{}^j = 0$, and:

$\partial^2_{ct}\alpha_{\kappa'}(\grave{}y_\perp, \kappa' x^3, ct) =$
$\kappa'^2\|\pi(x)\|^2/(2(\pi(y_{-2(n-\frac{1}{2}j)})\pi(ôxÞ_i))+\pi^2(y_0)\partial_{ct}\alpha_{\kappa'})^{-1}-\partial_{ct}\alpha_{\kappa'}= 0,$

as a solution of the equation following:

$$\grave{}\partial_\perp{}^2\mathbf{f}_{\kappa'}(\grave{}y_\perp) + ë_{\kappa'}\mathbf{f}_{\kappa'}(\grave{}y_\perp) = \grave{}\partial_\perp ö(ê'x)_{y3-2(n-\frac{1}{2}(j-ê'))\ ct-2(n-\frac{1}{2}(j-ê'))}\grave{}y_\perp Î\ \Omega_t, \quad (6)$$

$$\grave{}\partial_\perp\mathbf{f}_{\kappa'}(\grave{}y_\perp) = 0, \grave{}y_\perp Î\ \Omega_t, \quad (7)$$

$$\mathbf{f}_{\kappa'}(\grave{}y_\perp) = 0,\ \grave{}y_\perp Î\ \delta\Omega_t = S, \quad (8)$$

for additional causal condition for:

$$|\grave{}x_\perp| \to |\grave{}y_\perp| \text{ and } |\grave{}y_\perp| < (y^{02} - y^{32})^{\frac{1}{2}}, \quad (9)$$

where $\varphi(ê'x)_{y3-2(n-\frac{1}{2}),\ ct-2(n-\frac{1}{2}j)}$ is anyone non local scalar field function with the norm:

$ê'\|\varphi(x)\| = |\varphi(ê'x)_{y3-2(n-\frac{1}{2}j),\ ct-2(n-\frac{1}{2}j))}|$,

fulfilled the given additional causal and boundary condition for fixed $\kappa' x^0 = ct = y^0_{-2(n-\frac{1}{2}j)}$, $\kappa' x^3 = x^3 = y^3_{-2(n-\frac{1}{2}j)}$, so that the norm ||`$\partial_\perp\mathbf{f}_{\kappa'}$|| is given by the double product:

||`$\partial_\perp\mathbf{f}_{\kappa'}$||$^2$ = (`$\partial_\perp\mathbf{f}_{\kappa'}$(`$y_\perp$),`$\partial_\perp\mathbf{f}_{\kappa'}$(`$y_\perp$)) , (10)

and for the minimum of the norm ||$\mathbf{f}_{\kappa'}$|| is the minimal value of $ë_{\kappa'} = ë_1$ by the fulfilling of the additional causality and boundary conditions (7) and (8) and by ||$\mathbf{f}_{\kappa'}$|| = 1 where ||$\mathbf{f}_{\kappa'}$|| is the norm defined by the help of the equation:

$$(\mathbf{f}_{\kappa'}, \mathbf{g}_{\kappa'}) = \int(\mathbf{f}^t_{\kappa'}, \mathbf{g}_{\kappa'})d\grave{}y_\perp, \quad (11)$$

$\Omega_{t,\,x3}$ included the double product:

(`$\partial_\perp\mathbf{f}_{\kappa'}$,`$\partial_\perp\mathbf{g}_{\kappa'}$) = ∫(`$\partial_\perp\mathbf{f}^t_{\kappa'}$:`$\partial_\perp\mathbf{g}_{\kappa'}$)d`$y_\perp$, $\Omega_{t,\,x3}$

obtained by the definition 2:

(`$\partial_\perp\mathbf{f}_{\kappa'}$:`$\partial_\perp\mathbf{g}_{\kappa'}$) = ∑ ($\partial_j f^t_{ê'k}$)($\partial_j g_{ê'k}$).

k, j = 1 and $\mathbf{f}^t_{\kappa'}$ is orthogonal transposed of $\mathbf{f}_{\kappa'}$.

Then it can be defined by:

|φ(τx/)| = ||φ(τx/)||= 0, and:

$\varphi^2 = \varphi^2(y_{-2(n-\frac{1}{2}j)}) = \varphi^2(y_0) \neq 0$, $ê'^2\|\varphi(x)\|^2 = \varphi^2(ê'x)$,

or by the Hilbert impulse scalar field for ||π(τx/)|| = 0,

$$\pi^2(y_{-2(n-\frac{1}{2}j)}) = \pi^2(y_0) \neq 0,\ \pi^2(ê'x) = ê'^2\|\pi(x)\|^2,\ \varphi(\alpha_{\kappa'}{}^j) = \varphi(\kappa' x) = \varphi(\tau x/) + \varphi_j(y_{-2(n-\frac{1}{2}(j)})f^1{}_{\kappa'},\ \text{or:} \quad (12)$$

$$\pi(\partial_{ct}\alpha_{\kappa'}{}^j) = \pi(\kappa' x) = \pi(\tau x/) + \pi_j(y_{-2(n-\frac{1}{2}(j)})f^2{}_{\kappa'}, \quad (13)$$

with following:

|φ(κ'x)| = κ'||φ(ê'x)||, or:

|π(κ'x)| = κ'||π(ê'x)||,

where ||φ|| and ||π|| are norms of the real closed Schwarz space also following from $S_R(\mathbf{M}) = S^+(\mathbf{M})\cdot+\cdot S^-(\mathbf{M})$, obtained by the reduction from eq. (3) following from the fixing of the coordinates by eq. (2) for odd or even functions depending by the fixed coordinate variable x^0, x^3 and defined scalar product ($f^1_{\kappa'}$, $f^1_{\kappa'}$)$_Å$ = ($\alpha_{\kappa'}$, $\alpha_{\kappa'}$)$_\varphi$ for $f^1_{\kappa'}$, $f^1_{\kappa'}$Î $Å^+$ or $f^2_{\kappa'}$, $f^2_{\kappa'}$ Î $Å^-$ and extended by an isometric image $Å^+(\mathbf{M}) \to L_\varphi(\mathbf{R}^2) = S_R(\mathbf{R}^2)^{\|\varphi\|}$ and $Å^-(\mathbf{M}) \to L_\pi(\mathbf{R}^2) = S_R(\mathbf{R}^2)^{\|\pi\|}$ for L_φ, L_π from the Sobolev's spaces with fractional numbers of the indices.

Further if by fixed variables:

$f^2_{\kappa'}(\grave{}y_\perp) = \partial_{ct}\alpha_{\kappa'}(\grave{}y_\perp)_{y3-2(n-\frac{1}{2}j),\ ct-2(n-\frac{1}{2}j)} = \partial_{ct}\alpha_{\kappa'}{}^j(\grave{}y_\perp) = 0,$

would hold for the additional causality and boundary conditions for`$y_\perp$Î $\delta\Omega_t$ = S at the right, and by defined:

$$d_t(\,.\,) = \partial_t(\,.\,) + ¿\partial_x^3(\,.\,) \text{ and } ¿ = ë\partial_t y^3 \quad 0 < ë < 1, \quad (14)$$

on free surface S placed in Minkowski space-time for ct = κ'x^0 = $ct_{2(n - ½(j+1))}$,

κ'x^3 = $y^3_{2(n - ½(j+1))}$ and:

$\partial_t y^3 = \partial_t y^3_{2(n - ½(j+1))}$,

follow the impulse equations for fulfilled additional causality and boundary condition `$y_\perp$Î $\delta\Omega_t$ = S on the fixed surface S by:

$$¿\partial_{x3}\alpha_{\kappa'}(\text{`}y_\perp)_{y3\text{-}2(n - ½j)},\ {}_{ct\text{-}2(n - ½j)} = 0. \quad (15)$$

Also by the definition it is in force the equation:

$d_{ct}\alpha_{\kappa'}(\text{`}y_\perp)_{y3\text{-}2(n-½j)}, c_{t\text{-}2(n-½j)} = d_{ct}\alpha_{\kappa'}(\text{`}y_\perp)y^3_{2(n - ½(j+1))}, ct_{2(n - ½(j+1))}$,

and obtained by the definition for the time:

$$t = t\text{-}2(n - ½j) \quad (16)$$

$f^{2+}_{\kappa'}(\text{`}y_\perp) = \partial_{ct}\alpha^+_{\kappa'}(\text{`}y_\perp)_{y3\text{-}2(n - ½j)},\ {}_{ct\text{-}2(n - ½j)} =$
$f^2_{\kappa'}(\text{`}y_\perp)+¿\partial_{x3}\alpha_{\kappa'}(\text{`}y_\perp)y^3_{2(n-½(j+1)}, ct_{2(n - ½(j+1))}$

It is assumed the local relativistic quantum scalar wave field system under consideration to have additional causality and boundary conditions on the generic surface S for his ground state. In this case the so called Casimir vacuum, fixed or moved with a constant velocity v parallel towards the fixed one boundary, which do surgery, bifurcate and separate the singularity by virtual particles of the relativistic quantum system in the Minkowski manifold of the event points from some others vacuum state as by Casimir effect of the quantum vacuum states for the relativistic quantum fields f. That has the property that any virtual quantum particle which is once on the generic surface S remains on it and fulfilled every one additional causality and boundary conditions on this local relativistic scalar quantum system with a vacuum state, described by the one field operator valued functional A(f) for the local test function f Î $Å^+$ or f Î $Å^-$. Then the solution of the Klein-Gordon wave equation is obtained by covariant statement:

$$\square f(x^\mu) = (\partial^2_{ct} - (\Delta + m^2))f(x^\mu) =$$
$$(\partial^2_{ct} - (\text{`}\partial_\perp^2 + \partial^2_z + m^2))f(x^\mu) = 0, \quad (17)$$

where □ is a d'Lembertian and:

$\Delta = \partial^2_x + \partial^2_y + \partial^2_z = \text{`}\partial_\perp^2 + \partial^2_z$,

is a Laplacian differential operator by additional causal properties and boundary conditions. So also:

$f(\text{`}y_\perp, ê'x^3, ct)_{y3\text{-}2(n - ½j)},\ {}_{ct\text{-}2(n - ½j)} = f^1_{\kappa'}(\text{`}y_\perp) = \alpha_{\kappa'}(\text{`}y_\perp)_{y3\text{-}2(n - ½j)}$ $_{ct\text{-}2(n - ½j)}$, and:

$\partial_{ct}f(\text{`}y_\perp, ê'x^3, ct)_{y3\text{-}2(n - ½j)\ ct\text{-}2(n - ½j)} = f^2_{\kappa'}(\text{`}y_\perp) = \partial_{ct}\alpha_{\kappa'}(\text{`}y_\perp)_{y3\text{-}2\text{-}(n - ½j)\ ct\text{-}2(n - ½j)}$,

by the causality condition:

$|\text{`}y_\perp| < (y^{02} - y^{32})^{½}$, where:

t Î $(t_{-2(n - ½j)}, t_{2(n - ½j)}]$, n = 0, 1, 2, …; j = 0,1,2,…,2n.

Also the ground states of the local relativistic quantum fields system defined in the Minkowski space-time fulfilled every one additional causal and boundary conditions interact at the large distance with the boundary surface S by the help of the non local fundamental virtual quantum particles and so the vacuum state has a globally features. It is that the Casimir force calculated from the Casimir energy of the vacuum "zero fluctuations" and the Minkowski space-time described the geometry induced on the every tangential space on the anyone Lorenz manifold creates the globally Lorenz geometry.

Examples of such boundary surfaces S with additional causality properties by a kind of the boundary of importance for the living cells are those in which the surface of a fixed mirror at the initial time t = 0 by the referent inertial system at the rest (a map). Moreover this is in contact with the local quantum relativistic scalar fields system with additional causality properties in his simple connected vacuum region– the bottom of the sea of the virtual (potential) non local scalar quantum field particles for example – and the generic free surface of the parallel moved mirror with a constant velocity v towards the fixed one or the free vacuum surface of the local quantum scalar particles of the wave field in contact with the moved mirror parallel towards the fixed one – the free and localizable vacuum region. This is described in the non local case by the conjugate impulse Schrödinger wave functional obtained by the vector valued states $|\varphi_j>$ created Hilbert functional space with indefinite metric at a given time t. It is:

$\Psi^*_{\alpha\kappa'}(\varphi_j, t) = < \varphi_j|\alpha_{\kappa'}, t>$, and:

$\Psi_{\varphi áê'}(\alpha_{\kappa'}, t) = <\alpha_{\kappa'}|\varphi_{áê'}, t >$, where:

$|\alpha_{\kappa'}> = |\varphi_j>\alpha_{\kappa'}^{\ j}$ and $|\varphi_{áê'}> = \varphi_j|\alpha_{\kappa'}^{\ j}>$,

summed up by repetition of the above and down indices and:

t Î $[t_{-2(n - ½j)}, t_{2(n - ½j)}]$, n = 0, 1, 2, …, j = 0, 1, 2,…, 2n,

with additional causality condition $|\text{`}y_\perp| < (y^{02} - y^{32})^{½}$ and averaged Klein-Gordon operator equation:

$<0|K_m A(\varphi.f)|0> = ä(x - y_{2(n - ½j)}) = <\varphi|\ A(J))\ |0>$.

Moreover it have a singularities at $qÞ_ô^{\ 2} = 0$ which can be interpreted as a presence of the massless scalars Goldstones bosons in the ground state of the relativistic scalar quantum field system in the Hilbert space Ĥ with indefinite metric. Also from this point of view when we have a zero temperature too the "Einstein condensation" in a ground state has on the light cone a ä-function behaviour in the impulse Minkowski space as by the ideal gas in the vacuum and by the Casimir world go over state more realistic with a interacting quantum vacuum state. But this resemblance is only formal and by going over the physical representation the scalar massless Goldstones bosons disappears. This is one of the indications of the Higgs-mechanisms, e.g. effect of the mass preservation from the vector fields by spontaneous broken gauge group (or the scalar Goldstones bosons are "swallowing up") and so it is to show, that the Casimir force is to be obtained by quantum electromagnetic field system with a massless real photon and asymmetrical Casimir vacuum state where the scaling behaviour by the fermions as a fundamental quantum particles or by the Higgs massive boson as a fundamental scalar "matter" particle in the Standard Model with the generic boundary conditions S is broken. That is the cause to be observed at least a one massive scalar particle following the theorem of Goldstone and the Higgs mechanism.

For simplicity here we have considered a domain of space-time containing any one massless scalar field j(x) defined at the point of the Minkowski space-time at the fixed time t. Further a concrete massless field $j(y^0,`y)$ is considered as a Hilbert valued vector state obeying the impulse wave equation in a Hilbert space, defined over the space W_t Ì M^4 at the time $x^0 = ct = y_0^0$ and $x^3 = y^3$ in the Minkowski space-time M^4. By imposing suitable boundary conditions for any one quantum field system considered as any one relativistic quantum field j(x) fulfilled the Klein-Gordon equation, the total fields energy in any domain at the point (ct,`x) from the Minkowski space-time can be written as a sum of the energy of the "vacuum fluctuations" for:

t Î $(t_{-2(n - ½j)}, t_{2(n - ½j)}]$, n = 0, 1, 2, ..., j = 0, 1, 2,..., 2n,

so that the additional causality condition $|`y_\wedge| < R = (y^{02} - y^{32})^{½}$ is fulfilled and the ground state of this concrete quantum field system must be conformed by those suitable additional causality and boundary conditions and so we can modelled the interaction of the concrete relativistic quantum field system to the external classical field by means of this suitable boundary value problem.

Our interest is concerned to the vacuum and especially the physical Casimir vacuum conformed by the suitable boundary value problem.

Nevertheless, the idea that the vacuum is like a ground state of any one concrete relativistic quantum field system - is enormously fruitful for the biological systems from the point of view of the nanophysics, i.e. it is to consider the time's arrow in the systems with a feedback. Moreover the Maxwell's demon has an indefinite fully eigen time too, following on "allowed" world path in the Casimir world.

The obviously necessity to take in consideration the quantum field concepts by observation macroscopically objects present from infinity significant number of virtual particles and to be found by low temperatures is following from the elementary idea. Consider e.g. the obtained Casimir vacuum by so called "Gedanken" experiment of reflections and hyperbolical turns at fixed times present from n stationary state level of the Casimir energy of "vacuum fluctuations". In so one vacuum state every virtual scalar is surrounded closely from the neighbouring particles so that on his kind get a volume at every vacuum stationary energy level of the order:

$V/n \sim ((`y_\wedge^2 + (y^3_{2n})^2)^{½})^3 = (y^3_{2n} + const)^3$ , lim $`y_\wedge^2/2y^3_{2n}$ = const Î [0, 1],

for $`y_\wedge^2 \to \infty$, $y^3_{2n} \to \infty$, for $n \to \infty$ and the additional causality condition :

$|`y_\wedge| < (y^{02} - y^{32})^{½}$ for $y_0^2 \to 0$ and $y_0^i = (y^0, `y_\wedge, y^3)$.

Also every virtual scalar particle at the state with the smallest energy possesses sufficient Casimir energy ù dependent from the distance between the mirrors and equally of the difference between dark energy and the dark matter. Than it follows:

$q_{áê}^{\ 0} = (E_d + ù)/c = (q_{áê}^{\ 2} + k^{32})^{½}$,

$q_{áê'}^{\ 0} = (E_d - ù)/c = (q_{áê'}^{\ 2} + k^{32})^{½}$,

so that first ù = $c(q_{áê}^{\ 2} + k^{32})^{½} - E_d = ck^3 - E_d$ + const, where lim$q_{áê}^{\ 2}/2k^3$ = const Î [0, 1] for $q_{áê}^{\ 2} \to \infty$, $k^3 \to \infty$ and second ù = $E_d - c(q_{áê'}^{\ 2} + k^{32})^{½} = E_d - ck^3$ - const where lim$q_{áê'}^{\ 2}/2k^3$ = const Î [0, 1] for

$q_{áê'}^{\ 2} \to -\infty$, $k^3 \to -\infty$ obtained by the "vacuum fluctuations".

So that Casimir energy can be plus or minus dependent from the deferens of dark energy E_d and the impulse ck^3. The "Casimir vacuum fluctuations energy" are proportional to the minus third power of the distance $y^{-3}_0 = (vt_0)^{-3}$ between the mirrors at a given time:

$t = t_0$ and ù ~ $(2m)^{-1}((`q_\wedge^2 + k^{32})^{½})^3 \sim (2m)^{-1}(y^3_0 + const))^{-3} \sim (2m)^{-1}(n/V)^{-3}$, $n \to \infty$.

Moreover the distance between the ground state and the first excited level of the single see massless scalar particle will be of the same order that is for the Casimir energy ù too. It follows that if the temperature of the vacuum state of the relativistic sea quantum field system is less then the some one critical temperature T_c of the order of the temperatures of the "Einstein condensation" then in the Casimir vacuum state there are not the excited one particle states. Furthermore the temperature is not from significances for Casimir force which is the cause for expression of massless scalar Goldstones bosons.

Conclusion

The supposition that by the absence of the attraction between the scalar particles the ground state will be total a stationary state in which all scalars "are condensate" in so one state with impulse $`k_\wedge \to 0$, $`q_\wedge \to 0$ and taking in to account the small attraction by the action at the large distance of the Casimir force in the manifold of the material points moved on the non space like geodesic curve between the two mirrors the so called virtual virility scalars in vacuum state also it lead to so one stationary state of the relativistic quantum scalar field system in which then in the referent mass system on the mirror at the rest (a map) by the single scalars appear the mixture of the see excited states with fixed impulse $k^3 \geq q^3 \neq 0$.

Yet of this way it can be understand the existence of the supper symmetry by the fundamental "matter" fields. The super symmetric partner of the scalar particle the so called scalarino of the massless Fermi scalar non local fields with a half spin are obtained by the non local wave function ø(êx) fulfilled the n cells obtained by the 4-points $y_{2(n-½j)}$ where j = 0, 1,…, 2n are the number of the scalarino of the Minkowski space. It is also possibly to be obtained the non local interactions at the large distance by the virtual massless scalar fields Hilbert vector valued states obtained by the so called non local field operators defined in the Hilbert functional space with indefinite metric and appearing by the expansion on the light cone even for local crossing by ê, ê' → 0 or ê = ê' for scalarino field solution ψ:

:ψ(êx)ø(ê'x): = :∫$dq_κ dq_{κ'}$exp[i$q_κ$êx + i$q_{κ'}$ê'x]:ψ($q_κ$)ø($q_{κ'}$):.

Then also it is understandable for the interacting fields by the summation of the so called minimal local interaction in the global sense by symmetryzing:

xÞ$^i\partial_i$á(ôxÞ$_i$) = ½(^{ℓ}xÞ$^i\partial_i$á(ô^{ℓ}xÞ$_i$) + ^{r}xÞ$^i\partial_i$á(ô^{r}x)) ,

so that it is to be defined that for one field state á(ôxÞ$_i$) for j < n obtained by the Casimir vacuum follows:

|á$_ô$> = |á$_{ôl}$,..., á$_{ôj}$,...>. Moreover, ê:

:`ψ(êx)exp[∫dα(ôxÞ)]ø(ê'x): = ê'

ê

:`ψ(êx)exp[∫du(ôxÞ)]ø(ê'x): =

ê'

ê :`ψ(êx)exp[∫dôx$^i\partial_i$á(ôxÞ)]ø(ê'x): =

ê'

ê

:`ψ(êx)exp[-ie∫dôx^{i}A$_i$(ôxÞ)]ø(ê'x):

ê' ,

for the gauge vector potential i.e.:

A'$_i$(ôxÞ$_i$) = (A$_i$(ôxÞ) - ∂_iá(ôxÞ)),

where $\partial_i = \partial/\partial_{φxi}$ and by the condition:

A'$_i$(ôxÞ) = 0 e.g. F'$_{ii}$ = 0,

by the super symmetries considerations of the scalarino fields ø(ê'x) is to be taken under account the following condition for the fundamental scalar particles of the quantum massive scalar field á(x), for ê, ê' → 0 or by ê = ê'. That is also for the Casimir vacuum:

lim<0|:`ψ(êx)ø(ê'x):|0>Д$_{xx'}$ = <0|á$_τ$|0> = á$_τ$ = const.

For clearness it is defined the follows entity for the local case by definition of the Schrödinger vacuum wave functional:

ê'

<α$_{κ'}$|:`ψ(ê'x)exp[∫dôxÞ$^i\partial_i$á(ôxÞ)]ø(0):|0,t>0= <α$_{κ'}$, t|0> = Ψα$_{κ'}$*(0, t), 0 < t < t$_{-1}$.

By definition the mathematical vacuum state of the system at the fixed time t is:

|0, t> = ∫|á$_ê$>Ø*$_{áê'}$(0, t)Dá$_{ê'}$,

as averaged vacuum non local operator too.

In 1946 the shift for scalar field α(x) = const + u(x) i.e. dα(x) = du(x) has been given at the first by N.N. Bogolubov in the theory of microscopically supper fluidity.

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