A Quantum Ground Operator in Field Theory

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DEEP BACKGROUNDS

THEOREM (F. BULNES)

$$\mathrm{mod}(B) \qquad \xrightarrow{\mathcal{R}^{-1}} \qquad C$$

$$\nearrow \quad \downarrow \qquad\qquad\qquad \nearrow \quad \downarrow$$

$$0_c(\phi) \in H(\mathrm{mod}\, f(C_{-*}(\Omega Z)) \rightarrow H(\mathcal{M})\mathcal{M}$$

$$\downarrow \quad \nearrow \Omega Z \qquad \rightarrow \qquad \downarrow \mathrm{embb} \nearrow$$

$$C_{-*}(\Omega_\chi) \qquad \xrightarrow{Diff} \qquad \mathcal{W}(H) \ni \phi$$

$$\Im_{O_c}(\gamma) = \int_M O_c(\gamma(x))d\gamma(x),$$

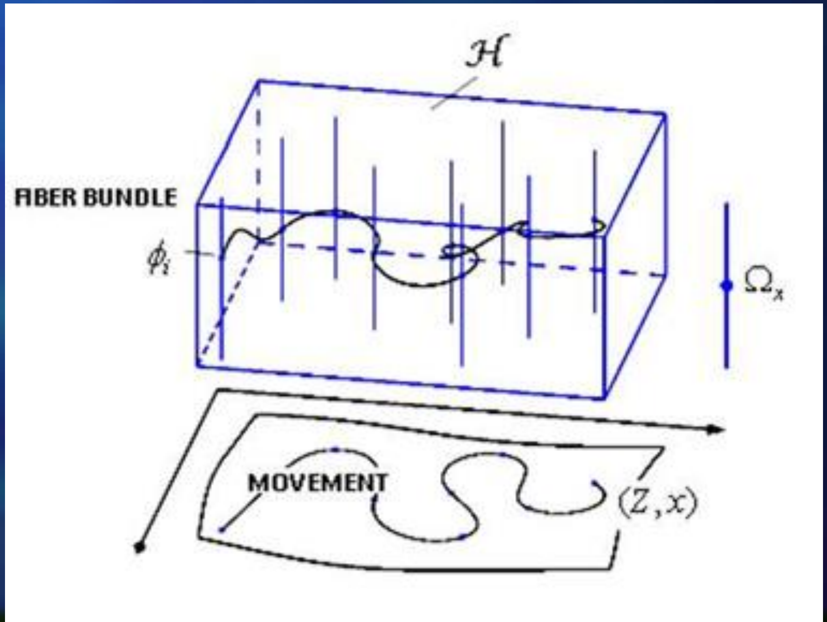
The operator O_c, involves a *connection* $\sigma_t(X_p), \forall p \in M, X_p(M)^{19}$ of the tangent bundle of the space of trajectories $\Omega(\Gamma) \subset \mathbb{R}^3 \times I_t$, such that the map

$$X \rightarrow \gamma_X(1),$$

is a diffeomorphism from $U_0 \subset T_p(M)$ to $U_p, \forall p \in M$, being U_0, U_p, open neighborhoods

Consequenses and Applications

$$\Im_{O_c}(\phi) = \int_{X(M)} O_c(\phi(x))d\phi(x),$$



Theorem 2. *(F. Bulnes) The energy wrapping (spectrum) is characterized by the fields related by diffeomorphism* $\boldsymbol{C}_{*}(\Omega(x)) \to \mathcal{W}(H)$*, whose space of paths going from* $\gamma(x)$ *to* $\phi(x)$*, foreseen in* [2]*. Then the ramification of field in this case is the connection to the operador* $O_c : TM \to T^*M$

CONSTRUCTION AND CHARACTERIZATION OF THE QUANTUM GROUND OPERATOR AS SUPPORT OPERATOR OF ALL THE VARIATIONS OF THE ACTION ALONG THE FIBER DERIVATIVE DEFINED BY LAGRANGIAN

$$
\begin{array}{ccccc}
TM & \xrightarrow{O_c} & TM^* & \xrightarrow{O_c(\upsilon)} & \Omega^2(M) \\
\Im\downarrow & \nwarrow & \downarrow \pi & \searrow\cong & \downarrow O_c(\upsilon)w, \\
\mathbb{R} & \xrightarrow{\Gamma} & TM & \xrightarrow{L} & \Omega^1(M)
\end{array}
$$

$(\phi_i, \partial_\mu\phi_i)$, to ω_L, modeling the space-time $\mathbb{M}$, through $\mathcal{H}$ −spaces,

$O_c : TM \rightarrow TM^*$, $\upsilon \mapsto O_c(\upsilon)$, $w \in TM$, $O_c(\upsilon)w = \frac{d}{dt}L(\upsilon + tw)\Big|_{t=0}$,

$\omega_L = (O_c)^*\omega$,

$$\omega_L = \frac{\partial^2 L}{\partial\phi^i\partial\partial_\mu\phi^j}d\phi^i \wedge d\phi^j + \frac{\partial^2 L}{\partial\phi^i\partial\partial_\mu\phi^j}d\phi^i \wedge d\partial_\mu\phi^j,$$

Then the variation of the action from the operator $O_c = d\Im(\phi) = L(\phi, \partial_\mu\phi)d\phi$, is translated in the differential

$$d\Im_L(\phi)h = \int_{I}\left(\frac{\partial L}{\partial\phi} - \frac{d}{dt}\frac{\partial L}{\partial\dot{\phi}}\right)(x(t), \dot{x}(t), t)dt, \quad (12)$$

IN THE HAMILTONIAN CONTEXT AND BASIC PROPERTIES OF THE QUANTUM GROUND OPERATOR

We consider the phase space as the space of points

$$\mathcal{H} = \{\phi(x) \in [m] \mid [m] \subset T\mathbb{M}^*\}^4,$$

Then $\forall\, p_1, p_2, , \ldots, p_n \in \mathbb{M}$, are n −particles with finite arragement of their states $\phi_1, \phi_2, \ldots, \phi_n \in \mathcal{H}$, given by the structure $C_*(\mathbb{M}) = C_{n,m}$ (configuration space[5] in $\mathbb{M}$), which consider configurations from Γ, until to the particles of the material reality in $\mathbb{M}$.

Likewise, let $\pi: T^*\mathbb{M} \to \mathbb{M}$, be (like given by the commutative diagram (9)) and let be

$$\gamma: \mathbb{R} \to TC_{n,m},$$

a curve followed by a particle p, such that $\pi \circ \gamma: \mathbb{R} \to \mathbb{M}$. Then (16) describes the curve in the configuration space, which also describes the sequence of configuration through which the particle system passes to different strata of co-dimension one. Every strata corresponds to a phase space of m, particles that are moved by the curve γ, and directed from their m, states $d\phi(x)$, by π, to n, particles p. The image of the ground operator on the space-time $\mathbb{M}$, includes all the possible configuration spaces. Then the quantum ground operator has the following functional properties. Let $x, x' \in \Omega(\Gamma) \subseteq \mathbb{M}$, two particles in the space-time moving through trajectories in $TC_{n,m}$, with energy states $\phi, \phi' \in \mathcal{H}$. We consider the correlation operator $\mathfrak{D}(x - x')$, [6]when these particles are correlationed:

$$\mathfrak{D}(x - x') = \lim_{T \to \infty} \frac{1}{T} \int_0^{T-\tau} x(t+\tau)x'(t)dt,$$

Also we consider the Dirac function $\delta(t) = \begin{cases} \infty, t = 0 \\ 0, t \neq 0 \end{cases}$,

FUNDAMENTAL PROPERTIES OF THE QUANTUM GROUND OPERATOR O_c

i). $\mathfrak{D}(x - x')\phi(x) = \delta(x - x')\phi(x), \forall\, x, x' \in \mathbb{M}:;$ [7]

ii). $O_c(x)\phi\big(x'(t)\big) = \mathfrak{D}(x - x'), \forall\, x, x' \in \mathbb{M}$, and $t \leq s$,

iii). $\int_{\mathcal{H}} O_c\big(\phi(t)\big)d\phi = \Im_{O_c};\ \frac{d\Im_{O_c}(\phi(t))}{d\phi} = O_c\big(s(t)\big)$, in the unlimited space,

iv). $O_c = \delta(t - t')$, if and only if $\frac{\delta x(t)}{\delta x(t')} = \delta(t - t'), \forall\, t \leq s$, then $F\big(x(t)\big) = x(t)$,

v). $\mathfrak{D}^{-1}(x - x')O_C(x(t)) = -\Delta_F(x - x')\delta(x - x'), \forall\, x.x' \in \mathbb{M}$, and $t \leq s$,

vi). $\int_{\mathcal{H}} O_c\big(\phi(t)\big)d\phi = \int_{\Omega} \mathfrak{D}(x - x')x(t)d\big(x(t)\big)$.

All properties are demonstrated in [2], the reader can to find all details in this reference.

[F. BULNES, JOURNAL OF APPLIED MATHEMATICS AND PHYSICS, USA, 2011]

Also we have as consequence of i), ii), and vi) that:

$$\int_{\mathcal{H}} \boldsymbol{O}_c(x, x', t)\phi(x)d\big(x(t)\big) = \int_{\mathbb{M}} \phi(x)\delta(x - x')dx(t) = \phi(x'),$$

There are more non-elemental properties or non-basic related with the evolution operator in quantum mechanics and relations with Laplacians and other operators. Also some functions, as the weight function. The citation let see these properties. Considering (9) and some functional analysis facts, we can consider the following lemma [3-5].

Lemma 2. 1. Let $\mathbb{M} = M \times I_t$, the unlimited space of the space-time. A particle $x(t)$, that is focalized by an field given for the weight function $w(t, s)$, comes given for

$$x(s) = \int_{\mathbb{M}} \phi(x')x(t)dx(t) = \int_{-\infty}^{\infty} \delta(t - s)x(t)dt, \quad (20)$$

Then to time $t = s$, begin the perturbation.

INTENTIONALITY

determined direction given by its tangent bundle $T\mathfrak{X}(\Omega(\Gamma))$, is to say, the field provides of direction to every point ϕ_i, where the field X, comes given as

$$X = \sum_i \phi^i \frac{\partial}{\partial \phi^i}\Big|_{(x^i,\phi^i)},$$

$$\nabla^{\mathfrak{I}}: T\Omega(\Gamma) \rightarrow T(\Omega(\Gamma)), (\cong T^*\mathbb{M}),$$

$$\mathfrak{I}_{O_c}(\phi) = \int_{X(M)} O_c(\phi(x))d\phi(x),$$

$$\mathcal{I}(\phi^i(x)) = \int_{T(\Omega(\Gamma))} \omega(\phi(x)) -$$

$$\lim_{N\to\infty\,\delta t\to 0} \frac{1}{B}\int_{-\infty}^{\infty} \frac{d\phi^1}{B} \cdots \int_{-\infty}^{\infty} \frac{d\phi^n}{B} \cdots = \prod_{i=1}^{\infty} \int_{-\infty}^{\infty} e^{i\mathfrak{I}[\phi^i,\partial_\mu\phi^i]}\, d\phi^i(x(t)),$$

$$\mathfrak{I}_{\mathfrak{Q}_x}(x(t)) = \int_{\mathbb{M}} L\left(\theta\left(\pi^{-1}(\sigma(\rho^{-1}))\right)\right)\omega,$$

$$\mathcal{I}\left(\mathfrak{I}_{\mathfrak{Q}_x}(x(t))\right) = \oint_{\Gamma} O_c(\theta(\pi^{-1}(\sigma(\rho^{-1}))))\,\mu_s,$$

Theorem 3. 1 (F. Bulnes). The double fibration, establishing the material-quantum-virtual connection on $\mathbb{M} = \mathcal{M} \times \mathfrak{Q}_x$, is

intention operator (28).

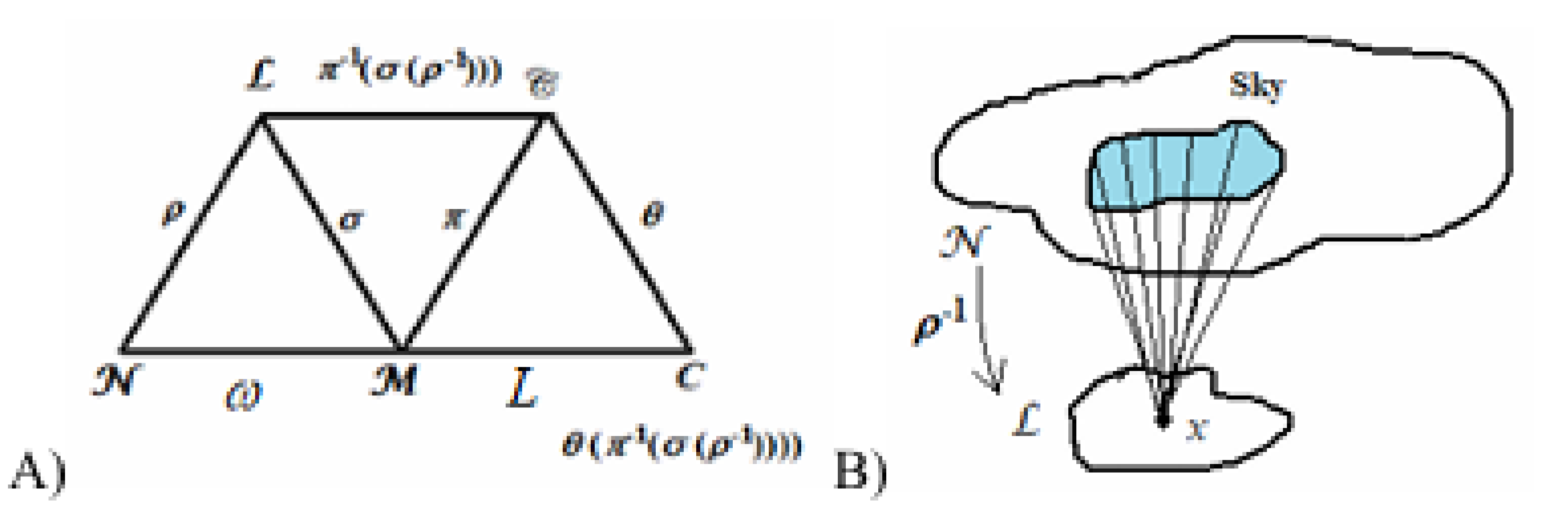


Figure 1: We consider to $\mathcal{I}$, as the intention to transform a space $\mathcal{M}$.

(through double fibration of $\mathcal{L}$) connect both realities determined in $\mathcal{N}$, and $\mathcal{M}$, along these submanifolds

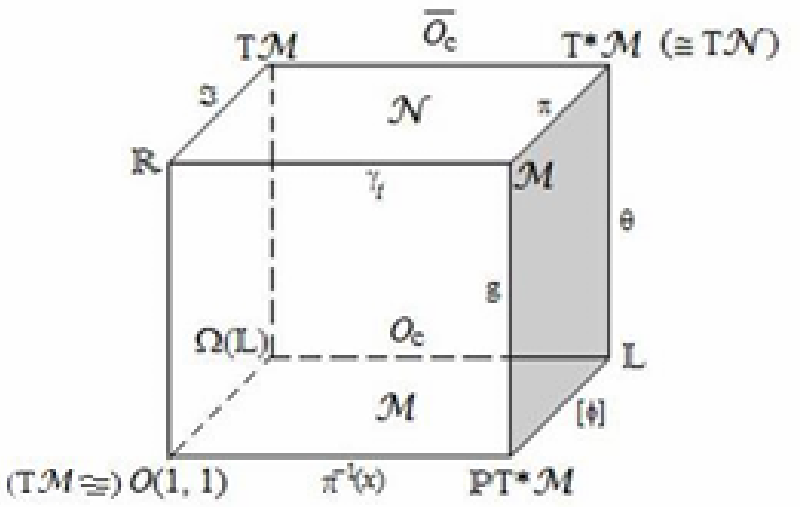
$$\begin{array}{ccc} \mathbb{L} & \xrightarrow{[\phi]} & \mathbb{P}T\mathcal{M}^* \\ \Psi \uparrow & & \uparrow \mathrm{g}, \\ T\mathcal{M}^* & \xrightarrow{\xi} & \mathcal{M} \end{array}$$

$$\mathbb{L} \to \mathbb{P}T\mathcal{M}^*|_{\pi^{-1}(\phi)} = \mathcal{O}(1,1),$$

where $\mathcal{O}(1,1)$, is a homogeneous bundle of lines due to that the sky $\mathfrak{Q}_x = \mathbb{P}^1 \times \mathbb{P}^1$; since the normal bundle $N \to \mathfrak{Q}_x$, in each sky $\mathfrak{Q}_x$, is isomorphic to the jet $J^1\mathcal{O}(1,1)$. In particular is satisfied the following exact sequence

$$0 \to \Omega^1 \otimes \mathcal{O}(1,1) \to N \to \mathcal{O}(1,1) \to 0,$$

which allows to have a composition of the reality in $\mathcal{M}$, though fields that come from $\mathcal{N}$. Then the quantum-virtual composition of both realities is given by the moduli space:



(43)

Def. 3. 1. A hyper-reality is a quantum image of the reality.

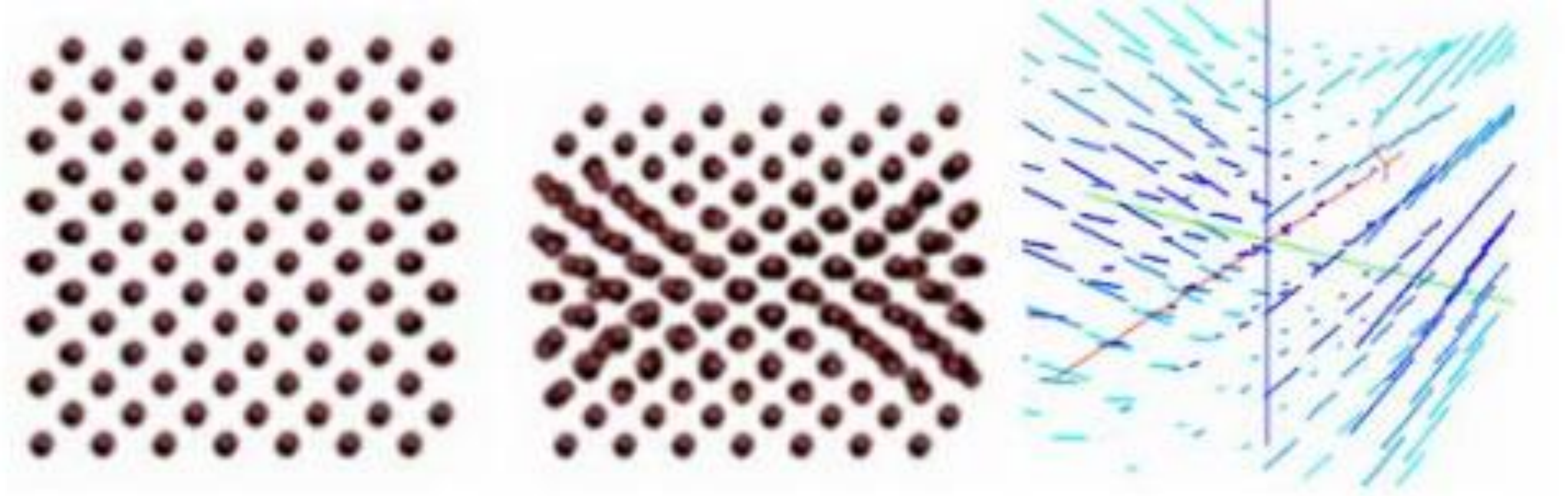


Figure 2: Examples on organization of nano matter particles or quantum particles (all stock of photons) realized in the nanotechnology.

Correction + restoring and some of QFT on the mind

Theorem 5.1. (F. Bulnes) [3, 6]. Consider an anomalous energy state $\boldsymbol{O}_c(\ast)$, for the presence of a perturbation with load $\boldsymbol{w}(\boldsymbol{s}, \boldsymbol{t})$. Then, the *correction + restoring*, of the singularity $\ast(\boldsymbol{s})$, comes given for

$$x(t) = correction + restoring = \int_{X(C)} O_c(\ast(s))w(s,t)dt$$

$$= \dim\Lambda(\alpha) \int_C \left\{ \frac{1}{A} \prod_{j=1}^{\infty} \left[\int_{-\infty}^{\infty} \phi(n_j)F(n_j) \right] dx(t) \right\},$$

A pair of quantum transforms

We consider newly the space of the field perception:

$$X(C) = \{\phi(x(t)) \in T\Omega(\Gamma) | \phi(x(t)) = O_c(x(t),\ \dot{x}(t),\ t)dx(t)\},$$

Arguments for algebras and homotopies and their relations we can demonstrate the nature of sum "correction + restoring" that has their realization by the path integral established in Ref. [3]. Then, we can enunciate the pair of quantum integral transforms as [1, 6]:

Def. 6.1. The pair of quantum integral transforms on the space $X(C)$, are

$$Q\{x(t)\} = \int_{X(C)} O_c(x(s))w^+(t, s)ds = \int_{X(C)} O_c(x(t))d\phi,$$

$$Q^{-1}\{*(t)\} = \dim\Lambda(\alpha) \int_{X(C)} O_c(*(s))w^-(t, s)dt = \int_{X(C)} O_c(*(s))dx,$$

$$D_X = \{(t_1,\ \dots,\ t_q) \in \mathbf{R}_1 \times \dots \times \mathbf{R}_q | t_1 \geq s_1,\ \dots,\ t_q \geq s_q\},$$

Thank you!