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Measurement Disturbs Explanation of Quantum Mechanical States-A Hidden Variable Theory

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Abstract- A system of 'measurements' dissipating explanation of' quantum mechanical states' and parallel system of' quantum mechanical states 'that contribute to the dissipation of the velocity of' measurements' done of the' quantum mechanical states' is investigated. It is shown that the time independence of the contributions portrays another system by itself and constitutes the equilibrium solution of the original time independent system. With the methodology reinforced with the explanations, we write the governing equations with the nomenclature for the systems in the foregoing. Further papers extensively draw inferences upon such concatenation process, ipso facto, fait accompli desideratum. **It is our thesis that accentuation and dissipation coefficients themselves are hidden variables that manifest the reality from perception**.

Index Terms- Bells Inequality, Copenhagen Interpretation, Quantum Superposition, EPR Paradox, Uncertainty Principal

I. Introduction

Quantum entanglement occurs when particles such as photons, electrons, molecules as large as "bucky balls", and even small diamonds interact physically and then become separated; the type of interaction is such that each resulting member of a pair is properly described by the same quantum mechanical description (state), which is indefinite in terms of important factors such as position, momentum, spin, polarization, etc

According to the Copenhagen interpretation of quantum mechanics, their shared state is indefinite until measured. Quantum entanglement is a form of quantum superposition. When a measurement is made and it causes one member of such a pair to take on a definite value (e.g., clockwise spin), the other member of this entangled pair will at any subsequent time be found to have taken the appropriately correlated value (e.g., counterclockwise spin). Thus, there is a correlation between the results of measurements performed on entangled pairs, and this correlation is observed even though the entangled pair may have been separated by arbitrarily large distances.

This behavior is consistent with quantum mechanical theory and has been demonstrated experimentally, and it is accepted by the physics community. However, there is some debate about a possible underlying mechanism that enables this correlation to occur even when the separation distance is large. The difference in opinion derives from espousal of various interpretations of quantum mechanics.

The counterintuitive predictions of quantum mechanics about strongly correlated systems were first discussed by Albert Einstein in 1935, in a joint paper with Boris Podolsky and Nathan Rosen. In this study, they formulated the EPR paradox; a thought experiment that attempted to show that quantum mechanical theory was incomplete. They wrote:

We are thus forced to conclude that the quantum-mechanical description of physical reality given by wave functions is not complete.

So, despite the interest, the flaw in EPR's argument was not discovered until 1964, when John Stewart Bell demonstrated precisely how one of their key assumptions, the principle of locality, conflicted with quantum theory. Specifically, he demonstrated an upper limit, known as Bell's inequality, regarding the strength of correlations that can be produced in any theory obeying local realism, and he showed that quantum theory predicts violations of this limit for certain entangled systems. His inequality is experimentally testable, and there have been numerous relevant experiments, starting with the pioneering work of Freedman and Clauser in 1972 and Aspect's experiments in 1982 They have all shown agreement with quantum mechanics rather than the principle of local realism. However, the issue is not finally settled, for each of these experimental tests has left open at least one loophole by which it is possible to question the validity of the results.

The work of Bell raised the possibility of using these super strong correlations as a resource for communication. It led to the discovery of quantum key distribution protocols, most famously BB84 by Bennet and Brassard and E91 by Artur Ekert. Although BB84 does not use entanglement, Ekert's protocol uses the violation of a Bell's inequality as a proof of security. N other words, violation of bells inequality produces or implies insecurity.

II. Concept

Quantum systems can become entangled through various types of interactions (see section on methods below). If entangled, one object cannot be fully described without considering the other(s). They remain in a quantum superposition and share a single quantum state until a measurement is made An example of entanglement occurs when subatomic particles decay into other particles. These decay events obey the various conservation laws, and as a result, pairs of particles can be generated so that they are in some specific quantum states. For instance, a pair of these particles may be generated having a two-state spin: one must be spin up and the other must be spin down. This type of entangled pair, where the particles always have opposite spin, is known as the spin anti-correlated case, and if the probabilities for measuring each spin are equal, the pair is said to be in the singlet state.

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If each of two hypothetical experimenters, Alice and Bob, has one of the particles that form an entangled pair, and Alice measures the spin of her particle, the measurement will be entirely unpredictable, with a 50% probability of the spin being up or down. But if Bob subsequently measures the spin of his particle, the measurement will be entirely predictable―always opposite to Alice's, hence perfectly anti-correlated.

So far in this example experiment, the correlation seen with aligned measurements (i.e., up and down only) can be simulated classically. To make an analogous experiment, a coin might be sliced along the circumference into two half-coins, in such a way that each half-coin is either "heads, and each half-coin put in a separate envelope and distributed respectively to Alice and to Bob, randomly. If Alice then "measures" her half-coin, by opening her envelope, for her the measurement will be unpredictable, with a 50% probability of her half-coin being "heads" or "tails", and Bob's "measurement" of his half-coin will always be opposite, hence perfectly anti-correlated.

However, with quantum entanglement, if Alice and Bob measure the spin of their particles in directions other than just up or down, with the directions chosen to form a Bell's inequality, they can now observe a correlation that is fundamentally stronger than anything that is achievable in classical physics. Here, the classical simulation of the experiment breaks down because there are no "directions" other than heads or tails to be measured in the coins. One might imagine that using a die instead of a coin could solve the problem, but the fundamental issue about measuring spin in different directions is that these measurements cannot have definite values at the same time―they are incompatible. In classical physics this does not make sense, since any number of properties can be measured simultaneously with arbitrary accuracy. Bell's theorem implies, and it has been proven mathematically, that compatible measurements cannot show Bell-like correlations, and thus entanglement is a fundamentally non-classical phenomenon.

Experimental results have demonstrated that effects due to entanglement travel at least thousands of times faster than the speed of light. In another experiment, the measurements of the entangled particles were made in moving, relativistic reference frames in which each respective measurement occurred before the other, and the measurement results remained correlated.

III. ENTANGLEMENT, NON-LOCALITY AND HIDDEN VARIABLES

There is much confusion about the meaning of entanglement, non-locality and hidden variables and how they relate to each other. As described above, entanglement is an experimentally verified and accepted property of nature. Non-locality and hidden variables are two proposed mechanisms that enable the effects of entanglement.

If the objects are indeterminate until one of them is measured, then the question becomes, "How can one account for something that was at one point indefinite with regard to its spin (or whatever is in this case the subject of investigation) suddenly becoming definite in that regard even though no physical interaction with the second object occurred, and, if the two objects are sufficiently far separated, could not even have had the time needed for such an interaction to proceed from the first to the second object?" The answer to the latter question involves the issue of locality, i.e., whether for a change to occur in something the agent of change has to be in physical contact (at least via some intermediary such as a field force) with the thing that changes. Study of entanglement brings into sharp focus the dilemma between locality and the completeness or lack of completeness of quantum mechanics.

In the media and popular science, quantum non-locality is often portrayed as being equivalent to entanglement. While it is true that a bipartite quantum state must be entangled in order for it to produce non-local correlations, there exist entangled states that do not produce such correlations. A well-known example of this is the Werner state that is entangled for certain values of p_{sym}, but can always be described using local hidden variables. In short, entanglement of a two-party state is necessary but not sufficient for that state to be non-local. It is important to recognize that entanglement is more commonly viewed as an algebraic concept, noted for being a precedent to non-locality as well as to quantum teleportation and to super dense coding, whereas non-locality is defined according to experimental statistics and is much more involved with the foundations and interpretations of quantum mechanics.

IV. METHODS OF CREATING ENTANGLEMENT

Entanglement is usually created by direct interactions between subatomic particles. These interactions can take numerous forms. One of the most commonly used methods is spontaneous parametric down-conversion to generate a pair of photons entangled in polarisation. Other methods include the use of a fiber coupler to confine and mix photons, the use of quantum dots to trap electrons until decay occurs, the use of the Hong-Ou-Mandel effect, etc. In the earliest tests of Bell's theorem, the entangled particles were generated using atomic cascades.

It is also possible to create entanglement between quantum systems that never directly interacted, through the use of entanglement swapping.

It is to be remembered that all major theories GTR, STR, QM, QFT, uncertainty principal deal with a set of variables and a system that is dealt with. Conservation of mass and energy holds holistically notwithstanding preservation of individual interactions

In his celebrated paper Adolf Haimovici (1), studied the growth of a two species ecological system divided on age groups. In this paper, we establish that his processual regularities and procedural formalities can be applied for consummation of a system of measurement and explanation of quantum mechanical system.

Axiomatic predications of systemic dynamics in question are essentially "laws of accentuation and dissipation'. It includes once over change, continuing change, process of change, functional relationships, predictability, cyclical growth, cyclical fluctuations, speculation theory, cobweb analyses, stagnation thesis, perspective analysis etc. Upshot of the above statement is data produce consequences and consequences produce data.

V. EXPLANATION OF QUANTUM MECHANICAL REALITY

ASSUMPTIONS:

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Explanations of "quantum mechanical systems" are divided in to three categories:

1) Category one constituting explanations tended in respect of quantum mechanical systems under practically suitable classificatory category

2) Category 2 which belong to higher age than that of category 1

3) Category three representative and constitutive of that category which has quantum mechanical systems of higher category. There however is no sacrosanct time scale.

In this connection, it is to be noted that there is no sacrosanct time scale as far as the above pattern of classification is concerned. Any operationally feasible scale with an eye on measurements made for the corresponding category of quantum mechanical systems would be in the fitness of things. For category 3. "Over and above" nomenclature could be used to encompass a wider range of consumption due to cellular respiration. Similarly, a "less than" scale for category 1 can be used.

a) The speed of growth of system of explanations tendered done under the category1 is dependent upon the quantum mechanical reality as espoused under category2. In essence the accentuation coefficient in the model is representative of the constant of proportionality between category 1 and category 2 this assumptions is made to foreclose the necessity of addition of one more variable, that would render the systemic equations unsolvable
b) The dissipation in all the three categories is attributable to the following two phenomenon :

1) Aging phenomenon: The aging process leads to transference of the balance of number of explanations or studies expatiated under category 1 to the next category, no sooner than the age of such expatiations enucleations of the chosen quantum mechanical system crosses the boundary of demarcation
2) Depletion phenomenon: Destruction of that particular quantum mechanical system under the study dissipates the growth speed by an equivalent extent. To put it in unmistakable terms, the system under study is "dead" for whatever be the reasons attributed and ascribed for it.

NOTATION :

G_{24} : Quantum of explanations of quantum mechanical reality corresponding to the consummation of category 1 of measurements done of the quantum mechanical systems

G_{25} : Quantum of explanations of quantum mechanical systems under the category of 2

G_{26} : Quantum of explanations under category3 corresponding to measurements in the category 3.

$(a_{24})^{(4)}, (a_{25})^{(4)}, (a_{26})^{(4)}$: Accentuation coefficients

$(a'_{24})^{(4)}, (a'_{25})^{(4)}, (a'_{26})^{(4)}$: Dissipation coefficients

FORMULATION OF THE SYSTEM :

In the light of the assumptions stated in the foregoing, we infer the following:-

(a) The growth speed in category 1 is the sum of a accentuation term $(a_{24})^{(4)} G_{25}$ and a dissipation term $-(a'_{24})^{(4)} G_{24}$, the amount of dissipation taken to be proportional to the total quantum of "files "of quantum mechanical explanations of systems

(b) The growth speed in category 2 is the sum of two parts $(a_{25})^{(4)} G_{24}$ and $-(a'_{25})^{(4)} G_{25}$ the inflow from the category 2 dependent on the total amount standing in that category.

(c) The growth speed in category 3 is equivalent to $(a_{26})^{(4)} G_{25}$ and $-(a'_{26})^{(4)} G_{26}$ dissipation ascribed only to depletion phenomenon of the quantum mechanical systemal realities for the destruction of the systems under study

Model makes allowance for the new quantum mechanical explanations of various substances or chemical compounds be it heavy or lighter and deceleration in the quantum mechanical systemal explanations attributable and ascribable to 'drying up' or loss of the concomitant quantum mechanical system

GOVERNING EQUATIONS:

The differential equations governing the above system can be written in the following form

$\frac{dG_{24}}{dt} = (a_{24})^{(4)} G_{25} - (a'_{24})^{(4)} G_{24}$ 1

$\frac{dG_{25}}{dt} = (a_{25})^{(4)} G_{24} - (a'_{25})^{(4)} G_{25}$ 2

$\frac{dG_{26}}{dt} = (a_{26})^{(4)} G_{25} - (a'_{26})^{(4)} G_{26}$ 3

$(a_i)^{(4)} > 0$, $i = 24,25,26$ 4

$(a'_i)^{(4)} > 0$, $i = 24,25,26$ 5

$(a_{25})^{(4)} < (a'_{24})^{(4)}$ 6

$(a_{26})^{(4)} < (a'_{25})^{(4)}$ 7

We can rewrite equation 1, 2 and 3 in the following form

$\frac{dG_{24}}{(a_{24})^{(4)} G_{25} - (a'_{24})^{(4)} G_{24}} = dt$ 8

$\frac{dG_{25}}{(a_{25})^{(4)} G_{24} - (a'_{25})^{(4)} G_{25}} = dt$ 9

Or we write a single equation as

$\frac{dG_{24}}{(a_{24})^{(4)} G_{25} - (a'_{24})^{(4)} G_{24}} = \frac{dG_{25}}{(a_{25})^{(4)} G_{24} - (a'_{25})^{(4)} G_{25}} = \frac{dG_{26}}{(a_{26})^{(4)} G_{25} - (a'_{26})^{(4)} G_{26}} = dt$ 10

The equality of the ratios in equation (10) remains unchanged in the event of multiplication of numerator and denominator by a constant factor.

For constant multiples α ,β ,γ all positive we can write equation (10) as

$\frac{\alpha dG_{24}}{\alpha\left((a_{24})^{(4)} G_{25} - (a'_{24})^{(4)} G_{24}\right)} = \frac{\beta dG_{25}}{\beta\left((a_{25})^{(4)} G_{24} - (a'_{25})^{(4)} G_{25}\right)} = \frac{\gamma dG_{26}}{\gamma\left((a_{26})^{(4)} G_{25} - (a'_{26})^{(4)} G_{26}\right)} = dt$ 11

The general solution of the consumption of oxygen due to cellular respiration system can be written in the form

$\alpha_i G_i + \beta_i G_i + \gamma_i G_i = C_i e_i^{\lambda_i t}$ Where $i = 24,25,26$ and C_{24}, C_{25}, C_{26} are arbitrary constant coefficients.

STABILITY ANALYSIS :

Supposing $G_i(0) = G_i^0(0) > 0$, and denoting by λ_i the characteristic roots of the system, it easily results that

1. If $(a'_{24})^{(4)} (a'_{25})^{(4)} - (a_{24})^{(4)} (a_{25})^{(4)} > 0$ all the components of the solution, ie all the three parts of the expatiations or expositions of the quantum mechanical reality of quantum mechanical systems tend to zero, and the solution is stable with respect to the initial data.

2. If $(a'_{24})^{(4)} (a'_{25})^{(4)} - (a_{24})^{(4)} (a_{25})^{(4)} < 0$ and $\left(\lambda_{25} + (a'_{24})^{(4)}\right) G_{24}^0 - (a_{24})^{(4)} G_{25}^0 \neq 0, (\lambda_{25} < 0)$, the first two components of the solution tend to infinity as $t \rightarrow \infty$, and $G_{26} \rightarrow 0$, ie. The category 1 and category 2 parts grows to infinity, whereas the third part category 3 tends to zero.

3. If $(a'_{24})^{(4)}(a'_{25})^{(4)} - (a_{24})^{(4)}(a_{25})^{(4)} < 0$ and $\left(\lambda_{25} + (a'_{24})^{(4)}\right)G^0_{24} - (a_{24})^{(4)}G^0_{25} = 0$ Then all the three parts tend to zero, but the solution is not stable i.e. at a small variation of the initial values of G_i, the corresponding solution tends to infinity.

On the other hand, away from "equilibrium", the "fluxes" could be more emphasized. Result is increase in "entropy". When this occurs, the system no longer tends towards equilibrium. On the contrary, it may encounter instabilities that culminate into newer orders that move away from equilibrium. Thus, dissipative structures revitalize and resurrect complex forms away from equilibrium state.

From the above stability analysis we infer the following:

1. The adjustment process is stable in the sense that the system of measurements converges to equilibrium.
2.The approach to equilibrium is a steady one , and there exists progressively diminishing oscillations around the equilibrium point
3.Conditions 1 and 2 are independent of the size and direction of initial disturbance
4.The actual shape of the time path of measurement-explanation of quantum mechanical systems is determined by efficiency parameter , the strength of the response of the portfolio in question, and the initial disturbance
5.Result 3 warns us that we need to make an exhaustive study of the behavior of any case in which generalization derived from the model do not hold
6.Growth studies as the one in the extant context are related to the systemic growth paths with full employment of resources that are available in question, in the present case quantum mechanical reality-measurement system

MEASUREMENTS

Assumptions:

are classified into three categories analogous to the stratification that was resorted to in description or explanation of quantum ems as Einstein put it, Measurements are also transferred from one category to another corresponding to the quantum mechanical tudy (such transference is attributed to the aging process of 'measurements' from that category apparently would have become issification in the corresponding category, because we are in fact classified quantum mechanical systems and concomitant reof quantum systemal realities'

(1) Category 1 is representative of measurements of quantum mechanical systems corresponding to quantum mechanical realities expatiated of the systems under category 1

(2) Category 2 constitutes those 'measurements' whose age is higher than that specified under the head category 1 and is in correspondence with the similar classification of 'quantum mechanical systems of various compounds , chemicals, or elements'

(3) Category 3 of 'measurements' encompasses those with respect to category 3 of 'quantum mechanical systems' and concomitant vis-à-vis 'quantum mechanical realities'

a) The speed of growth of 'measurements' or 'measurement files' in category 1 is a linear function of the amount of measurement' files under category 2 at the time of reckoning. As before the accentuation coefficient that characterizes the speed of growth in category 1 is the proportionality factor between balance in category 3 and category 2.

b) The dissipation coefficient in the growth model is attributable to two factors;

1. With the progress of time ' measurements' or 'measurement files' sector gets aged due to aging process of the quantum mechanical system under consideration and become eligible for transfer to the next category. Notwithstanding Category 3 does not have such a provision for further transference

2. Whenever there is destruction and obliteration of those quantum mechanical systems and corresponding quantum mechanical realities, there shall be deceleration of the dissipation coefficient of the 'measurements files' of the quantum mechanical systems. It is to be noted that here we are talking of the 'measurement file' section and not of the 'quantum mechanical reality case study itself.

c) Inflow into category 2 is only from category 1 in the form of transfer of balance from the category 1.This is evident from the age wise classification scheme. As a result, the speed of growth of category 2 is dependent upon the amount of inflow, which is a function of the quantum of balance of under the category 1.

d) The balance of 'measurement' portfolio in category 3 is because of transfer of balance from category 2. It is dependent on the amount of 'measurements' or 'number of measurements' of the quantum mechanical cases under consideration sector under category 2.

NOTATION :

T_{24} : Balance standing in the category 1 of 'measurement numbers'

T_{25} : Balance standing in the category 2 of 'measurement of quantum mechanical systems'

T_{26} : Balance standing in the category 3 of 'measurements' of corresponding quantum mechanical systems and Corresponding 'quantum mechanical reality' of various elements, generalizations, notwithstanding.

$(b_{24})^{(4)}, (b_{25})^{(4)}, (b_{26})^{(4)}$: Accentuation coefficients
$(b'_{24})^{(4)}, (b'_{25})^{(4)}, (b'_{26})^{(4)}$: Dissipation coefficients

FORMULATION OF THE SYSTEM :

Under the above assumptions, we derive the following :

a) The growth speed in category 1 is the sum of two parts:
   1. A term $+(b_{24})^{(4)}T_{25}$ proportional to the amount of balance in the category 2
   2. A term $-(b'_{24})^{(4)}T_{24}$ representing the quantum of 'measurement files' dissipated from category 1 .This comprises of 'measurements' which have grown old, qualified to be classified under category 2 due to the corresponding growth in the 'quantum mechanical systems ' classified earlier

b) The growth speed in category 2 is the sum of two parts:

1. A term $+(b_{25})^{(4)}T_{24}$ constitutive of the amount of inflow from the category2

2. A term $-(b'_{25})^{(4)}T_{25}$ the dissipation factor arising due to aging of 'quantum mechanical systems under considerations' and on account of destruction of such quantum mechanical systems of various elements, compounds ,stars, galaxies etc.,

c) The growth speed under category 3 is attributable to inflow from category 2 and depletion due to obliteration or obfuscation of 'quantum mechanical systems'. ,be it due to entanglement ,or collusion with photons etc.,

GOVERNING EQUATIONS:

Following are the differential equations that govern the growth in the 'measurements file' portfolio

$$\frac{dT_{24}}{dt} = (b_{24})^{(4)}T_{25} - (b'_{24})^{(4)}T_{24} \quad 12$$

$$\frac{dT_{25}}{dt} = (b_{25})^{(4)}T_{24} - (b'_{25})^{(4)}T_{25} \quad 13$$

$$\frac{dT_{26}}{dt} = (b_{26})^{(4)}T_{25} - (b'_{26})^{(4)}T_{26} \quad 14$$

$$(b_i)^{(4)} > 0 \quad , \quad i = 24,25,26 \quad 15$$

$(b_i')^{(4)} > 0$, $i = 24,25,26$ 16

$(b_{25})^{(4)} < (b_{24}')^{(4)}$ 17

$(b_{26})^{(4)} < (b_{25}')^{(4)}$ 18

Following the same procedure outlined in the previous section , the general solution of the governing equations is $\alpha_i'T_i + \beta_i'T_i + \gamma_i'T_i = C_i'e_i^{\lambda' i t}, i = 24,25,26$ where $C_{24}', C_{25}', C_{26}'$ are arbitrary constant coefficients and $\alpha_{24}', \alpha_{25}', \alpha_{26}', \gamma_{24}', \gamma_{25}', \gamma_{26}'$ corresponding multipliers to the characteristic roots of the system

MEASUREMENT-QUANTUM MECHANICAL SYSTEMAL EXPLANATIONS OR REALITIES-DUAL SYSTEM ANALYSIS

We will denote

1) By $T_i(t), i = 24,25,26$, the three parts of the 'measurements files' analogously to the G_i of the quantum mechanical systems under consideration
2) By $(a_i'')^{(4)}(T_{25}, t)$ $(T_{25} \geq 0, t \geq 0)$,the contribution of the 'measurements' portfolio vis-à-vis to the dissipation coefficient of the 'quantum mechanical systems 'under consideration for study.
3) By $(-b_i'')^{(4)}(G_{24}, G_{25}, G_{26}, t) = -(b_i'')^{(4)}((G_{27}), t)$, the contribution of the 'quantum mechanical systemic explanation or quantum mechanical reality' to the dissipation coefficient of the 'measurements' portfolio

MEASUREMENTS-QUANTUM MECHANICAL SYSTEMIC EXPLANATION SYSTEM GOVERNING EQUATIONS:

The differential system of this model is now

$$\frac{dG_{24}}{dt} = (a_{24})^{(4)}G_{25} - \left[(a_{24}')^{(4)} + (a_{24}'')^{(4)}(T_{25}, t)\right]G_{24}$$ 19

$$\frac{dG_{25}}{dt} = (a_{25})^{(4)}G_{24} - \left[(a_{25}')^{(4)} + (a_{25}'')^{(4)}(T_{25}, t)\right]G_{25}$$ 20

$$\frac{dG_{26}}{dt} = (a_{26})^{(4)}G_{25} - \left[(a_{26}')^{(4)} + (a_{26}'')^{(4)}(T_{25}, t)\right]G_{26}$$ 21

$$\frac{dT_{24}}{dt} = (b_{24})^{(4)}T_{25} - \left[(b_{24}')^{(4)} - (b_{24}'')^{(4)}((G_{27}), t)\right]T_{24}$$ 22

$$\frac{dT_{25}}{dt} = (b_{25})^{(4)}T_{24} - \left[(b_{25}')^{(4)} - (b_{25}'')^{(4)}((G_{27}), t)\right]T_{25}$$ 23

$$\frac{dT_{26}}{dt} = (b_{26})^{(4)}T_{25} - \left[(b_{26}')^{(4)} - (b_{26}'')^{(4)}((G_{27}), t)\right]T_{26}$$ 24

$+(a_{24}'')^{(4)}(T_{25}, t) =$ First augmentation factor attributable to MEASUREMENTS DISTRURBING DISSIPATING QUANTUM MECHANICAL EXPLANATION OR QUANTUM MECHANICAL REALITY AS EIENSTEIN PUT IT to the dissipation of 'QUANTUM MECHANICAL SYSTEMS EXPATIATION'FOR THAT UNDER THE CONSIDERATION.
$-(b_{24}'')^{(4)}(G, t) =$ First detrition factor contributed by QUANTUM MECHANICAL DESCRIPTION BEING DISSIPATED BY THE MEASUREMENTS MADE CORRESPONDINLY

Where we suppose

(A) $(a_i)^{(4)}, (a_i')^{(4)}, (a_i'')^{(4)}, (b_i)^{(4)}, (b_i')^{(4)}, (b_i'')^{(4)} > 0,$
$i, j = 24,25,26$

(B) The functions $(a_i'')^{(4)}, (b_i'')^{(4)}$ are positive continuous increasing and bounded.

Definition of $(p_i)^{(4)}, (r_i)^{(4)}$:

$(a_i'')^{(4)}(T_{25},t) \leq (p_i)^{(4)} \leq (\hat{A}_{24})^{(4)}$

$(b_i'')^{(4)}(G,t) \leq (r_i)^{(4)} \leq (b_i')^{(4)} \leq (\hat{B}_{24})^{(4)}$ 25

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(C) $\lim_{T_2\to\infty}(a_i'')^{(4)}(T_{25},t) = (p_i)^{(4)}$ 27

$\lim_{G\to\infty}(b_i'')^{(4)}(G,t) = (r_i)^{(4)}$ 28

Definition of $(\hat{A}_{24})^{(4)}, (\hat{B}_{24})^{(4)}$:

Where $(\hat{A}_{24})^{(4)}, (\hat{B}_{24})^{(4)}, (p_i)^{(4)}, (r_i)^{(4)}$ are positive constants and $i = 24,25,26$

They satisfy Lipschitz condition:

$|(a_i'')^{(4)}(T_{25}',t) - (a_i'')^{(4)}(T_{25},t)| \leq (\hat{k}_{24})^{(4)}|T_{25} - T_{25}'|e^{-(\hat{M}_{24})^{(4)}t}$ 29

$|(b_i'')^{(4)}((G_{27})',t) - (b_i'')^{(4)}((G_{27}),T)| < (\hat{k}_{24})^{(4)}||(G_{27}) - (G_{27})'||e^{-(\hat{M}_{24})^{(4)}t}$ 30

With the Lipschitz condition, we place a restriction on the behavior of functions $(a_i'')^{(4)}(T_{25}',t)$ and $(a_i'')^{(4)}(T_{25},t)$. (T_{25}',t) and (T_{25},t) are points belonging to the interval $[(\hat{k}_{24})^{(4)}, (\hat{M}_{24})^{(4)}]$. It is to be noted that $(a_i'')^{(4)}(T_{25},t)$ is uniformly continuous. In the eventuality of the fact, that if $(\hat{M}_{24})^{(4)} = 1$ then the function $(a_i'')^{(4)}(T_{25},t)$, the first augmentation coefficient attributable to 'MEASUREMENTS', would be absolutely continuous.

Definition of $(\hat{M}_{24})^{(4)}, (\hat{k}_{24})^{(4)}$:

(D) $(\hat{M}_{24})^{(4)}, (\hat{k}_{24})^{(4)},$ are positive constants

$\frac{(a_i)^{(4)}}{(\hat{M}_{24})^{(4)}} , \frac{(b_i)^{(4)}}{(\hat{M}_{24})^{(4)}} < 4$ 31

Definition of $(\hat{P}_{24})^{(4)}, (\hat{Q}_{24})^{(4)}$:

(E) There exists two constants $(\hat{P}_{24})^{(4)}$ and $(\hat{Q}_{24})^{(4)}$ which together with $(\hat{M}_{24})^{(4)}, (\hat{k}_{24})^{(4)}, (\hat{A}_{24})^{(4)}$ and $(\hat{B}_{24})^{(4)}$ and the constants $(a_i)^{(4)}, (a_i')^{(4)}, (b_i)^{(4)}, (b_i')^{(4)}, (p_i)^{(4)}, (r_i)^{(4)}, i = 24,25,26,$
satisfy the inequalities

$$\frac{1}{(\hat{M}_{24})^{(4)}}[(a_i)^{(4)} + (a_i')^{(4)} + (\hat{A}_{24})^{(4)} + (\hat{P}_{24})^{(4)}(\hat{k}_{24})^{(4)}] < 1$$

$$\frac{1}{(\hat{M}_{24})^{(4)}}[(b_i)^{(4)} + (b_i')^{(4)} + (\hat{B}_{24})^{(4)} + (\hat{Q}_{24})^{(4)}(\hat{k}_{24})^{(4)}] < 1$$ 32

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Theorem 1: if the conditions (A)-(E) above are fulfilled, there exists a solution satisfying the conditions

Definition of $G_i(0), T_i(0)$:

$G_i(t) \leq \left(\hat{P}_{24} \right)^{(4)} e^{(\hat{M}_{24})^{(4)} t}$, $\boxed{G_i(0) = G_i^0 > 0}$

$T_i(t) \leq (\hat{Q}_{24})^{(4)} e^{(\hat{M}_{24})^{(4)} t}$, $\boxed{T_i(0) = T_i^0 > 0}$

Proof:

Consider operator $\mathcal{A}^{(4)}$ defined on the space of sextuples of continuous functions $G_i, T_i : \mathbb{R}_+ \to \mathbb{R}_+$ which satisfy

$$G_i(0) = G_i^0,\ T_i(0) = T_i^0,\ G_i^0 \leq (\hat{P}_{24})^{(4)},\ T_i^0 \leq (\hat{Q}_{24})^{(4)}, \quad 34$$

$$0 \leq G_i(t) - G_i^0 \leq (\hat{P}_{24})^{(4)} e^{(\hat{M}_{24})^{(4)} t} \quad 35$$

$$0 \leq T_i(t) - T_i^0 \leq (\hat{Q}_{24})^{(4)} e^{(\hat{M}_{24})^{(4)} t} \quad 36$$

By

$$\bar{G}_{24}(t) = G_{24}^0 + \int_0^t \left[(a_{24})^{(4)} G_{25}(s_{(24)}) - \left((a_{24}')^{(4)} + a_{24}'')^{(4)} (T_{25}(s_{(24)}), s_{(24)}) \right) G_{24}(s_{(24)}) \right] ds_{(24)} \quad 37$$

$$\bar{G}_{25}(t) = G_{25}^0 + \int_0^t \left[(a_{25})^{(4)} G_{24}(s_{(24)}) - \left((a_{25}')^{(4)} + (a_{25}'')^{(4)} (T_{25}(s_{(24)}), s_{(24)}) \right) G_{25}(s_{(24)}) \right] ds_{(24)} \quad 38$$

$$\bar{G}_{26}(t) = G_{26}^0 + \int_0^t \left[(a_{26})^{(4)} G_{25}(s_{(24)}) - \left((a_{26}')^{(4)} + (a_{26}'')^{(4)} (T_{25}(s_{(24)}), s_{(24)}) \right) G_{26}(s_{(24)}) \right] ds_{(24)} \quad 39$$

$$\bar{T}_{24}(t) = T_{24}^0 + \int_0^t \left[(b_{24})^{(4)} T_{25}(s_{(24)}) - \left((b_{24}')^{(4)} - (b_{24}'')^{(4)} (G(s_{(24)}), s_{(24)}) \right) T_{24}(s_{(24)}) \right] ds_{(24)} \quad 40$$

$$\bar{T}_{25}(t) = T_{25}^0 + \int_0^t \left[(b_{25})^{(4)} T_{24}(s_{(24)}) - \left((b_{25}')^{(4)} - (b_{25}'')^{(4)} (G(s_{(24)}), s_{(24)}) \right) T_{25}(s_{(24)}) \right] ds_{(24)} \quad 41$$

$$\bar{T}_{26}(t) = T_{26}^0 + \int_0^t \left[(b_{26})^{(4)} T_{25}(s_{(24)}) - \left((b_{26}')^{(4)} - (b_{26}'')^{(4)} (G(s_{(24)}), s_{(24)}) \right) T_{26}(s_{(24)}) \right] ds_{(24)} \quad 42$$

Where $s_{(24)}$ is the integrand that is integrated over an interval $(0, t)$

(a) The operator $\mathcal{A}^{(4)}$ maps the space of functions satisfying 34,35,36 into itself .Indeed it is obvious that

$$G_{24}(t) \leq G_{24}^0 + \int_0^t \left[(a_{24})^{(4)} \left(G_{25}^0 + (\hat{P}_{24})^{(4)} e^{(\hat{M}_{24})^{(4)} s_{(24)}} \right) \right] ds_{(24)} = \left(1 + (a_{24})^{(4)} t\right) G_{25}^0 + \frac{(a_{24})^{(4)} (\hat{P}_{24})^{(4)}}{(\hat{M}_{24})^{(4)}} \left(e^{(\hat{M}_{24})^{(4)} t} - 1 \right) \quad 43$$

From which it follows that

$$(G_{24}(t) - G_{24}^0) e^{-(\hat{M}_{24})^{(4)} t} \leq \frac{(a_{24})^{(4)}}{(\hat{M}_{24})^{(4)}} \left[\left((\hat{P}_{24})^{(4)} + G_{25}^0 \right) e^{\left(-\frac{(\hat{P}_{24})^{(4)} + G_{25}^0}{G_{25}^0} \right)} + (\hat{P}_{24})^{(4)} \right] \quad 44$$

(G_i^0) is as defined in the statement of theorem 1

Analogous inequalities hold also for G_{25} , G_{26}, T_{24}, T_{25}, T_{26}

It is now sufficient to take $\frac{(a_i)^{(4)}}{(\hat{M}_{24})^{(4)}}$, $\frac{(b_i)^{(4)}}{(\hat{M}_{24})^{(4)}} < 1$ and to choose $(\hat{P}_{24})^{(4)}$ and $(\hat{Q}_{24})^{(4)}$ large to have

$$\frac{(a_i)^{(4)}}{(\hat{M}_{24})^{(4)}}\left[(\hat{P}_{24})^{(4)} + \left((\hat{P}_{24})^{(4)} + G_j^0\right)e^{-\left(\frac{(\hat{P}_{24})^{(4)}+G_j^0}{G_j^0}\right)}\right] \leq (\hat{P}_{24})^{(4)}$$ 45

$$\frac{(b_i)^{(4)}}{(\hat{M}_{24})^{(4)}}\left[\left((\hat{Q}_{24})^{(4)} + T_j^0\right)e^{-\left(\frac{(\hat{Q}_{24})^{(4)}+T_j^0}{T_j^0}\right)} + (\hat{Q}_{24})^{(4)}\right] \leq (\hat{Q}_{24})^{(4)}$$ 46

In order that the operator $\mathcal{A}^{(4)}$ transforms the space of sextuples of functions G_i , T_i satisfying 34,35,36 into itself

The operator $\mathcal{A}^{(4)}$ is a contraction with respect to the metric

$$d\left(\left((G_{27})^{(1)},(T_{27})^{(1)}\right),\left((G_{27})^{(2)},(T_{27})^{(2)}\right)\right) =$$
$$\sup_i\{\max_{t\in\mathbb{R}_+}\left|G_i^{(1)}(t) - G_i^{(2)}(t)\right|e^{-(\hat{M}_{24})^{(4)}t},\max_{t\in\mathbb{R}_+}\left|T_i^{(1)}(t) - T_i^{(2)}(t)\right|e^{-(\hat{M}_{24})^{(4)}t}\}$$ 47

Indeed if we denote

Definition of $\widetilde{(G_{27})},\widetilde{(T_{27})}$:
$$\left(\widetilde{(G_{27})},\widetilde{(T_{27})}\right) = \mathcal{A}^{(4)}\left((G_{27}),(T_{27})\right)$$
It results

$$\left|\tilde{G}_{24}^{(1)} - \tilde{G}_i^{(2)}\right| \leq \int_0^t (a_{24})^{(4)}\left|G_{25}^{(1)} - G_{25}^{(2)}\right|e^{-(\hat{M}_{24})^{(4)}s_{(24)}}e^{(\hat{M}_{24})^{(4)}s_{(24)}}\,ds_{(24)} +$$
$$\int_0^t\{(a'_{24})^{(4)}\left|G_{24}^{(1)} - G_{24}^{(2)}\right|e^{-(\hat{M}_{24})^{(4)}s_{(24)}}e^{-(\hat{M}_{24})^{(4)}s_{(24)}} +$$
$$(a''_{24})^{(4)}\left(T_{25}^{(1)},s_{(24)}\right)\left|G_{24}^{(1)} - G_{24}^{(2)}\right|e^{-(\hat{M}_{24})^{(4)}s_{(24)}}e^{(\hat{M}_{24})^{(4)}s_{(24)}} +$$
$$G_{24}^{(2)}\left|(a''_{24})^{(4)}\left(T_{25}^{(1)},s_{(24)}\right) - (a''_{24})^{(4)}\left(T_{25}^{(2)},s_{(24)}\right)\right|\ e^{-(\hat{M}_{24})^{(4)}s_{(24)}}e^{(\hat{M}_{24})^{(4)}s_{(24)}}\}ds_{(24)}$$ 48

Where $s_{(24)}$ represents integrand that is integrated over the interval $[0,t]$

From the hypotheses on 25,26,27,28 and 29 it follows

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$$\left|(G_{27})^{(1)} - (G_{27})^{(2)}\right|e^{-(\hat{M}_{24})^{(4)}t} \leq$$
$$\frac{1}{(\hat{M}_{24})^{(4)}}\left((a_{24})^{(4)} + (a'_{24})^{(4)} + (\hat{A}_{24})^{(4)} + (\hat{P}_{24})^{(4)}(\hat{k}_{24})^{(4)}\right)d\left(\left((G_{27})^{(1)},(T_{27})^{(1)};\ (G_{27})^{(2)},(T_{27})^{(2)}\right)\right)$$ 50

And analogous inequalities for G_i *and* T_i. Taking into account the hypothesis (34,35,36) the result follows

Remark 4: The fact that we supposed $(a''_{24})^{(4)}$ and $(b''_{24})^{(4)}$ depending also on t can be considered as not conformal with the reality, however we have put this hypothesis ,in order that we can postulate condition necessary to prove the uniqueness of the solution bounded by $(\hat{P}_{24})^{(4)}e^{(\hat{M}_{24})^{(4)}t}$ *and* $(\hat{Q}_{24})^{(4)}e^{(\hat{M}_{24})^{(4)}t}$ respectively of $\mathbb{R}_+$. 51

If instead of proving the existence of the solution on $\mathbb{R}_+$, we have to prove it only on a compact then it suffices to consider that $(a_i'')^{(4)}$ and $(b_i'')^{(4)}, i = 24,25,26$ depend only on T_{25} and respectively on $(G_{27})(and\ not\ on\ t)$ and hypothesis can replaced by a usual Lipschitz condition.

Remark 2: There does not exist any t where $G_i\ (t) = 0\ and\ T_i\ (t) = 0$

From 19 to 24 it results

$$G_i\ (t) \geq G_i^0 e^{\left[-\int_0^t \{(a_i')^{(4)} - (a_i'')^{(4)}(T_{25}(s_{(24)}),s_{(24)})\} ds_{(24)}\right]} \geq 0$$

$$T_i\ (t) \geq T_i^0 e^{(-(b_i')^{(4)} t)} > 0 \quad \text{for } t > 0$$ 52

Definition of $\left((\widehat{M}_{24})^{(4)}\right)_1, \left((\widehat{M}_{24})^{(4)}\right)_2\ and\ \left((\widehat{M}_{24})^{(4)}\right)_3$:

Remark 3: if G_{24} is bounded, the same property have also $G_{25}\ and\ G_{26}$. indeed if 53

$G_{24} < (\widehat{M}_{24})^{(4)}$ it follows $\frac{dG_{25}}{dt} \leq \left((\widehat{M}_{24})^{(4)}\right)_1 - (a_{25}')^{(4)} G_{25}$ and by integrating

$$G_{25} \leq \left((\widehat{M}_{24})^{(4)}\right)_2 = G_{25}^0 + 2(a_{25})^{(4)}\left((\widehat{M}_{24})^{(4)}\right)_1/(a_{25}')^{(4)}$$

In the same way , one can obtain

$$G_{26} \leq \left((\widehat{M}_{24})^{(4)}\right)_3 = G_{26}^0 + 2(a_{26})^{(4)}\left((\widehat{M}_{24})^{(4)}\right)_2/(a_{26}')^{(4)}$$

If $G_{25}\ or\ G_{26}$ is bounded, the same property follows for G_{24} , G_{26} and G_{24} , G_{25} respectively.

Remark 4: If G_{24} is bounded, from below, the same property holds for $G_{25}\ and\ G_{26}$. The proof is analogous with the preceding one. An analogous property is true if G_{25} is bounded from below. 54

Remark 5: If T_{24} is bounded from below and $\lim_{t\to\infty}((b_i'')^{(4)}((G_{27})(t),t)) = (b_{25}')^{(4)}$ then $T_{25} \to \infty$. 55

Definition of $(m)^{(4)}$ and ε_4 :

Indeed let t_4 be so that for $t > t_4$

$$(b_{25})^{(4)} - (b_i'')^{(4)}((G_{27})(t),t) < \varepsilon_4, T_{24}\ (t) > (m)^{(4)}$$

Then $\frac{dT_{25}}{dt} \geq (a_{25})^{(4)}(m)^{(4)} - \varepsilon_4 T_{25}$ which leads to

$T_{25} \geq \left(\frac{(a_{25})^{(4)}(m)^{(4)}}{\varepsilon_4}\right)(4 - e^{-\varepsilon_4 t}) + T_{25}^0 e^{-\varepsilon_4 t}$ If we take t such that $e^{-\varepsilon_4 t} = \frac{1}{2}$ it results

$T_{25} \geq \left(\frac{(a_{25})^{(4)}(m)^{(4)}}{2}\right), \quad t = log\frac{2}{\varepsilon_4}$ By taking now ε_4 sufficiently small one sees that T_{25} is unbounded. The same property holds for T_{26} if $\lim_{t\to\infty}(b_{26}'')^{(4)}\left((G_{27})(t),t\right) = (b_{26}')^{(4)}$

We now state a more precise theorem about the behaviors at infinity of the solutions of equations 37 to 42

Behavior of the solutions of equation 37 to 12

Theorem 2: If we denote and define

Definition of $(\sigma_1)^{(4)}, (\sigma_2)^{(4)}, (\tau_1)^{(4)}, (\tau_2)^{(4)}$: 56

(a) $\sigma_1)^{(4)}, (\sigma_2)^{(4)}, (\tau_1)^{(4)}, (\tau_2)^{(4)}$ four constants satisfying

$$-(\sigma_2)^{(4)} \le -(a'_{24})^{(4)} + (a'_{25})^{(4)} - (a''_{24})^{(4)}(T_{25}, t) + (a''_{25})^{(4)}(T_{25}, t) \le -(\sigma_1)^{(4)}$$ 57

$$-(\tau_2)^{(4)} \le -(b'_{24})^{(4)} + (b'_{25})^{(4)} - (b''_{24})^{(4)}\big((G_{27}), t\big) - (b''_{25})^{(4)}\big((G_{27}), t\big) \le -(\tau_1)^{(4)}$$ 58

Definition of $(\nu_1)^{(4)}, (\nu_2)^{(4)}, (u_1)^{(4)}, (u_2)^{(4)}, \nu^{(4)}, u^{(4)}$: 59

(b) By $(\nu_1)^{(4)} > 0, (\nu_2)^{(4)} < 0$ and respectively $(u_1)^{(4)} > 0, (u_2)^{(4)} < 0$ the roots of the equations $(a_{25})^{(4)}\left(\nu^{(4)}\right)^2 + (\sigma_1)^{(4)}\nu^{(4)} - (a_{24})^{(4)} = 0$ 60

and $(b_{25})^{(4)}\left(u^{(4)}\right)^2 + (\tau_1)^{(4)}u^{(4)} - (b_{24})^{(4)} = 0$ and 61

Definition of $(\bar{\nu}_1)^{(4)},, (\bar{\nu}_2)^{(4)}, (\bar{u}_1)^{(4)}, (\bar{u}_2)^{(4)}$:

(c) By $(\bar{\nu}_1)^{(4)} > 0, (\bar{\nu}_2)^{(4)} < 0$ and respectively $(\bar{u}_1)^{(4)} > 0, (\bar{u}_2)^{(4)} < 0$ the

(d) roots of the equations $(a_{25})^{(4)}\left(\nu^{(4)}\right)^2 + (\sigma_2)^{(4)}\nu^{(4)} - (a_{24})^{(4)} = 0$

(e) and $(b_{25})^{(4)}\left(u^{(4)}\right)^2 + (\tau_2)^{(4)}u^{(4)} - (b_{24})^{(4)} = 0$ 62

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Definition of $(m_1)^{(4)}, (m_2)^{(4)}, (\mu_1)^{(4)}, (\mu_2)^{(4)}, (\nu_0)^{(4)}$:- 64

(f) If we define $(m_1)^{(4)}, (m_2)^{(4)}, (\mu_1)^{(4)}, (\mu_2)^{(4)}$ by

$$(m_2)^{(4)} = (\nu_0)^{(4)}, (m_1)^{(4)} = (\nu_1)^{(4)}, \ \boldsymbol{if}\ (\nu_0)^{(4)} < (\nu_1)^{(4)}$$ 65

$$(m_2)^{(4)} = (\nu_1)^{(4)}, (m_1)^{(4)} = (\bar{\nu}_1)^{(4)}, \boldsymbol{if}\ (\nu_1)^{(4)} < (\nu_0)^{(4)} < (\bar{\nu}_1)^{(4)},$$

and $\boxed{(\nu_0)^{(4)} = \frac{G_{24}^0}{G_{25}^0}}$ 66

$$(m_2)^{(4)} = (\nu_1)^{(4)}, (m_1)^{(4)} = (\nu_0)^{(4)}, \ \boldsymbol{if}\ (\bar{\nu}_1)^{(4)} < (\nu_0)^{(4)}$$

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and analogously

$$(\mu_2)^{(4)} = (u_0)^{(4)}, (\mu_1)^{(4)} = (u_1)^{(4)}, \ \boldsymbol{if}\ (u_0)^{(4)} < (u_1)^{(4)}$$ 68

$$(\mu_2)^{(4)} = (u_1)^{(4)}, (\mu_1)^{(4)} = (\bar{u}_1)^{(4)}, \boldsymbol{if}\ (u_1)^{(4)} < (u_0)^{(4)} < (\bar{u}_1)^{(4)},$$

and $\boxed{(u_0)^{(4)} = \frac{T_{24}^0}{T_{25}^0}}$ 69

$(\mu_2)^{(4)} = (u_1)^{(4)}, (\mu_1)^{(4)} = (u_0)^{(4)}, \boldsymbol{if}\ (\bar{u}_1)^{(4)} < (u_0)^{(4)}$ where $(u_1)^{(4)}, (\bar{u}_1)^{(4)}$ are defined by 59 and 64 respectively 70

Then the solution of 19,20,21,22,23 and 24 satisfies the inequalities

$$G_{24}^0 e^{((S_1)^{(4)} - (p_{24})^{(4)})t} \le G_{24}(t) \le G_{24}^0 e^{(S_1)^{(4)}t}$$ 71

where $(p_i)^{(4)}$ is defined by equation 25

$$\frac{1}{(m_1)^{(4)}} G_{24}^0 e^{\left((S_1)^{(4)}-(p_{24})^{(4)}\right)t} \leq G_{25}(t) \leq \frac{1}{(m_2)^{(4)}} G_{24}^0 e^{(S_1)^{(4)}t}$$ 72

$$\left(\frac{(a_{26})^{(4)} G_{24}^0}{(m_1)^{(4)}\left((S_1)^{(4)}-(p_{24})^{(4)}-(S_2)^{(4)}\right)}\left[e^{\left((S_1)^{(4)}-(p_{24})^{(4)}\right)t}-e^{-(S_2)^{(4)}t}\right]+G_{26}^0 e^{-(S_2)^{(4)}t} \leq G_{26}(t) \leq \frac{(a_{26})^{(4)} G_{24}^0}{(m_2)^{(4)}\left((S_1)^{(4)}-(a_{26}')^{(4)}\right)}\left[e^{(S_1)^{(4)}t}-e^{-(a_{26}')^{(4)}t}\right]+G_{26}^0 e^{-(a_{26}')^{(4)}t}\right)$$ 73

$$\boxed{T_{24}^0 e^{(R_1)^{(4)}t} \leq T_{24}(t) \leq T_{24}^0 e^{\left((R_1)^{(4)}+(r_{24})^{(4)}\right)t}}$$ 74

$$\frac{1}{(\mu_1)^{(4)}} T_{24}^0 e^{(R_1)^{(4)}t} \leq T_{24}(t) \leq \frac{1}{(\mu_2)^{(4)}} T_{24}^0 e^{\left((R_1)^{(4)}+(r_{24})^{(4)}\right)t}$$ 75

$$\frac{(b_{26})^{(4)} T_{24}^0}{(\mu_1)^{(4)}\left((R_1)^{(4)}-(b_{26}')^{(4)}\right)}\left[e^{(R_1)^{(4)}t}-e^{-(b_{26}')^{(4)}t}\right]+T_{26}^0 e^{-(b_{26}')^{(4)}t} \leq T_{26}(t) \leq$$ 76

$$\frac{(a_{26})^{(4)} T_{24}^0}{(\mu_2)^{(4)}\left((R_1)^{(4)}+(r_{24})^{(4)}+(R_2)^{(4)}\right)}\left[e^{\left((R_1)^{(4)}+(r_{24})^{(4)}\right)t}-e^{-(R_2)^{(4)}t}\right]+T_{26}^0 e^{-(R_2)^{(4)}t}$$

Definition of $(S_1)^{(4)}, (S_2)^{(4)}, (R_1)^{(4)}, (R_2)^{(4)}$:- 77

Where $(S_1)^{(4)} = (a_{24})^{(4)}(m_2)^{(4)} - (a_{24}')^{(4)}$

$$(S_2)^{(4)} = (a_{26})^{(4)} - (p_{26})^{(4)}$$ 78

$$(R_1)^{(4)} = (b_{24})^{(4)}(\mu_2)^{(4)} - (b_{24}')^{(4)}$$

$$(R_2)^{(4)} = (b_{26}')^{(4)} - (r_{26})^{(4)}$$

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Proof : From 19,20,21,22,23,24 we obtain

$$\frac{d\nu^{(4)}}{dt} = (a_{24})^{(4)} - \left((a_{24}')^{(4)} - (a_{25}')^{(4)} + (a_{24}'')^{(4)}(T_{25},t)\right) - (a_{25}'')^{(4)}(T_{25},t)\nu^{(4)} - (a_{25})^{(4)}\nu^{(4)}$$

Definition of $\nu^{(4)}$:- $\boxed{\nu^{(4)} = \frac{G_{24}}{G_{25}}}$

It follows

$$-\left((a_{25})^{(4)}\left(\nu^{(4)}\right)^2 + (\sigma_2)^{(4)}\nu^{(4)} - (a_{24})^{(4)}\right) \leq \frac{d\nu^{(4)}}{dt} \leq -\left((a_{25})^{(4)}\left(\nu^{(4)}\right)^2 + (\sigma_1)^{(4)}\nu^{(4)} - (a_{24})^{(4)}\right)$$

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From which one obtains

Definition of $(\bar{\nu}_1)^{(4)}, (\nu_0)^{(4)}$:-

(a) For $0 < \boxed{(\nu_0)^{(4)} = \frac{G_{24}^0}{G_{25}^0}} < (\nu_1)^{(4)} < (\bar{\nu}_1)^{(4)}$

$$\nu^{(4)}(t) \geq \frac{(\nu_1)^{(4)} + (C)^{(4)}(\nu_2)^{(4)} e^{\left[-(a_{25})^{(4)}\left((\nu_1)^{(4)}-(\nu_0)^{(4)}\right)t\right]}}{1+(C)^{(4)} e^{\left[-(a_{25})^{(4)}\left((\nu_1)^{(4)}-(\nu_0)^{(4)}\right)t\right]}} \quad , \quad \boxed{(C)^{(4)} = \frac{(\nu_1)^{(4)}-(\nu_0)^{(4)}}{(\nu_0)^{(4)}-(\nu_2)^{(4)}}}$$

it follows $(\nu_0)^{(4)} \leq \nu^{(4)}(t) \leq (\nu_1)^{(4)}$

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In the same manner , we get

$$\nu^{(4)}(t) \leq \frac{(\bar{\nu}_1)^{(4)}+(\bar{C})^{(4)}(\bar{\nu}_2)^{(4)}e^{\left[-(a_{25})^{(4)}\left((\bar{\nu}_1)^{(4)}-(\bar{\nu}_2)^{(4)}\right)t\right]}}{1+(\bar{C})^{(4)}e^{\left[-(a_{25})^{(4)}\left((\bar{\nu}_1)^{(4)}-(\bar{\nu}_2)^{(4)}\right)t\right]}} \quad , \quad \boxed{(\bar{C})^{(4)} = \frac{(\bar{\nu}_1)^{(4)}-(\nu_0)^{(4)}}{(\nu_0)^{(4)}-(\bar{\nu}_2)^{(4)}}}$$ 82

From which we deduce $(\nu_0)^{(4)} \leq \nu^{(4)}(t) \leq (\bar{\nu}_1)^{(4)}$

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(b) If $0 < (\nu_1)^{(4)} < (\nu_0)^{(4)} = \frac{G_{24}^0}{G_{25}^0} < (\bar{\nu}_1)^{(4)}$ we find like in the previous case,

$$(\nu_1)^{(4)} \leq \frac{(\nu_1)^{(4)}+(C)^{(4)}(\nu_2)^{(4)}e^{\left[-(a_{25})^{(4)}\left((\nu_1)^{(4)}-(\nu_2)^{(4)}\right)t\right]}}{1+(C)^{(4)}e^{\left[-(a_{25})^{(4)}\left((\nu_1)^{(4)}-(\nu_2)^{(4)}\right)t\right]}} \leq \nu^{(4)}(t) \leq$$ 84

$$\frac{(\bar{\nu}_1)^{(4)}+(\bar{C})^{(4)}(\bar{\nu}_2)^{(4)}e^{\left[-(a_{25})^{(4)}\left((\bar{\nu}_1)^{(4)}-(\bar{\nu}_2)^{(4)}\right)t\right]}}{1+(\bar{C})^{(4)}e^{\left[-(a_{25})^{(4)}\left((\bar{\nu}_1)^{(4)}-(\bar{\nu}_2)^{(4)}\right)t\right]}} \leq (\bar{\nu}_1)^{(4)}$$

(c) If $0 < (\nu_1)^{(4)} \leq (\bar{\nu}_1)^{(4)} \leq \boxed{(\nu_0)^{(4)} = \frac{G_{24}^0}{G_{25}^0}}$, we obtain

$$(\nu_1)^{(4)} \leq \nu^{(4)}(t) \leq \frac{(\bar{\nu}_1)^{(4)}+(\bar{C})^{(4)}(\bar{\nu}_2)^{(4)}e^{\left[-(a_{25})^{(4)}\left((\bar{\nu}_1)^{(4)}-(\bar{\nu}_2)^{(4)}\right)t\right]}}{1+(\bar{C})^{(4)}e^{\left[-(a_{25})^{(4)}\left((\bar{\nu}_1)^{(4)}-(\bar{\nu}_2)^{(4)}\right)t\right]}} \leq (\nu_0)^{(4)}$$ 85

And so with the notation of the first part of condition (c) , we have

Definition of $\nu^{(4)}(t)$:-

$(m_2)^{(4)} \leq \nu^{(4)}(t) \leq (m_1)^{(4)}$, $\boxed{\nu^{(4)}(t) = \frac{G_{24}(t)}{G_{25}(t)}}$

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In a completely analogous way, we obtain

Definition of $u^{(4)}(t)$:-

$(\mu_2)^{(4)} \leq u^{(4)}(t) \leq (\mu_1)^{(4)}$, $\boxed{u^{(4)}(t) = \frac{T_{24}(t)}{T_{25}(t)}}$

Now, using this result and replacing it in 19, 20,21,22,23, and 24 we get easily the result stated in the theorem. 87

Particular case :

If $(a''_{24})^{(4)} = (a''_{25})^{(4)}$, then $(\sigma_1)^{(4)} = (\sigma_2)^{(4)}$ and in this case $(\nu_1)^{(4)} = (\bar{\nu}_1)^{(4)}$ if in addition $(\nu_0)^{(4)} = (\nu_1)^{(4)}$ then $\nu^{(4)}(t) = (\nu_0)^{(4)}$ and as a consequence $G_{24}(t) = (\nu_0)^{(4)} G_{25}(t)$ this also defines $(\nu_0)^{(4)}$ for the special case .

Analogously if $(b''_{24})^{(4)} = (b''_{25})^{(4)}$, then $(\tau_1)^{(4)} = (\tau_2)^{(4)}$ and then $(u_1)^{(4)} = (\bar{u}_1)^{(4)}$ if in addition $(u_0)^{(4)} = (u_1)^{(4)}$ then $T_{24}(t) = (u_0)^{(4)} T_{25}(t)$ This is an important consequence of the relation between $(\nu_1)^{(4)}$ and $(\bar{\nu}_1)^{(4)}$, and definition of $(u_0)^{(4)}$.

4. STATIONARY SOLUTIONS AND STABILITY

Stationary solutions and stability curve representative of the variation of MEASUREMENTS DISSIPATING OR DISTRURBING THE QUANTUM MECHANICAL REALITY OR EXPLANATION OF THE QUANTUM MECHANICAL SYSTEMS UNDER CONSIDERATION SYSTEM curve lies below the tangent at $(G_{27}) = G_0$ for $(G_{27}) < G_0$ and above the tangent for $(G_{27}) > G_0$ .Wherever such a situation occurs the point G_0 is called the **"point of inflexion".** In this case, the tangent has a positive slope that simply means the rate of change of QMS Explanations is greater than zero. Above factor shows that it is possible, to draw a curve that has a point of inflexion at a point where the tangent (slope of the curve) is horizontal.

Stationary value :

In all the cases $(G_{27}) = G_0$, $(G_{27}) < G_0$, $(G_{27}) > G_0$ the condition that the rate of change of oxygen consumption is maximum or minimum holds. When this condition holds we have stationary value. We now infer that :

1. A necessary and sufficient condition for there to be stationary value of (G_{27}) is that the rate of change of QUANTUM MECHANICAL SYSTEMIC EXPLANATION function at G_0 is zero.

2. A sufficient condition for the stationary value at G_0 , to be maximum is that the acceleration of the QUANTUN MECHANICAL SYSTEMAL EXPLANATION OR THE QUANTUM MECHANICAL REALITY OF THE SYSTEM AS EINSTEIN PUT IT is less than zero.

3. A sufficient condition for the stationary value at G_0, be minimum is that acceleration of' QUANTUM MECHANICAL EXPLANATIONS OF QUANTUM MECHANICAL REALITY' is greater than zero.

4. With the rate of change of (G_{27}) namely 'QUANTUM MECHANICAL DESCRPTION defined as the accentuation term and the dissipation term, we are sure that the rate of change of QUANTUM MECHANICAL DESCRPTION is always positive.

5. Concept of stationary state is mere methodology although there might be closed system exhibiting symptoms of stationariness.

We can prove the following

<u>Theorem 3</u>: If $(a_i'')^{(4)}$ *and* $(b_i'')^{(4)}$ are independent on t , and the conditions (with the notations 25,26,27,28)

$$(a_{24}')^{(4)}(a_{25}')^{(4)} - (a_{24})^{(4)}(a_{25})^{(4)} < 0$$

$$(a_{24}')^{(4)}(a_{25}')^{(4)} - (a_{24})^{(4)}(a_{25})^{(4)} + (a_{24})^{(4)}(p_{24})^{(4)} + (a_{25}')^{(4)}(p_{25})^{(4)} + (p_{24})^{(4)}(p_{25})^{(4)} > 0 \quad 88$$

$$(b_{24}')^{(4)}(b_{25}')^{(4)} - (b_{24})^{(4)}(b_{25})^{(4)} > 0 ,$$

$$(b_{24}')^{(4)}(b_{25}')^{(4)} - (b_{24})^{(4)}(b_{25})^{(4)} - (b_{24}')^{(4)}(r_{25})^{(4)} - (b_{25}')^{(4)}(r_{25})^{(4)} + (r_{24})^{(4)}(r_{25})^{(4)} < 0$$

with $(p_{24})^{(4)}, (r_{25})^{(4)}$ as defined by equation 25 are satisfied , then the system

$$(a_{24})^{(4)}G_{25} - \left[(a_{24}')^{(4)} + (a_{24}'')^{(4)}(T_{25})\right]G_{24} = 0 \quad 89$$

$$(a_{25})^{(4)}G_{24} - \left[(a_{25}')^{(4)} + (a_{25}'')^{(4)}(T_{25})\right]G_{25} = 0 \quad 90$$

$$(a_{26})^{(4)}G_{25} - \left[(a_{26}')^{(4)} + (a_{26}'')^{(4)}(T_{25})\right]G_{26} = 0 \quad 91$$

$$(b_{24})^{(4)}T_{25} - [(b_{24}')^{(4)} - (b_{24}'')^{(4)}((G_{27}))\,]T_{24} = 0 \quad 92$$

$$(b_{25})^{(4)}T_{24} - [(b'_{25})^{(4)} - (b''_{25})^{(4)}((G_{27}))]T_{25} = 0$$ 93

$$(b_{26})^{(4)}T_{25} - [(b'_{26})^{(4)} - (b''_{26})^{(4)}((G_{27}))]T_{26} = 0$$ 94

has a unique positive solution , which is an equilibrium solution for the system (19 to 24)

Proof:

(a) Indeed the first two equations have a nontrivial solution G_{24}, G_{25} if

$$F(T_{27}) = (a'_{24})^{(4)}(a'_{25})^{(4)} - (a_{24})^{(4)}(a_{25})^{(4)} + (a'_{24})^{(4)}(a''_{25})^{(4)}(T_{25}) + (a'_{25})^{(4)}(a''_{24})^{(4)}(T_{25}) + (a''_{24})^{(4)}(T_{25})(a''_{25})^{(4)}(T_{25}) = 0$$

95

Definition and uniqueness of T^*_{25} :-

After hypothesis $f(0) < 0, f(\infty) > 0$ and the functions $(a''_i)^{(4)}(T_{25})$ being increasing, it follows that there exists a unique T^*_{25} for which $f(T^*_{25}) = 0$. With this value , we obtain from the three first equations

$$G_{24} = \frac{(a_{24})^{(4)}G_{25}}{[(a'_{24})^{(4)}+(a''_{24})^{(4)}(T^*_{25})]} \quad , \quad G_{26} = \frac{(a_{26})^{(4)}G_{25}}{[(a'_{26})^{(4)}+(a''_{26})^{(4)}(T^*_{25})]}$$

96

By the same argument, the equations 92,93 admit solutions G_{24}, G_{25} if

$$\varphi(G_{27}) = (b'_{24})^{(4)}(b'_{25})^{(4)} - (b_{24})^{(4)}(b_{25})^{(4)} - [(b'_{24})^{(4)}(b''_{25})^{(4)}(G_{27}) + (b'_{25})^{(4)}(b''_{24})^{(4)}(G_{27})] + (b''_{24})^{(4)}(G_{27})(b''_{25})^{(4)}(G_{27}) = 0$$

97

Where in $(G_{27})(G_{24}, G_{25}, G_{26}), G_{24}, G_{26}$ must be replaced by their values from 96. It is easy to see that φ is a decreasing function in G_{25} taking into account the hypothesis $\varphi(0) > 0, \varphi(\infty) < 0$ it follows that there exists a unique G^*_{25} such that $\varphi((G_{27})^*) = 0$

Finally we obtain the unique solution of 89 to 94

G^*_{25} given by $\varphi((G_{27})^* G^*) = 0$, T^*_{25} given by $f(T^*_{25}) = 0$ and

$$G^*_{24} = \frac{(a_{24})^{(4)}G^*_{25}}{[(a'_{24})^{(4)}+(a''_{24})^{(4)}(T^*_{25})]} \quad , \quad G^*_{26} = \frac{(a_{26})^{(4)}G^*_{25}}{[(a'_{26})^{(4)}+(a''_{26})^{(4)}(T^*_{25})]}$$

98

$$T^*_{24} = \frac{(b_{24})^{(4)}T^*_{25}}{[(b'_{24})^{(4)}-(b''_{24})^{(4)}((G_{27})^*)]} \quad , \quad T^*_{26} = \frac{(b_{26})^{(4)}T^*_{25}}{[(b'_{26})^{(4)}-(b''_{26})^{(4)}((G_{27})^*)]}$$

99

Obviously, these values represent an equilibrium solution of 19,20,21,22,23,24

ASYMPTOTIC STABILITY ANALYSIS

Theorem 4: If the conditions of the previous theorem are satisfied and if the functions $(a''_i)^{(4)}$ and $(b''_i)^{(4)}$ Belong to $C^{(4)}(\mathbb{R}_+)$ then the above equilibrium point is asymptotically stable.

Proof: Denote

Definition of $\mathbb{G}_i, \mathbb{T}_i$:-

$$G_i = G^*_i + \mathbb{G}_i \quad , \quad T_i = T^*_i + \mathbb{T}_i$$

100

$$\frac{\partial (a''_{25})^{(4)}}{\partial T_{25}}(T^*_{25}) = (q_{25})^{(4)} \quad , \quad \frac{\partial (b''_i)^{(4)}}{\partial G_j}((G_{27})^*) = s_{ij}$$ 101

Then taking into account equations 89 to 94 and neglecting the terms of power 2, we obtain from 49 to 24

$$\frac{d\mathbb{G}_{24}}{dt} = -\left((a'_{24})^{(4)} + (p_{24})^{(4)}\right)\mathbb{G}_{24} + (a_{24})^{(4)}\mathbb{G}_{25} - (q_{24})^{(4)} G^*_{24}\mathbb{T}_{25}$$ 102

$$\frac{d\mathbb{G}_{25}}{dt} = -\left((a'_{25})^{(4)} + (p_{25})^{(4)}\right)\mathbb{G}_{25} + (a_{25})^{(4)}\mathbb{G}_{24} - (q_{25})^{(4)} G^*_{25}\mathbb{T}_{25}$$ 103

$$\frac{d\mathbb{G}_{26}}{dt} = -\left((a'_{26})^{(4)} + (p_{26})^{(4)}\right)\mathbb{G}_{26} + (a_{26})^{(4)}\mathbb{G}_{25} - (q_{26})^{(4)} G^*_{26}\mathbb{T}_{25}$$ 104

$$\frac{d\mathbb{T}_{24}}{dt} = -\left((b'_{24})^{(4)} - (r_{24})^{(4)}\right)\mathbb{T}_{24} + (b_{24})^{(4)}\mathbb{T}_{25} + \sum_{j=24}^{26}\left(s_{(24)(j)} T^*_{24}\mathbb{G}_j\right)$$ 105

$$\frac{d\mathbb{T}_{25}}{dt} = -\left((b'_{25})^{(4)} - (r_{25})^{(4)}\right)\mathbb{T}_{25} + (b_{25})^{(4)}\mathbb{T}_{24} + \sum_{j=24}^{26}\left(s_{(25)(j)} T^*_{25}\mathbb{G}_j\right)$$ 106

$$\frac{d\mathbb{T}_{26}}{dt} = -\left((b'_{26})^{(4)} - (r_{26})^{(4)}\right)\mathbb{T}_{26} + (b_{26})^{(4)}\mathbb{T}_{25} + \sum_{j=24}^{26}\left(s_{(26)(j)} T^*_{26}\mathbb{G}_j\right)$$ 107

The characteristic equation of this system is

$$\left((\lambda)^{(4)} + (b'_{26})^{(4)} - (r_{26})^{(4)}\right)\{\left((\lambda)^{(4)} + (a'_{26})^{(4)} + (p_{26})^{(4)}\right)$$
$$\left[\left(\left((\lambda)^{(4)} + (a'_{24})^{(4)} + (p_{24})^{(4)}\right)(q_{25})^{(4)} G^*_{25} + (a_{25})^{(4)}(q_{24})^{(4)} G^*_{24}\right)\right]$$
$$\left(\left((\lambda)^{(4)} + (b'_{24})^{(4)} - (r_{24})^{(4)}\right)s_{(25),(25)} T^*_{25} + (b_{25})^{(4)} s_{(24),(25)} T^*_{25}\right)$$
$$+\left(\left((\lambda)^{(4)} + (a'_{25})^{(4)} + (p_{25})^{(4)}\right)(q_{24})^{(4)} G^*_{24} + (a_{24})^{(4)}(q_{25})^{(4)} G^*_{25}\right)$$
$$\left(\left((\lambda)^{(4)} + (b'_{24})^{(4)} - (r_{24})^{(4)}\right)s_{(25),(24)} T^*_{25} + (b_{25})^{(4)} s_{(24),(24)} T^*_{24}\right)$$
$$\left(\left((\lambda)^{(4)}\right)^2 + \left((a'_{24})^{(4)} + (a'_{25})^{(4)} + (p_{24})^{(4)} + (p_{25})^{(4)}\right)(\lambda)^{(4)}\right)$$
$$\left(\left((\lambda)^{(4)}\right)^2 + \left((b'_{24})^{(4)} + (b'_{25})^{(4)} - (r_{24})^{(4)} + (r_{25})^{(4)}\right)(\lambda)^{(4)}\right)$$
$$+\left(\left((\lambda)^{(4)}\right)^2 + \left((a'_{24})^{(4)} + (a'_{25})^{(4)} + (p_{24})^{(4)} + (p_{25})^{(4)}\right)(\lambda)^{(4)}\right)(q_{26})^{(4)} G_{26}$$
$$+\left((\lambda)^{(4)} + (a'_{24})^{(4)} + (p_{24})^{(4)}\right)\left((a_{26})^{(4)}(q_{25})^{(4)} G^*_{25} + (a_{25})^{(4)}(a_{26})^{(4)}(q_{24})^{(4)} G^*_{24}\right)$$
$$\left(\left((\lambda)^{(4)} + (b'_{24})^{(4)} - (r_{24})^{(4)}\right)s_{(25),(26)} T^*_{25} + (b_{25})^{(4)} s_{(24),(26)} T^*_{24}\right)\} = 0$$

And as one sees, all the coefficients are positive. It follows that all the roots have negative real part, and this proves the theorem. 108

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