The Observer as the "Wave function", his Observable(s) as the "Collapse" (Relative States): Proposing here, a *Standard Model* for Quantum Gravity.

(Part 1: the Overview)

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Quantum theory (QT) treats of "observables" yet the term "observer" remains hardly a rigorous notion. We argue that the uncertainty principle of QT can be understood in the Gödel sense that: any given *observer* constitutes own practical definition of "***the unobservable"*** (if superposition) namely length scale, phase space, non-local action, fundamental frequency etc. Conversely, ***the observable*** is definable strictly only in inverse-observer terms as, that is, the "collapse" namely inverse-length, phase-points, locality, harmonics respectively. Granted this picture is not a-priori intuitive we show that it resolves key modern difficulties plus it has formal grounds. One pictures the *observer* thus in the manner of Gödel's "consistency-is-undecidable" or Planck's "the-constant-is-uncertainty" or indeed Einstein's "speed-of-light-is-null-information*"* etc. definitive of which three cases, we assert, is Peano's (and Noether's?) notion of ***the constant*** as being for any gamut of variables/symmetry the ***meta-state*** ("conserved current"?). Given then that the observer is in any scheme of events the invariance (constant) it should be the case that it is the *observer* proper and *not* his *observables* which should constitute the violation of Bell's inequality—if as the infinitesimal/imaginary axis or as the dimensionless/infinite-dimensional or the so-called conservation law etc. We posit: the observer is by definition the ***virtual exchange*** (field) of standard model or "space-time" of GR or just the "metric"—defined by the singular trait that it is the ***de facto*** universal constant i.e. the *natural unit* and hence *natural limit* of physical information. As a prediction we show herein an exact value to define man (perhaps our purest sample of *observer*) as also the ***natural unit*** for quantum gravity. Ultimately, that known hitherto as the potential (conservation law) becomes here same exactly as the "mind" or the "life" i.e. strictly put: "the-observer-as-the-unobservable" (superposition).The *observer* is for us per se the "entity"—in the sense of "phase-space" (normal mode; fundamental; wave speed) giving us an intuitive picture of observables that is same in fact as Huygens' wave fronts/wavelets (or Everett's *many-worlds,* or indeed Darwin's evolution/speciation of "life") same in short as any "spontaneous symmetry breaking".

Preamble:

This is the first of a three-part paper (to be posted here within the next few weeks). This first part attempts an overview. The second part (subtitled, The Perspectives) takes a look at the implications of our hypothesis with regard to some select accepted theories of modern science and then the third and concluding part (The Formalism) attempts to develop the formal basis of our arguments.

Here is almost entirely a qualitative as against a quantitative effort. Being a non-physicist, a major question arises whether this writer understands in the first place the subject matter, but the answer to that question we will not pre-empt. The mode of representation of quantum theory as contained by this paper must be at best informal and at the worst deviant (not to say, even plain erroneous). However, our aim here is not so much to do quantum physics as it is to suggest a useful direction of inquiry.

Unavoidably there will be unforgivable errors, pretentions, usages and buckets of ignorance to put the professional off this paper but we believe there is also something well worth the open minded expert's while.

Key words: observer, entity, virtual work, constant, equilibrium, equality, unobservable, observables, inequality.

Overview:

In Brief:

We put forward 4 axioms as forming the summary of our whole arguments in this paper namely:

(1.) An equality is an entity (think of this as the invariance i.e. the *observer*)
(2.) An entity is not an observable whatsoever (it is the superposition or "connectedness" of all things else)
(3.) Observables represent inequalities (i.e. perturbations; amplitudes; proportions) thereof.
(4.) There can therefore be one and only one valid entity (every other is hypothetical).

In other words, we argue that any observer is a *distinct* uncertainty relation – uncertainty defined as matter by the extent it is the *de facto* ***"measurement"*** (invariant; equilibrium; natural unit) between any two physical values (observables) and hence is *de facto* too their

"***immeasurable"*** (superposition) extent otherwise known classically perhaps as the "entropy", "limit" or just "Markov property".[1]

To grant that the observer (constant) is necessarily a player in any scheme of events it will seem that the Gödel[2] imperative, as itemized by Peano[3] is for us to see the term "observer" as the "consistency" proper or "phase space" or "virtual exchange" (think of this as the "***energy***" per se or simply as the "***constant***") vis-a-vis his observables as the "phase points" (think, the energy ***"form(s)"/"level(s)"*** if "[atomic] ***mass***" etc these as signifying Peano's "***natural number(s)***" within a constant; or Noethers symmetries of an invariant.)

This altogether carries the sense of observables as some form of Lorentz "contraction" [of the ether] the ether proper being the given observer as/or the "universal constant" or "field" (Everett's universal wave function.)[4] And this in turn allows us to extend into the notion of the natural number as meaning simply the observable or variable (or "collapse"). One rule though: like in Einstein's simultaneity there is no *practicably* differentiating between "constants" (observers); a constant is simply *the* constant; the de facto unit of/or measurement – something you may only BE (say a Markov property[5]; stochastic process) as opposed to that which you may only OBSERVE (say, the Gaussian property/distribution).

So then the emergent (apparent) path follows only from the initial conditions, of which there can be only one valid.

In a sense this perspective simply eliminates the difficulty that quantum physics has called the measurement problem (or collapse): that situation that the patently deterministic wave function [of Schrodinger's] gives rise to probabilistic measurement results. Perhaps here absorbs the stochastic element as being simply the "imaginary" or so-called only ideal states in physics (e.g. inertia, perfect gas etc). Or indeed absorbs the deterministic property so. Think of these alternative perspectives as the so-called Schrodinger versus Heisenberg pictures of the wave function or in classical terms as the "equivalence" between the inertial frame/mass versus the gravitational frame/mass.

Indeed once we follow strictly the additional logical import that: observables *cannot* be deemed to exist without an observer—this being the critical tenet in uncertainty principle—the notion observer becomes same exactly as that of the metric or "sample space" (in probability theory) or just the "norm" or, more physically, the "isolated system" in thermodynamics and generally technically the "imaginary unit" or "virtual work" and, in the standard model of particle physics, the "virtual exchange". We find then that by whatever scheme or model there is *need* for (or inevitability of) the *unknown*[6] which unknown let's call

now the *unit* of measurement/sourcing of information. This is naturally, by us herein, simply "the observer".

Any observer is thus more ordinarily to be perceived as per se the "measurement" proper; as for example in the notion of *unified atomic mass*. Implicit in this scheme is that there is no observer-observer (as in *Wigner's Friend*).

We can also look at this whole argument dimension wise, as a case of evolution of dimensions from the Euclidean (as the "observable") to the so-called higher dimensions (as the "observer"). This perspective is made more relevant by the fact that the QM space is an *infinite dimensional* so-called Hilbert space.[7] But we can also look at the situation vice versa as namely, a case of compactification (involution) of dimensions — meaning any observer is the point-at-infinity. So eventually one has now essentially Poincare's[8] conjecture:
"Every simply connected, closed 3-manifold is homeomorphic to the 3-sphere."

The import is what is already known, that "...Poincaré's insights on qualitative properties of differential equations proved that in some cases the behaviour of the solutions is effectively random. Even when there is no hint of randomness in the equations, there can be genuine elements of randomness in the solutions. The Russian school of dynamicists under Andrey Kolmogorov and Vladimir Arnold developed similar ideas at much the same time…."

Now alternatively, we can look at the measurement problem historically i.e. path-wise (reminiscent perhaps of Feynman's "consistent histories)such that any given observer is the unit of measure of evolution (think, evolution as the "space" or "time dilation") versus involution (i.e. "time" as "space contraction"). Meaning, the observer is the ***space-time*** per se or more generally the "simultaneity", "universal constant", norm or radiation gauge (QM's Heisenberg cut) or in geometric terms the "point" or "origin" of/or a spherical coordinate. And there is a reason (already given as Poincare's conjecture) why we may choose the spherical coordinate system as our model here.

Our Point of Departure, Perhaps:

Here pretends ultimately to be an alternative explanation of/or alternative imagery to the so-called Higgs mechanism. Eventually this paper is coming at a time when news is discovery of the Higgs boson with the implicit further confirmation of the standard model of particle physics. Meanwhile, our hypothesis suggests rather amending current understanding of the standard model itself (strangely though here "predicts" a value of the supposed higgs particle that at 1.14651×10^8 kg^4 m^{10} / s^8 C^5 one can say comes rather close to the CERN[9,10] effort).

While it is generally accepted that moving modern physics ahead requires something beyond the standard model as presently understood, pinpointing exactly what change is required has proved often sophisticated and unwieldy. This present proposition must appear in context then naïve (might as well be, in the sense of *naïve set theory*).

In any case, the thesis here indicates to one to furnish in simple intuitive terms a foundation for physics (and hopefully all science) similar to that afforded mathematics[11] by the trio of Peano's axioms, Godel's second incompleteness theorem and the Zermelo-Fraenkel set theory (ZFC).

Wigner[12] has called attention to the *unreasonable effectiveness* of mathematics in the natural sciences while several writers have in response called attention to the even much more *unreasonable ineffectiveness* of mathematics in the social sciences. One could say that the singular problem of quantum gravity embodies in modern physics this fundamental lacuna.

Presently, however, we argue that the gap between quantum theory and general relativity is by definition itself a duality – at once an *uncertainty* principle and yet what one may call now an *entity principle*, and we are persuaded that the latter perspective indicates to be a more holistic/useful treatment of the problem.

The Kernel:

It does not seem that one can practically define the term *observable* without first defining the term *observer*. Attempt to proceed otherwise seems to be at the root of the so-called measurement problem in quantum mechanics. So what is an *observer*? An observer is by our definition the virtual exchange (think, the "field", "boson", "wave function") of the standard model. We insist that it is by definition the unobservable; it is evident only as the connectedness of every observable else to every other. And this view is not so strange if one for instance calls the observer simply now "energy" (or zero energy). For, according to Feynman on the notion of conservation of energy:[13]

"It is not a description of a mechanism, or anything concrete; it is just a strange fact that we can calculate some number and when we finish watching nature go through her tricks and calculate the number again, it is the same."

One might as well think of the observer as the same we know traditionally as a conservation law (but the concept of a "law" already carries with it the burden of human artifice).

Basically we suggest that a *conservation law* is actually the same Everett has called the universal wave function.[14]

We prefer to think of it *biologically* now as the all-or-none[15] nature i.e. generally the modulus, the connectedness of all things or simply the *irritability*; if *sensibility* (sensitivity or sentient-ness) and which all go to say simply the constant of Peano's as per se the "universe" (entity) or vice versa.

In wave mechanics we may think of the observer as the normal mode (standing wave; fundamental) and his observables as the overtones (antinodes; amplitude; relative intensity). Our observer is the *entity* (superposition; phase space; wave function) vis-a-vis his observables as the *identities* (the wavefront; wavelets; wave vectors; phase-points or wave function "collapse").

FIGURE 1: the standing wave as a spherical coordinate

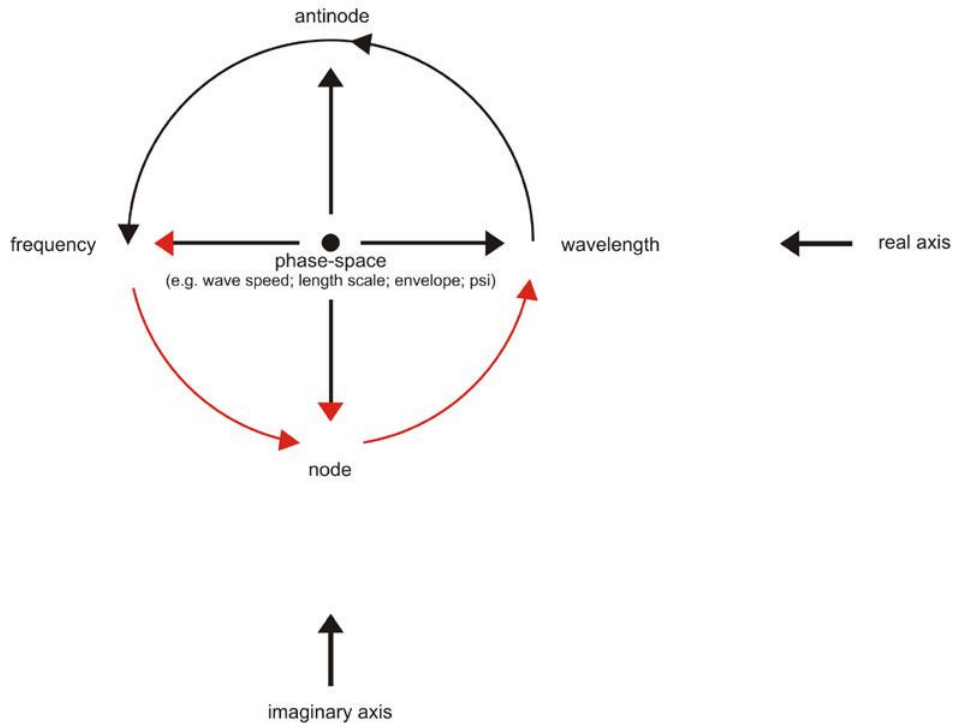
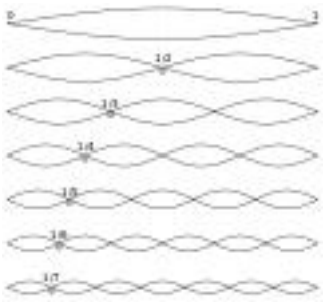


Figure 1b



Standing waves in a string — the fundamental mode and the first 6 overtones.

(courtesy: Wikipedia)

And how is it that they are in practice *separated* one evolving deterministically the latter probabilistically? This question may be framed differently: does any so-called observable exist without an observer? The response is obvious: it does not seem that our model here of the observer or of the observable has anything resembling an intrinsic absolute nature outside that prescribed by relative states[15].

Now once we can (1.) think of the observer as the unit of/or measurement proper (i.e. the sample space or probability *unity* or the configuration space indeed as a Markov property the same Born[16] has termed the "collisions" and presently our virtual exchange or, still, in Newton's inverse square law formulation the *constant of proportionality* "G") once we can think of the observer simply as the equality (isomorphism) we can then (2.) allow that observables are altogether the *inequalities* (perturbations) or probability amplitude proper if in the sense of collision the *Compton shift.*[17] We find thus that there is no separation actually (as is well born out by chaos theory or dynamical systems theory or decoherence theory) between the two concepts of determinism and chance: the observer is by definition stochastic i.e. Markovian, like the concepts of entropy; energy or indeed any conservation law as articulated by Noether's theorem[18] and the Hamiltonian[19] approach. The observer is the teleology proper; the fundamental or normal mode i.e. the state space for all times namely ψ. And then the observable is in being the amplitude the instantaneous state (relative states[15]; relative intensity; overtones i.e. by all qualitative descriptions the octave namely $|\psi|^2$). The observable is as it were a particular direction of/or *flow* of the observer as per se the entropy.

To put it all GR wise, when we consider that all observers (whatever observer may mean) are to be by definition *not* preferred one over the other, meaning: (a.) they are simultaneously valid and hence (b.) distinct one from the other, immediately we face the need for some kind of isolating/selecting mechanism i.e. we expect some form of polarizability; essentially a

mechanism for telling us exactly which observer-observable(s) we are [at]. Call this a Higgs mechanism (spontaneous symmetry breaking) or call it a Fourier or Lorentz transformation etc. But we must note just again that by definition any observer is the *all-time state* so in fact there is NO practically or qualitatively differentiating between observers. Another way to put this must be that the observer is something you may only BE as against OBSERVE.

If one then thinks of the observer as the *it* (vis-à-vis the *bit*) then we have essentially quantum physics (as outlined by Bell's theorem). If on the other hand one thinks of the observer as the *bit* (vis-à-vis the *it*) then we have it will seem the classical notion of entropy (isolated system) and the consequence known otherwise as the second law of thermodynamics namely: information (in the sense now of the changeability of the arrow of time, also known by Darwin as "evolution" and by QM as decoherence) can only be increasingly constrained i.e. apparently deterministic and having a fixed path.

It is therefore the proposal herein that the natural form adopted by this isolating or selecting or changeability of the arrow of time (if namely the Higgs mechanism) is entirely explainable as resonance (in the form of a Huygens principle of sorts as that is "interference" or "beating" or dispersion or diffraction indeed anything we may know as wave characteristics/interaction or simply as vector summation). The essential tenet is that only the self-same wave (the stationary wave) CAN be deemed to interfere i.e. there can be only one fundamental; so all observables may be regarded simply as the "progressive wave" if more precisely as wave numbers or overtones or the wavefront/wavelets of Huygens. That is, any event is by definition an inverse-length of sort.

In other words, tied to the notion of the observer as the unobservable (non-local action) is the [deterministic] reason that it is a Markovian – the norm 1 (You can think of this norm qualitatively as in renormalization theory the radiation gauge; this is the [universal] constant as at once also the effective infinity or vice versa.) Meaning now, we see the de facto observer as the definition of "nothing" or "all-things" – it is the conservation law by any name.

Moreover, being in their own rights latently also conservation laws, it is the observables (the wave fronts) that do seemingly break the observer's symmetry *relatively* (i.e. spontaneously; elastically) or, in extreme cases such as exemplified by a "collision", *absolutely* (i.e. inelastically).

An observer is then the fundamental mode if the resonance frequency. It is herein called simply the entity and this does not at all imply it has any special or mystical features, it might

as well be called the "space-time" – the natural *unit* of space versus time (think, *matter* versus *the antimatter*). Or it might be called the "uncertainty" or "virtual exchange particle" – i.e. the natural *unit* of measure of wave versus corpuscular natures. Indeed hereunder we push this notion far enough for the observer to mean also the "life"/"mind" or just genus—i.e. the natural *unit* of measure of speciation (evolution versus "involution" i.e. extinction/emergence of ***sensibilities*** (species). Now then such *path* will range necessarily from the "living" through to the "non-living" of systems etc. But it will always represent as it were the "curvature", going by Einstein, (if relative intensity or Gausiian distribution) of/or the amplitude of a space-time (observer).

Indeed once we can identify the effective observer as a field (universal constant) we also effectively per adventure drop the "relative" from *relative intensity* for then we technically thereby invalidate alternative frames of reference. This consideration permits us now to in an a-priori sense define the term observer as a Markov property; the notion absolute value (in the sense of Newton's *absolute time*). It needs no cause for the simple qualitative reason that it is the ground (if vacuum; fundamental) state. It is the very absence of disturbance in the intuitive sense of a "nothing" or "infinity" or "rest". It is mathematically the imaginary unit or infinitesimal

So our matter is by definition a complex value: $X+^{i}Y$ wherein x versus y are any two observables as signifying Peano's natural numbers the odd versus the even (i.e. any *two* points in space and/or time or QM's spin up versus spin down) this is provided one has arrived at the relevant flavor of the imaginary unit *i* (the space-time or virtual exchange particle or spin zero) namely the observer as a natural unit.

The historical question of meaning of the imaginary unit is well documented. One can only add now that it should be found that the historical lines of argument about the meaning or validity of the imaginary unit will in physical terms resemble that between the hidden variable versus Copenhagen interpretations[20] of QM. The part of Everrett's interpretation is thus actually that our imaginary number (Everett's universal wave function) versus its real numbers "x" and "y" (QM's *observables*) are actually concurrently co-existent and inter-influencing as it were one the other.

This is such that ultimately we are faced with the material fact that for every symmetry broken there is a symmetry created, and vice versa. In the least our present model makes these comparisons possible. It mutes the dichotomy between determinism and probability and by extension it mutes the so-called measurement problem.

This is in the least because we can now see any observer as representing somewhat the Poincare cut (think, Heisenberg cut*)[21] i.e. the renormalization[22] (or radiation gauge[23]) such that what QM identifies as probability densities (expectation values) are actually only the amplitudes or noise or perturbations (relative intensities) as measured by this cut—namely, the de facto observer. What modern theories have stopped short of saying is clearly now our hypothesis: any given observer is the "vacuum" proper (the field; uncertainty; nothing; zero point energy; entropy; imaginary unit; conservation *law* or by Peano the "constant" [of proportionality]") implying in fact the cut-off for all observables. This same is in other words the non-local/length scale.

Presently we itemize all the above arguments just again under 4 axioms:

a.) An equality (invariance) is an entity namely *observer*.
b.) An entity (observer) is not an observable.
c.) Observables, namely identities, represent inequalities (i.e. fluctuations; variables; proportions) thereof.
d.) There can thus be one and only one valid (i.e. de facto) observer/entity.

A few specific data may render this picture in the immediate more refutable.

Our "Predictions":

Now we will grant that man, meaning, oneself (whatever this may mean in physical parameters) is unarguably to be also one's first hand instance of the term observer i.e. one is to oneself the purest sample of the term entity (observer). Below we suggest then a schema for demonstrating in a general sense man as constituting *the entity* which non-locality we illustrate as the spherical coordinate system perhaps a geometric equivalent of the standing wave or potential. This permits us at least nominally to illustrate his observables as the three dimensional point/particle (if wave packets or wavelets of Huygens) located in a potential.

The crucial thing right away is that *life, mind* or entity is the meaning we give herein to modern notions like quantum scale, space-time, virtual particle, spin zero* (Higgs field[24]) etc. And this is in line with our thesis that any given observer is the valid radiation gauge[24] (the true vacuum, action) such that all observable matter and phenomena evolve from thence i.e. all symmetries break forth from thence and otherwise may be defined extinct only by agency of this unit. In other words, we think of the *self* as the most natural of units.

We find thus that analogous of a combined Newton's and Coulomb's inverse square law we have that:

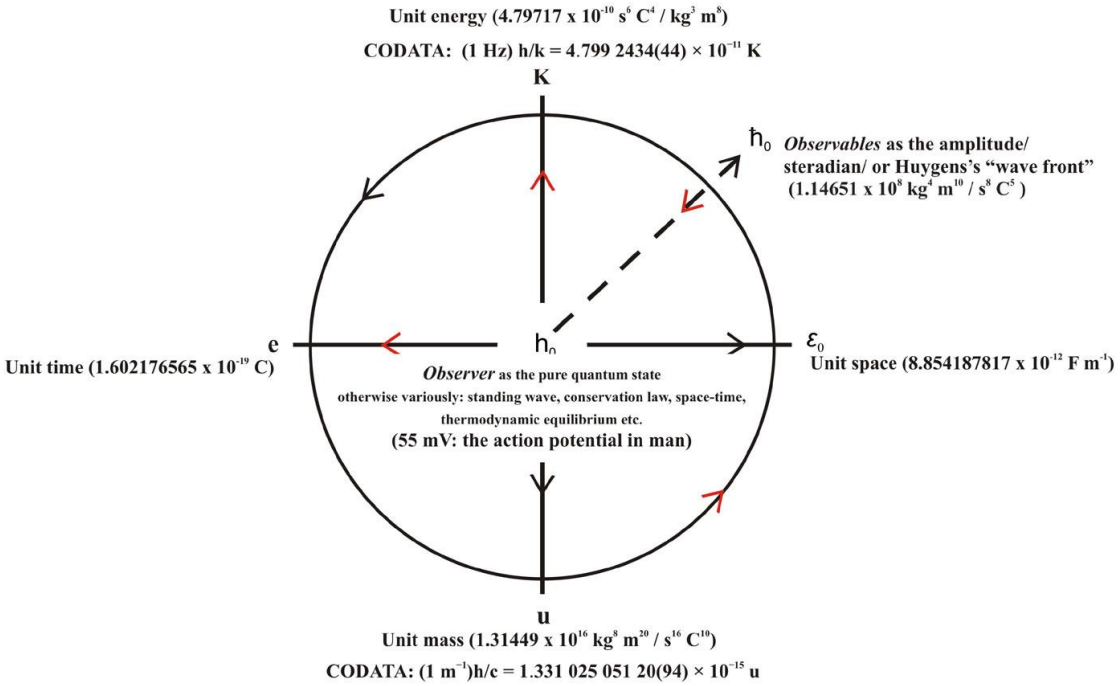
$h_0 \, (e^- \, e^+) \, / \, (\varepsilon_0)^2 = \hbar_0$ ……..(1.)

wherein, h_0 is the threshold potential of the action potential[25, 26] in man (as representing perhaps the *de facto* observer) and which we shall call herein after simply the action potential, *e* is the elementary charge (or unit time), ε_0 is the electric constant (or unit space) and one can say that $\hbar_0$ is at once representative of the reduced Planck constant or reduced Compton wavelength. And $\hbar_0$ is in fact our present notion of the so-called Higgs particle or more literally Huygens's *wave front*. Incidentally one can say that at the calculated value of $1.14651 \times 10^8 \, kg^4 \, m^{10} / s^8 \, C^5$ this value is rather quantitatively close to the LHC reported value of 1.25 GHz eV although presently the qualitative meanings seem clearly worlds apart. Detailed dimension analysis may further explain this value and may indeed relate them.

The singular and simplest claim (or prediction) one can make based on the data indicated is that man "h_0" is to be the effective Planck constant, as it were, for quantum gravity (we have herein adopted the symbol h_0 to encapsulate sort of a notional free-size only ad hoc Planck constant).

Furthermore, note the general relationship in figure 2 below. The idea is that movement in any one direction reflects instantly in every other direction such that any point we choose within this sphere has unique value in every other direction, which situation amounts to what we may call symmetry:

FIGURE 2: the observer as a standing wave/spherical coordinate



It may be said for formality that we derived h_0 thus:

$\varepsilon_0 / e = h_0$…….. (2.)

But the calculated value namely 5.52635 x 10^7 s^2 C / kg m^3 seems not to fit or predict as perfectly as does the measured value of the threshold of the action potential in man namely 55mV. One is left to choose which value proves more predictive or practical.

Basically we mean to show now that as a sequel to the de Broglie hypothesis: momentum = total energy = a conservation law = PEANO'S "CONSTANT" = the given (i.e. *de facto*) observer namely here h_0 as the effective "superposition" or Compton wavelength (or so-called rest mass-energy). Implicit is that the "Compton shifts" i.e. the decoherence or evolving interference patterns of the observer proper defines the observables or speciation(s)/traits of Darwin's evolution or the *inverse-length* or wavelets of Huygens's or the wave numbers of quantum mechanics (quantum decoherence). We return to this in detail in part 2 of this paper under the sub-head, "Quantum Decoherence as Darwinian Evoltion"

Suffice it to say now that in accord with the wave equation:

$c = f\lambda$ ……(3.)

and the de Broglie equation (in four-vector)*:

$P = \hbar K$ ……(4.)

we claim now that it should be valid that:

$h_0 = \hbar_0 K$ ……(5.)

Here we may see K as a wave packet (a four-vector inverse length; a wave number or envelope.) The important sense is that h_0 is the effective length scale (wave speed) such that K is in fact an inverse length (wavelength; wave number or wave vector) while $\hbar_0$ is the "freguency". Given now that K is now the unknown (and by equation (3.) rather λ) this expression becomes:

$h_0 / \hbar_0 = K$……(6.)

Thus the value of K is precisely: 4.79717 x 10^{-10} s^6 C^4 / kg^3 m^8. We may take "K" then as representing CODATA (1 Hz)h/k = 4.799 2434(44) × 10^{-11} K. Also note the result when instead we take h_0 as the base of $\hbar_0$, then K = 2.08456 x 10^9 kg^3 m^8 / s^6 C^4 possibly indicative of CODATA: (1 K)k/h = 2.083 6618(19) × 10^{10} Hz namely the Boltzmann constant in Hz.

And then to get the reciprocal of K given that the inverse of a log operation is exponentiation we have that:

$(\hbar_0)^2 = u$ ……..(7.)

In which here u is precisely: 1.31449 x 10^{16} kg^8 m^{20} / s^{16} C^{10}. We may take "u" then as representing or at least replacing CODATA: (1 m^{-1})h/c = 1.331 025 051 20(94) × 10^{-15} u

Generally speaking, "h_0" is the *observer* as defining any *entity* (pure quantum state/scale) or a "life" or "space-time" or "thermodynamic equilibrium" generally hitherto the perhaps a "conservation law". Accordingly $\hbar_0$ is the "time" and K is the "space" —these latter two as meaning any *two* observable traits/symmetry/charges/species i.e. any differences (inequality) of/or traits as measured by the given observer (space-time). In other words, an entity (observer) is by definition a unique unit of measure of such differences.

Meaning, an observer is simply the stationary action if in applied terms the potential/ equilibrium/fundamental/normal mode/standing wave (and this we call simply the "entity")—it being in effect a *generalization* of the notion "universal constant" to mean same as "universal wave function" or just "universe" i.e. ***natural unit cum natural limit*** of physical information.

Clearly this function of being at once the unit-and-limit is the essential utility of such as Planck's h, Newton's G, Einstein's C, indeed any universal constant (they are related only in so far as for specific purposes one must be found to be more natural i.e. ***de fact*** than the other). This same property by which an element is at once the *unit and limits* is what we mean here simply by the term *observer*.

To bring out this so-called relativistic (mass-energy) or "conservation law" attribute of our specific observer now namely h_0 let us note immediately also the 4 following sequence of supporting data:

C / h = 4.52444e+41 / kg m ……(8.)

Wherein *c* and *h* are respectively speed of light and Planck's constant (CODATA page 81).

Meanwhile:

h_0 / h = 8.30054e+31 / s C……(9.)

wherein h_0 is our man value (the action potential in man).

And then:

C / h_0 = 5.45077e+09 s C / kg m ……..(10.)

Note meanwhile that this value suggests to be a rephrasing or correction of Einstein's c^2 in the mass-energy equation E =mc^2 such that we have now as the more *natural* value to man h_0 rather the *root* and not the *square* of speed of light).

Altogether as relating roughly the so-called natural unit we have that c, h, G (the Newtonian universal gravitational constant) and now man h_0 as simply:

$G / h_0 = 3.83810083 \times 10^{16}\ m^{-2}\ kg^{-3}\ s^3\ A$ ……(11.)

"G" being here in the $(GeV / c^2)^{-2}$) unit is defined in CODATA as ($G / \hbar c$).

With regard to these last four equations one can only note that the import(s) altogether is a matter to be investigated but crucial must be the fact that going strictly by the indicated dimensions, equation (10.) is sort of the conversion factor or unification of equations (8.) and (9.). Meanwhile, this "unification" may be more conventionally understood presently in the sense of equation (11.). So what is significance of the value $3.83810083 \times 10^{16}\ m^{-2}\ kg^{-3}\ s^{3}\ A$? We think it may be understood in the sense of a reduced Compton wavelength of the electron (or $\hbar_0$), see CODATA page 74, when our man value h_0 is the effective "rest-mass energy" or "universal wave function" i.e. the *de facto* uncertainty relation.

Over all, it seems we can assert that a "mass" is a [reduced Compton] wavelength and an "energy" is a [Planck] frequency such that any ***observer*** is by definition the phase space between them (as defining a conservation law; or Compton wavelength, or mass-energy or wave speed). We think "phase space" now in the sense of say the Snell ***constant*** (Huygens's "wave speed") between any two refractive indices (wave fronts) as by definition the negative versus the positive indices respectively (in the sense of Kramer-Kronig). The import is that we have any ***observable(s)*** as by all practical purposes an inverse length—the positive refractive index (so then the "frequency" of Planck's is always masked in the form perhaps of being the *binding energy*. Conversely put, any given observer/phase space is a unique length scale (fundamental) by which we must define the Planck "frequency" making *frequency* in practice strictly an inverse-length or overtone/wave number/wavelet i.e. it is relative strictly to the given observer as *its* phase-space (think of the observable/measurement result as by definition thus the "collapse" of a wave function).

Meanwhile, the observer is by definition thus the *superposition* in the sense that (1.) It is the fundamental (observer; phase-space) that uniquely determines the overtones (observables; overtones) and (2.) any such fundamental is actually a Markov property (a modulus, absolute value) in the sense that it is entirely an arbitrary.

Explaining this Model:

One is not very competent to adequately interpret or formally derive the relationships above but the singular and simplest claim (or prediction) one can make based on the data indicated (CODATA page 81) is that man "h_0" is to be the most natural/fundamental of our units (we have herein adopted the symbol h_0 to encapsulate the observer as sort of a notional free-size only ad hoc Planck constant).

The Inverse Length (wave front) as Direct Measure of observables/Quantum Decoherence:

Generally we assert that an observer is per se a distinct invariance (conservation law, universal constant, geometric space or in QM the "entanglement") or more generally in mathematics an isomorphism such that his observables are the "points" (properties or sets) within this space i.e. crudely the Peano's "natural numbers" and are measured therefore in units of the observer.

It must follow then that, a Godel's 2nd incompleteness theorem is equivalent to a Newton's/Coulomb's inverse square law BUT with the viso that the inverse square law now obtains in reverse such that "force" i.e. "strength of interactions" INCREASES with distance (compactification) from the observer and then DECREASE, indeed ultimately evolves to become the observer proper namely the GR "inertial frame". And this is to be expected since force is the opposite of inertia. Furthermore, this permits perhaps the equivalence principle arguments of Einstein's.

We will suffice it now to say that merging the twin classical notions of distance and observer into one notion of a *non-local observer* say a ***unique*** gravitational constant "G" suggests now the QM notion of entanglement —if the *inertial frame* of GR. It only means that a Newtonian "mass" is no more strictly a weight; it is an evolution in the sense of a quantum number i.e. a distinct matter species or speciation as one might get on the periodic table or in heredity; it is a particular convolution (configuration) of the space-time which space-time defines now the given observer (as the effective *entanglement* or phase-space).

The key thing now is that we get the apparently paradoxical effect that "force" (not just the gravitational, indeed any "force" in so far as we may then think of it in QM terms as the Hilbert space; infinite dimensional space or as dimensionless-ness) is by definition fictitious.

However, one interpretes this fictitiousness as only describing the Newtonian attribute "infinitesimal" (virtual work) — it being at once Godel's consistency AND undecidable (i.e. per se the *incompleteness*) and which is most precisely put: the given observer. We see this "incompleteness" as explained by the fact that any given "[universal] constant" or "observer" is only the de facto non-locality (think, number basis); this being by definition the *entropy (if defect mass)* i.e. the inverse of the natural numbers as the apparent "masses" (observables; particles; phase points or per se information/negative entropy).

Ultimately, what GR has called the "space-time" and QM has called the "wave function" and SR has called speed-of-light is simply now the observer (as perhaps the ***ground state*** and ultimately conservation law) and then his observables (the *matter* in GR and *observables* in QM) are by definition now only the curvatures i.e. relative intensities (inverse length; wave

vector; wave number as measured that is by the observer). Indeed going by the tenets of QM observable matter is the squares of amplitudes of a given wavefunction (*space-time; matter wave*). In a nutshell, we find that observable "space" and "time" are but the natural numbers (the odd versus the even) of Peano's and accordingly the "particles" (the bosonic versus the fermionic) of QM. That is, they are by definition the *relative* intensities/wave vectors as defined necessarily by/from a given quality factor (standing wave) which standing wave defines for us now the invariance i.e. the "constant" of Peano's— information (observables) are as it were the relative intensities in the sense of "octave", inverse-length, wavelets or "decoherence" i.e. per se the spontaneous symmetry breaking of any reference field (observer).

Thus the observer is *ab initio* evident as the term "energy" (wave nature) but ultimately as the "binding energy" (standing wave) while his observables are *ab initio* evident as the "particle" (wave vector; mass) but ultimately as rather the progressive wave. Now add to this understanding the further assumption that the very notion "standing wave" is by definition really only the infinitesimal state (virtual work; universal constant) on which eventually must be predicated the notion of a progressive wave (node or antinode). The *universal constant*, and now our *standing wave* by any name is necessarily then tentative (i.e. *ad hoc* by Planck's own view of his "Planck constant" and *fictitious* by Einstein's own view of the universal gravitational constant of Newton's). It becomes clear that we have here essentially the equivalence principle of GR doubling as the uncertainty principle of QM, reason: for every particle creation there is particle annihilation; for every symmetry-breaking there is symmetry-creating. When we think of equivalence as only a constructive interference (a "potential" or genus or "gravitational mass/orbit" or *resonance*) and uncertainty as a destructive interference (a "force" or mutation or "gravitational perturbation" or damping/decoherence) it becomes clear that in dealing with a constant (field; collision; virtual exchange) we are dealing at once with *both*—in the sense of a charge conservation law.

But now, to simplify, we would rather think of any reference frame (preferred or not so preferred) simply as the "entity" (observer) if traditionally speaking the *entropy* or *uncertainty or conservation law*. Conversely observables are the information or probabilities (certainty; expectation values) within this mathematical space.

The foregoing should give us deeper perspective of equation (1.) above wherein "h_0" is an entity (distinct conservation law) in the sense of a Compton wavelength. Its *relative* inelasticity (amplitude or antinodes) say "K" in figure 2 defines then a Compton shift while

its relative elasticity (wave length, frequency or node) say "u" defines a de Broglie wavelength (namely an instance of momentum or *fundamental frequency*).

Precisely, $\hbar_0$ redefines for us the Newtonian notion of force such that it is by definition a duality i.e. an action/reaction pair a self-same entity or momentum (namely a mass-energy; space-time; complementarity principle or just a genus in biology). Now one argues in a nutshell that $\hbar_0$ must have the significance of an inverse length wherein h_0 is the effective metric or length scale or, simply put, the superposition.

The experimental question therefore arises, may we accordingly better measure quantum decoherence (if spontaneous symmetry breaking) simply as the inverse length if "mass" or "particle nature" (wave number; quality factor)? Bearing this in mind it may be instructive to note that inverting equation (1.) to the form:

$$h_0 \, \varepsilon_0 / (e^- e^+)^2 = \hbar_0 \quad \text{.....(12.)}$$

gives us a value of $\hbar_0$ whose dimension is more directly perhaps resembling inverse length, namely:

$$1.8234354 \times 10^{13} \, m^{-5} \, kg^{-2} \, s^5 \, A$$

(as an aside, one is remotely persuaded that this value may somewhat signify the overtone or octave (think, inverse length, wave number) if the first stages of a nucleosynthesis—in the sense of a tunneling or resonance or mutation say a unique proton-electron mass ratio as now but an actual dimensioned field strength, signifying mutation process in a lone DNA as hypothized by Per-Olov Löwdin[27,28]) This is such that to flip our observer system (biological man) should be analogous to a CTP symmetry flip in a sense in which to inherit or express one trait is to disinherit or suppress another.)

Over all, to explain this inverse length notion it seems we may regard that any given observer is effectively the pure quantum state[29] but essentially this is the standing wave (i.e. the effective potential or fundamental if so-called *wave speed* or more strictly *constant* wavelength) in the sense of a Compton's and de Broglie's wavelength.

That is, any given observer is the effective "universe" (Everret's universal wave function) in the sense of a phase-space or charge conservation law such that all observables are by definition the "charges" (i.e. the relative elasticity if de Broglie-Compton wavelength or otherwise the plasticity—the Compton shift as merely a shift in Heisenberg's "position" or a

shift in quantum number or gravitational orbit, very possibly merely an overtone/octave of the observer as by definition the fundamental). A phase-space is an arbitrary, in fact absolute, quantity/quality.

Observables must be analogous to the "x" versus "y" elements of a genus "*i*" be it in biology or QM or general complex analysis such that an $x+^{i}y$ is a complete obsever-observables state (i.e. a so-called superposition) but which we deem now as defining simply an entity (or "universe"). It is such that securing by whatever means a flavor of "*i*" (the imaginary part) other than the subsisting one is tantamount to quantum decoherence or spontaneous symmetry breaking. We return to this latter under the heading Darwinian Evolution as Quantum Decoherence.

What is important to see now is that validity of both the Heisenberg and Schrodinger pictures of the wave function imply that we must regard any given observer as by definition the stationary state i.e. the action proper and pure quantum state (meaning in GR the "space-time"). Observables are essentially then the apparent maxima and minima of the "action".

In a statistical sense perhaps, if equation (1.) is representative of the mean free path (defect mass; wave nature) then equation (12.) must be representative of the cross section (binding energy; corpuscular nature) or vice versa and thus any observer given (strictly by the extent it is given) is the uncertainty relation proper between these (i.e. the mass-energy or space-time as meaning no more than the radiation gauge) if namely the entropy or ground state or zero point energy etc and which must be same then as a phase-space. In other words you may think of any observer simply as the Laplacian.

Now as a summary think of our four axioms again:

(1.) An equality is an entity (see this as the invariance i.e. the *observer* proper)
(2.) An entity is not an observable whatsoever (it is the superposition or "connectedness" of all things else)
(3.) Observables represent inequalities (i.e. perturbations; amplitudes; proportions) thereof.
(4.) There can thus be one and only one valid entity (every other is hypothetical).

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