Abstract – Our goal is to demonstrate how, with a self-generating operator, can be achieved emergent properties and how the measurements of a physical system can be expressed by a recursive bi-cyclic, in the S/T. We pushed this to determine level jumps and identical entities, and how the two are related to each other. In addition, by analogy with the numerical model, we try to prove the existence of a change in energy between aggregate system and single (or unique) system. Conceptualize the possibility that a system, with identical entities, has a form of unobservable energy.

Keywords: emergent properties, recursive loop, identical entities, tearing space and time, the numerical model, unobservable energy.

1 Systems, emerging Properties and Self-generating Operator

One of the crucial points, in the study of complex systems, is to determine the difference between holistic system (or Single, Unique) and aggregate system. A holistic system is, typically, defined as a system of elements, that has properties do not found in the individual elements that make it up. The combination of these elements together, under certain conditions, reveals new properties. [1]

1.1 Definition of emerging Properties

In general terms, an emergent property is a property not present in the constituents of the system, but present in the system as a whole. They occur after exceeding a critical level, a crucial point, emerges as a real jump in level. Our first step is to define this jump in level, in terms of measure, and the reference system. In my paper of 2006, I called the measure, of an emergent property, in the following way: If we measure the constituents of a system \( e_1, e_2, \ldots, e_k \), with respect to a reference system \( \mu \), their aggregation with \( \sum_k e_k \), and \( E_u \) the measurement of the single system, with respect to a reference system \( U \). Therefore, an emergent property, can be measured if between the measures \( \sum_k e_k \) and the summed measure \( E_u \), there is a factor of incommensurability \( \Theta \). But this definition is valid only for systems that have the points of incommensurability in a change or bifurcation point. For example, if we take 4 components, measured in \( \mu \), \((1, 2, 3, 4)\) and two systems resulting, measured in \( U \), that are A, if \( \sum_i e_i < 10 \), and B, if \( \sum_i e_i \geq 10 \). We set a rule, that you can add only 3 and more elements without repetition, and that any measurement of an element can bring with it a factor 0, from 0 to 0.5. Then we have: \( 1 + 2 + 3 = 6 \div 7 \), and the result will always be A, the same is true for \( 1 + 3 + 4 \). With \( 1 + 2 + 3 + 4 = 10 \div 11 \), the result will always be B. If we have \( 2 + 3 + 4 \) the result will fluctuate as a bifurcation point \( 9 \div 10 \), so we will have some cases with A and other with B.[2] As can be seen, the incommensurability factor, present to the measure, becomes a decisive factor only if it helps to determine the transition from one branch or the other, at the point of bifurcation. But there is another way in which the factor \( \Theta \) can interfere with the determination of the properties of a single system (or holistic), and is in the determination of entities measured as identical, and which together form the system. We will try to demonstrate how precisely their presence can generate new emergent properties, that are manifested by changes in energy and real level jumps between constituents and systems.

1.2 Generation of a measured system through the Operator \( \Gamma \)

In the essay “Lineamenti per un nuovo modello per i sistemi complessi” called a self-generating operator \( \Gamma \), can occur as a rule and as a symbol, and then be able to act on itself by determining the space of possibilities of the system. The mathematical operator, that is closest to this idea, is the recursive loop, and we explained how the measure of \( \Gamma \), \( Msr(\Gamma) \), is precisely the space defined by a recursive loop, which we call space \( o \).[3]

We consider \( \Gamma^i (\Gamma) \), how the action of \( \Gamma \) on \( \Gamma \) generating a space of possibilities, yet to be determined since it is not measured. Now call a reference system capable of measuring as coexisting, these states of the system, i.e. \( \Gamma^3 (\Gamma) = \Gamma + \Gamma + \Gamma \). We have seen how, in terms of the operator \( \Gamma \), this means having a system with cardinality 3, or \( \Gamma_3 \), and a system with cardinality 3, or \( \Gamma_3 \). The different position of the measurement allows us to switch from one to another reference, in fact:

With the measure \( Msr(\Gamma^3 (\Gamma)) \), we have one of the states of the system and with \( \Gamma^3 (Msr(\Gamma)) \), we have the determination of 3 different measures. But if we consider the system with respect to a time interval \( \Delta t \), it can be seen its components coexisting to the condition that they are all differentiable. [4] So we have:

\[
Msr(\Gamma^3 (\Gamma)) = Msr(\Gamma_1) + Msr(\Gamma_2) + Msr(\Gamma_3)
\]

and

\[
\Gamma^3 (Msr(\Gamma)) = Msr(\Gamma_1) + Msr(\Gamma_2) + Msr(\Gamma_3)
\]
In the first case, we have the measure of the system as a single system, in the second case as an aggregate of elements. But what exactly is the $\text{Msr} (\Gamma)$ with respect to a reference system $\mu$? We have defined a measure as a certain algorithm that expresses the result in a specified value (finite) space-time. [5]

$$\Gamma_1 = \text{Msr}(\Gamma_1) + \theta_1 = s_1\mu + \theta_1$$

(3)

Where $s_1$ is the measured value with respect to the unit of measure of the $\mu$, and $0$ is the factor of incommensurability of measurement. Now if we consider these 3 measurements as 3 components of a system, their sum give the system as an aggregate of elements:

$$\text{Msr}(\Gamma_1) + \text{Msr}(\Gamma_2) + \text{Msr}(\Gamma_3) = (s_1 + s_2 + s_3)\mu$$

(4)

If we consider the measure of the system as a whole, as a single system, then we will make an overall measure of it with respect to a $U$. That is:

$$\text{Msr}(\Gamma'(\Gamma)) = \text{Msr}(\Gamma_1 + \Gamma_2 + \Gamma_3) = SU$$

(5)

But even here we have:

$$\Gamma'(\Gamma) = \text{Msr}(\Gamma_1 + \Gamma_2 + \Gamma_3) + \Theta = SU + \Theta$$

(6)

Where $\Theta$ is the factor of incommensurability, we have:

$$\text{Msr}(\text{Msr}(\Gamma_1) + \theta_1 + \text{Msr}(\Gamma_2) + \theta_2 + \text{Msr}(\Gamma_3) + \theta_3)$$

(7)

$$\text{Msr}(s_1 + s_2 + s_3) + \text{Msr}(\theta_1 + \theta_2 + \theta_3)$$

(8)

Since the two measurement systems $\mu$ and $U$ are always commensurate with each other, and will be $\text{Msr}(s_1 + s_2 + s_3)$, as a factor $U$. The question is whether we can measure with $U$, the sum of the factors of incommensurability components $\text{Msr}(\theta_1 + \theta_2 + \theta_3)$, or if this is not possible. If we can, then we have:

$$\text{Msr}(\theta_1 + \theta_2 + \theta_3) = S\mu \in \text{Msr}(s_1 + s_2 + s_3) = S\mu$$

(9)

and the total size of the system $(S_\mu + S_\mu)U$ and so, with $U$, will be measuring something different from the sum of the measures $\mu$. If it is not possible then, $\text{Msr}(\theta_1 + \theta_2 + \theta_3) = \Theta$ and this means that $\text{Msr}(s_1 + s_2 + s_3) = SU$, the aggregate of elements corresponds to the measurement system as a whole. We can also have the intermediate case where only a part of the factor of incommensurability is measured. The example we have done previously is part of this formalization. These considerations have a value of example; they are unlikely to be encountered in real cases. Our goal is to assume the existence of an energy corresponding to this factor of incommensurability and it can be linked to the presence of identical entities in a system, so we can have a proof of this factor of incommensurability. But first we need to define how we can get the same measures.

2 Recursive Cyclic and measures of a system

What I want to say here, is that we can represent the space of measures of a system, through a recursive loop, as a result of the action of the operator $\Gamma$. We will call the space thus obtained, Space $\omega$; and see how, the measure of identical entities in this space, is able to generate level jumps and especially a differentiation between classical systems and quantum systems.

2.1 Why the space $\omega$ can represent the space of the measures of a system

Our idea [6] is that the measure is the result of an invariant and it is given by the relationship between the Instrument of Measure and the Object Measured. The result of a measurement is a number, this number has particular characteristics, and one of them is that it is not isolated. A measure makes sense if in relation to other measures, performed by the same instrument, at the same object, in the same way. A further aspect of the measure is that the process associated with it must always end in a finite time, limited. We can not imagine a measure that gives us its result in an infinite time. Therefore, the measurement process is similar to that of an algorithm (a Turing machine) that gives us the result in a given time, finite. The consequence of this is that the numerical values of the measures are finite numbers. So, when we show that the measure is a determination, will highlight its aspect, discreet and limited in space / time. An important consequence of this is that the set of measures is always a countable set.

Now we extend a hypothesis of quantum physics, which is a measure of an object causes a change. The act of measurement changes the measuring instrument, but according to our model, it forms, with the measured object, an invariant. This means that there must be also equal change in the object, and then the measure, as a value obtained, speaks of this variation from the side of the instrument, but there is also a corresponding from the object side. The measurement obtained is the measurement from the side of the instrument of the action of the invariant $\Gamma'$. It contains, in itself, the result of this interaction, which becomes a measurement of the variations of the object when the same instrument performs multiple measurements over time. So there is one aspect that speaks to us of the correlation between the side of the instrument and the object side, correlation is bound to the value of the invariant. But the side of the object can be varied only in a virtual way, because the actual measurement is, and remains always, the one given to us by the instrument. The use of complex numbers might represent this aspect, the imaginary component is the one given by virtual variation of the measured object, while the real component is the measure produced by the instrument.

The measure that we obtain, understood as a component of the instrument and a component of the object, and expressed by a complex number, represent the value obtained by the relation invariant. And then follows that the next action of the invariant, i.e. the next measurement, applies precisely the object of the previous measurement result; that, from the point of view of the invariant, is the result obtained from its previous action. The action of the invariant is applied on the object, but also on the measuring instrument (changed) and therefore on the number that contains this double variation. This means that the result of its action is a complex number and that its next action is applied to this value. The invariant $\Gamma'$ behaves in all respects as a recursive function, which is always the combination of the variation from the object side and on the side of the instrument. Its next action has, therefore, in turn, as
components these two aspects that become the object of its action and so on. In the case of systems that do not have variations from the object side, the action of the invariant coincides with the only real numbers and then with the measures given by the instrument. In this context, the value of the norm has a particular meaning, that of explaining the invariant as a measure.

2.2 Cyclic Recursive and Space ω of measures of a System

A recursive function is a function that has, as arguments-values, the previous results of the same function; starting from a series of initial values that are called, origin of the recursive (or trigger). The recursive can have one or more variables (in \( \mathbb{R} \) or \( \mathbb{C} \)), the result of the function is always unique. In the most trivial: we have:

\[
\begin{align*}
\mathcal{R}(x_0) &= x_1 \\
\mathcal{R}(x_1) &= \mathcal{R}(\mathcal{R}(x_0)) = \mathcal{R}^2(x_0) = x_2 \\
\mathcal{R}(x_2) &= \mathcal{R}(\mathcal{R}(\mathcal{R}(x_0))) = \mathcal{R}^3(x_0) = x_3 \\
\ldots
\end{align*}
\]

Generalizing, we have a k-tuple of argument values, also some properties are defined: the set of values resulting form an infinite set \( U \). There may be singular points of the function and there is always an order of the values, obtained from the number of times that the same is applied with respect to an initial value, the order will be isomorphic to \( \mathbb{N} \).

We define the space \( \omega \) as an infinite and countable, described by the action of recursive:

1) There are the origin points of the space \( \omega \), represented by the values of trigger.
2) The space \( \omega \) is ordered and countable.
3) The space \( \omega \) is limited.
4) Given 2 points of \( \omega \), \( P_1; P_2 \) it will always have that \( P_1 \neq P_2 \).

Another fundamental characteristic of the recursive \( \mathbb{R} \), generating such a space, is to be cyclic, i.e.: \( \exists k \) t.c. \( \mathcal{R}^k = I \) and then \( k \) is the modulus for the \( n \) values of cyclic. As we shall see if \( k \) is a prime number from which \( n = m \star k + p \), the cyclic is not decomposable, otherwise it is. Then a recursive loop creates \( k \) congruence classes \( U_1, U_2, \ldots, U_k \), where you distribute points \( \omega \), so we have:

\[
\bigcup_{i} U_i = \omega
\]

But the recursive cyclical that generates \( \omega \), has an additional feature, the infinity points in each of the sets \( U_1, U_2, \ldots, U_k \) will have a function \( F(t) \). So the space \( \omega \) will be limited by the space described by all of the functions:

\[
\{ F_1(x), F_2(x), \ldots, F_k(x) \} = \Omega
\]

Ultimately the space \( \Omega \), unlike space \( \omega \), is a continuous space. The recursive cyclic gives rise to a space \( \omega \) therefore has the characteristic of being contained in a finite set of continuous functions, whose number coincides with the modulus of recursive and denoted as space \( \Omega \). The trigger conditions change only the phase and the height of the function, and leave modulus unchanged. Also the space \( \Omega \) is a limited space, the functions described therein are limited and therefore are continuous. [7]

2.3 Bi-cyclic Operator as result of a Recursive. Symmetry

If the space of measures \( \omega \) is covered by the space generated by the functions \( \{ F_1(t), F_2(t), \ldots, F_k(t) \} \) and whether they are limited in the range of \( (n, M) \), it follows that between 2 measurements, of a certain function \( F(t) \), there will always be one, then \( \omega \) is a dense set and isomorphic to \( \mathbb{Z} \) [8]. In addition, the functions \( F(t) \) are cyclic in the range \( \Delta_t \), this means that we will have an infinite number of sets

\[
\sigma_i = \sigma(\Delta_t) \subset \omega
\]

\[
\sigma_2 = \sigma(\Delta_2) \subset \omega
\]

\[
\ldots
\]

\[
\sigma_n = \sigma(\Delta_n) \subset \omega
\]

and \( \sigma_i \neq \sigma_j \neq \ldots \neq \sigma_k \), being the interval \( \Delta_t \) constant, it follows there exists an operator \( P \) that can translate in time, from the initial set \( \sigma_i = P(\sigma_i) \). So we have \( \sigma_i = P^i(\sigma_i) \), then:

\[
\omega = \bigcup_{i} \sigma_i \quad \text{and} \quad \omega = \bigcup_{i=1}^{n} P^i(\sigma_i) \tag{13}
\]

But, we have seen, \( \bigcup_{i} U_i = \omega \) and the functions \( F(t) \) are generated by the same operator, then we have a function such that \( F_i = \Phi(F) ; F_i = \Phi^k(F) \) and this can be applied to a subset \( U_i \) of the range \( \Delta_t \). So we have:

\[
\sigma_i = \bigcup_{i=1}^{n} F^i(U_i(\Delta_t)) \quad \text{and} \quad \omega = \bigcup_{i=1}^{n} P^i(\bigcup_{i=1}^{n} \Phi^i(U_i(\Delta_t))) \tag{14}
\]

Leads us to conclude as the space of measures \( \omega \) may be expressed by a recursive bicyclical, result of a shift in space and time of operators.

If we define \( \Omega \) as the continuous space where there are emergent properties of the measures, how can we move from a countable dense set \( \omega \) to a continuous set \( \Omega \)? The answer is that in every measure, there is a factor that determines an incommensurability around the same measure. This means that for each point \( \omega \) will exist a neighbourhood of points \( \omega \) of \( \Omega \) that converge at the same point. Then the values calculated, in that neighbourhood, converge to the same measure with a certain margin of error. It can be represented as a Hilbert’s space of convergent sequences, to the limit values \( \omega \). These sequences are an infinite number but countable, their limits are the real measures \( \omega \). And for every limit, there will be \( N \) possible sequences that converge to the same limit, the resulting set of points \( \mathbb{N}^N \), will be a continuous infinity of points \( \Omega \). Formally we can say \( \omega \supseteq \Omega \), \( \omega = \Omega \). This means that if there will be an operator \( \mathbb{R} \) that generates the space of measures \( \omega \), then there will also operators \( P \) and \( \Phi \) that define a bicyclic \( S/T \) translation. If we can measure a symmetry in \( \omega \), called emergent symmetry, it will look like the symmetry of neighbourhood measures. But if there is a symmetry in the \( S/T \) of \( \omega \), then we should have a bicyclical given by \( P \) and \( \Phi \), and therefore \( \mathbb{R} \).
3 Symmetry and emerging jumps
Level

An emergent symmetry allows us to seize regularity that the measurements carried, do not seem to have. Many times the measures analyzed seem to have a chaotic distribution, but if we consider the factors of incommensurability, which we indicate as a factor in the neighbourhood of the measure, then their sum leads us to discover shapes and symmetries unpredictable.[9]

3.1 Example of emergent symmetry

We have many examples of such symmetry in fractals, in recursive cyclic mesomorphic; here we want to use the function defined by Hofstadter which we will call RH [10].

\[
Q(n) = Q(n - Q(n - 1)) + Q(n - Q(n - 2))
\]  
(15)

and \(Q(1) = Q(2) = 1\) Where \(n\) is the index of the sequence and \(Q\) is resulting value.

If we consider the distances given by \(P(n) = Q(n + 1) - Q(n)\), we see that it is clearly a symmetry similar to a homothety, and it is only evident if we consider the area of neighbourhood of points.

![Fig. 1]

This means that will exists an operator that will transform an area of \(A(P\)n points in a area of \(A(P\) points). What we find, in this symmetry, is that at some point in the sequence, there is a jump, what we want to demonstrate is how an operator self-generating, on the type of \(\Gamma\), will generate a structure of this type. And as the presence of these jumps is a consequence of the presence of identical entities, in the cycle of the recursive.

3.2 Self-generating Operator, identical elements and level jumps

If we analyze the formula RH, we see that it looks like a Fibonacci’s function, except that the values of the two preceding elements becomes indices that tell us how far the current values we take the new values, and add them together. Thus, the value becomes the index and index tells us on its value. When we defined the operator \(\Gamma\), a characteristic was that, the action of \(\Gamma\) on \(\Gamma\) defined an order of execution. For example \(\Gamma^2(\Gamma) = \Gamma^2\), but also that it defined the cardinality of \(\Gamma\) with, \(\Gamma^2(\Gamma) = 2\Gamma\). By measuring, this double aspect of \(\Gamma\) was made explicit and separated, with:

\[
Msr(\Gamma^2(\Gamma)) \in \Gamma^2(Msr(\Gamma))
\]  
(16)

Thus the action of \(\Gamma\) on \(\Gamma\) can be an ordinal action or an action that defines a cardinality, the resulting value can be interpreted either in one direction or another, and this is exactly what happens in RH. Obviously in RH, the action has on two previous elements, and then in the same way we have:

\[
\Gamma(\Gamma^k(\Gamma) + \Gamma^{k+1}(\Gamma)) = \Gamma^{k+2}(\Gamma)
\]  
(17)

Now \(\Gamma^k(\Gamma)\) and \(\Gamma^{k+1}(\Gamma)\) represent two cardinal values, if they are equal to the ordinal values, we have \(k\Gamma = \Gamma k\) and \((k + 1)\Gamma = \Gamma(k + 1)\). But if they are different, they will be \(k\Gamma \neq \Gamma k\) and \((k + 1)\Gamma \neq \Gamma(k + 1)\), if we consider the corresponding ordinal of cardinal values, we have \(k\Gamma = q\Gamma\)

and \((k + 1)\Gamma = p\Gamma\), the function will come back in the index q and p, and will take the corresponding cardinal values.

[11] The cardinal value, of the corresponding index values, will be added together to get the value of cardinal \(\Gamma^{k+2}(\Gamma)\).

Now it is quite easy to prove as if the first two ordinal items have the same cardinality, \(\Gamma^k(\Gamma) = \Pi\Gamma\) and \(\Gamma^k(\Gamma) = \Pi\Gamma\) or \(\Gamma^k(\Gamma) = 3\Pi\Gamma\) and \(\Gamma^k(\Gamma) = \Pi\Gamma\), the system will assume the structure jumps. This happens when, with a different ordinality, we have two identical items with the same cardinality. If we try to force the cardinality making them different, the resulting structure would no longer jumps. So, despite the ordinality cycle is always increased, this does not happen for the cardinality; we can say that, ordinality acts as a factor of incommensurability, present but not measured, however intervening in the determination of the measure. The point is then, that a jumping structure is generated when an operator has self-generating elements identical, and one of the reasons is the fact, that having same cardinality means take the same value of an index, and then this doubling the values, and this factor is propagated in the recursive and proceeds forward.

4 Identical Elements as a tear in the symmetry S/T. Interpretation of a Numerical Model with energy levels

We start from the consideration that the identical elements are measured as identical, in a relativistic reference system, where is the uncertainty principle of Heisenberg. If the space of the measurements, of a physical system, can be represented by a recursive, then the use of the transform \(\Lambda\) allows us to verify if and when, you have on it the same measures.

4.1 The Bi-cyclic recursive embedded in S/T

The identity of measures is seen as a singularity in the S/T, it is the result of an asymmetry which looks like a real tear in space/time. We can represent a physical system immersed in the S/T relativistic, as a recursive bicyclic that moves in space and time, in the following manner: (18)
The first cycle \( z_1, z_2, z_3 \), are all different states observed at the same time, and thus the cycle \( z_4, z_5, z_6 \), it also consists of 3 different states measured at the same time, and that will be placed at a distance from the first time, \( \delta t \). We can imagine an operator \( \mathcal{R} \) that translates the states of the first cycle \( z_1, z_2, z_3 \) in time:

\[
\begin{align*}
z_1 &= \mathcal{R}(z_1) \\
z_2 &= \mathcal{R}(z_2) \\
z_3 &= \mathcal{R}(z_3) \\
z_4 &= \mathcal{R}(z_4) \\
z_5 &= \mathcal{R}(z_5) \\
z_6 &= \mathcal{R}(z_6)
\end{align*}
\]  

(19)

as well as an operator \( \Phi \), that moves the states spatially, for which we have: \( \Phi \)

\[
\begin{align*}
z_1 &= \Phi(z_1) \\
z_2 &= \Phi(z_2) \\
z_3 &= \Phi(z_3) \\
z_4 &= \Phi(z_4) \\
z_5 &= \Phi(z_5) \\
z_6 &= \Phi(z_6)
\end{align*}
\]

(20)

If we set: \( \mathcal{R} = \Phi \), then the transformation \( \Lambda \), applied to each cycle \( z_1, z_2, z_3 \), \( z_4, z_5, z_6 \), is commutant, in the S/T, only if they remain distinct. In fact, in the case \( \Lambda^p \neq \Lambda^q \), if \( z_1 \neq z_2 \) and \( z_4 \neq z_6 \), then \( \Theta_{p}^q = \Phi_{p}^q \). If two cycle states become identical, for example \( z_3 = z_5 \), then the transformed \( \Lambda \) will be such that \( \Lambda^p \neq \Lambda^q \). The system is not commutant, it is not isomorphic to the S/T, in fact being \( z_1 \neq z_2 \), to have \( z_4 = z_5 \) then \( \Theta_{p}^q = \Phi_{p}^q \). We can also say that if \( z_1 \neq z_2 \), for \( z_3 = z_5 \), will be \( \mathcal{R}(z_3) = \mathcal{R}(\Phi(z_3)) \), or \( \mathcal{R} = \mathcal{R}(\Phi^{-1}) \) (21). [12]

4.3 Analogy of recursive bicyclic with the numerical model

The analogy between the recursive bicyclic and numerical model, leads us to define a model of systems where, if we consider the elements in the range \( \Delta t \) and the end of the cycle time, they will determine the aggregate of elements forming the system. We can represent an aggregate system as a translation operator \( \Phi \) in Space and as a translation operator \( \mathcal{R} \) in Time. If the elements remain distinct, then the two operators themselves can switch with one another, from which: \( \mathcal{R}(\Phi^i) = \Phi^i(\mathcal{R}^i) \), but this is in turn equivalent to \( \mathcal{R}(\Phi^i) \). With the analogy of the numerical model, we have systems of the type (Pattern A):

\[
\begin{align*}
\mathcal{R}(\Phi^i) &= \mathcal{R}(\Phi^i) \\
\mathcal{R}(\Phi^i) &= \mathcal{R}(\Phi^i) \\
\mathcal{R}(\Phi^i) &= \mathcal{R}(\Phi^i) \\
\mathcal{R}(\Phi^i) &= \mathcal{R}(\Phi^i) \\
\mathcal{R}(\Phi^i) &= \mathcal{R}(\Phi^i) \\
\mathcal{R}(\Phi^i) &= \mathcal{R}(\Phi^i)
\end{align*}
\]

Fig.3

In terms of measure, in the S/T, this means that we have n distinct measures, in the previous 12. Arranged as shown:

\[
\begin{align*}
z_1 & \quad z_2 & \quad z_3 & \quad z_4 & \quad z_5 & \quad z_6 & \quad z_7 & \quad z_8 & \quad z_9 & \quad z_{10} & \quad z_{11} & \quad z_{12}
\end{align*}
\]

Fig.4

It should be noted that the measurement of 12 elements is possible only when they are all different in the S/T or reconstructed on orbits distinct, they are not more so, when the system is in superposition and their orbits can not be distinguished.
4.4 Example of identity elements and energy variation in the Model

In general, we can say that an element is differentiated when it is locatable in space and time. A quantum superposition occurs when two or more elements are located at the same instant S/T, this determines the increase of frequency of a certain state compared to other measurable. Also means that identical items, of the same state, can be measured only in chronological order, i.e. they are diachronic. As we have seen, if we measure \( z_2 \) as \( z_1 \), we could say that there will still be a factor of incommensurability, which presents itself as an imaginary. The problem we have is: This factor cannot be measured as part of the system, as element. Can it become part of the measurement system, as a single system?

To answer this question we need to define an energy interpretation of the numerical model. Consider a system consisting of 9 items by a recursive bicyclic in the S/T. 9 elements are all distinguishable even if in the first cycle are synchronous, this may happen because the functions of which they lie are distinguishable. Now we want to define the elements of such a system from the point of view of energy; given, each element, an energy value and see what happens in the case of elements which are identical. We construct a system of reference energy in the following way:

[15] Rotate the axis S/T of 45 degrees, so you have on the Y axis the change in energy \( \Delta E \), and on the X-axis, temporal variation \( \Delta T \). As shown below:

![Diagram](image)

**Fig.5**

In a classic system (SC) all values will be distinguishable as \( \Delta T \), to make the idea of this, we must consider the values \( z_1; z_2; z_3 \) are not perfectly aligned with those of \( z_4; z_5; z_6 \), in such a way that the measure \( z_2 \) and \( z_4 \) is carried out on different points of T. Furthermore, if we assume \( (z_1; z_3; z_4) \), that have the energy level E, then \( (z_2; z_5) \) they will have the energy level \( E + \Delta E \), and so level \( (z_4; z_6) \), \( E - \Delta E \). The result will be that systems SC, will have elements (and orbits) differentiated, the whole energy level will be \( E_{tot} = 9E \). But what happens if we have two measured elements as identical? As in the previous case of \( z_2 = z_4 \) ? To explain this, let’s see what happens if the elements of such a system are all aligned (as shown). In this case, the instant \( T_2 \) we will measure or an element with energy level \( E + \Delta E \) or with value \( E - \Delta E \). This means that states distinguishable are no longer 9 but 5. What happens to the other possible states? Will be part of the system as a single system?

In fact, it is as if these states are not in a real way, but in a virtual way. In our model we measure a system with total energy \( E_{tot} = 5E \) with a delta of \( +\Delta E \) and \( -\Delta E \). That is \( E_{tot} = 5E \pm 4\Delta E \), but this is the energy of the system into its components, the single system is the measure of the system as a whole and not only the real part, but also of the imaginary. And the imaginary part is represented by its elements, can not be measured as elements, or \( i4E \). [16] Then:

\[
E_U = \|E_{OB} + iE_{NOB}\| \tag{23}
\]

Where \( E_U \) is the energy of the system, as a single system, \( E_{OB} \) is the energy observed in the component and \( E_{NOB} \) the energy is not observable. It is present only virtually in the system but is realized when the system becomes one. In the previous model, which will measure the energy in the single system is not \( 5E \), but \( \sqrt{64 + 1} = 8,062 \). (24)

Then:

\[
E_U = \|E + iE\| = \sqrt{64 + 1} = 8,062 \tag{24}
\]

As you can see, the system should have an energy slightly higher than that measured in its components, and this gap will increase, with the rise of the virtual components, until the configuration limit that is where all the elements are aligned. We called SC, all the systems expressed through a bicyclic in S/T, and this means that in analogy with the model number, these systems are represented by numbers divisible, within the Pattern A. So \( E_U = 8,062 \) it’s still a SC although it has a double element. We called Quantum Systems Singular (or Entangled) (QSS) those systems where the number of elements, of a cycle, is a prime number, then no more representable by a bicyclic, and therefore no longer present in Pattern A. Systems with 5E, then, no longer have a measurable structure in the S/T, they are singular systems in S/T, the energy value is assigned to a reference standard, which we call q. Therefore the systems that have, as components values of the whole, a prime number, must have a singularity which we call q, but it is not said that this
singularity is also present in the single system, in fact in the former case we have:
\[ E_{\nu} = \|E + i4E\| = \sqrt{1} = 6.403 \]  
This means that aggregate system is therefore a QSS, while the single system is a QSC and is observable in the S/T relativistic.

Let us summarize the key aspects of our model:
1) Identical elements of a recursive bicyclic generate a superposition of states. The factor of incommensurability that follows, presents itself, in terms of energy, as Energy unobservable.
2) The bicyclic systems in S/T have analogy with the numbers divisible, by a numerical model. The resulting systems can be called SC-symmetric, in S/T.
3) Systems in the asymmetric S/T are singularities, tears in the fabric S/T, have analogy with prime numbers and we call them, Quantum Systems Singularities.
4) An aggregate system, representable by two cycles of a recursive in the S/T, in analogy with the numerical model, can be measured with respect to a reference system \( \Delta E/T \).

The elements in it distinguishable form the energy observable, and the elements indistinguishable form the energy not observable, expressed as a value imaginary.
5) The measurement of a single system will be given by the norm of the complex number, obtained by the observable energy and the unobservable energy.
6) If the resulting energy represents a number divisible, it will be expressed by a bicyclic recursive in the S/T, if it is a prime number, the system will be seen as a singularity in the S/T, as an event entangled.

If such a model corresponds to reality, then we have a way to explain the existence of the hidden energy. There must be a way to generate power from a system, making observable, energy that is not observable and must, therefore, exist an efficient way to decide whether a number is prime or not.

[1] G. Massa Finoli. “Un modello logico filosofico per i sistemi complessi”, 2006, Pg. 9-17. The conditions of aggregation are as important as the aggregation itself, an example for all are the properties of materials at very low temperatures.


[4] G. Massa Finoli. Ibidem, 2012, Pg.226-232. The idea is that in every cycle, we have one and only one measure, but if the states are on different orbits and remain on them, then you can define, in a given time, the position of co-existing measures.


[9] G. Massa Finoli. Ibidem, 2012, Pg.65-73. Another way to define an emergent symmetry is the External Measure, defined as a limit to infinity of successive measures. An External Measure is a measure NOT in the reference system which makes the measurements. For example \( \pi \) is a MisEst of actual measurements of \( \pi \).


[11] Or that will be positioned on the index-values \( \Gamma(k) - \Gamma q \) and \( \Gamma(k+1) - \Gamma p \).


[15] We note that such a system is a simple conceptual model developed with the aim to uncover possible hidden aspects of physics reality. It should be noted that the energy of the elements is purely indicative and symbolic, and so the calculation resulting.

[16] The idea is that the measure of a single system is given by the norm of the real measurements of elements and the factors of incommensurability present as imaginary values. Ultimately the real part of a measurement is the measurement instrument side, the imaginary part, side object, contributes to form the measure of the system as a single system through the determination of the norm. The norm should be the measure of the system as a single, or unique, system with his emergent aspects.