

# Multiple Certainties: An Implication of Field Structure Theory (FST)

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The Uncertainty Principle is a conclusion determined by the method of analysis, i.e., by the mathematics. Nature however is not constrained by the mathematics of quantum mechanics (QM). Instead of pursuing a QM reductionist approach to reality, as does physics, Field Structure Theory (FST) begins by studying form as the product of field force rather than in terms of an object in a field. *There is a huge analytical difference between viewing natural processes from a field perspective as opposed to the perspective of a field object (particles) producing the field.* FST starts with the whole and derives the particular. It is the "something comes from everything" approach as opposed to the "something comes from the nothing" approach. With a discrete form (the loop) and a deterministic set of axiomatic principles, *structural physics* (FST) can build with a form that has proven itself to have inexhaustible structural potential to delineate the natural complexity. FST finds determinism at every structural platform of reality from smallest to largest.

As the forms and structure of matter becomes smaller, the more wavelike its behavior became until the distinctions between particle and wave became uncertain. To deal with this the particle/wave ambiguities, the mathematics of uncertainty was developed and this became known as the Uncertainty Principle. The error has been in assuming that what we think that what happens structurally at our mencroscale, which is some  $10^{45}$  powers larger than the fundamental scale of reality, is what is happening throughout all scales of reality. Last year at the NPA-18 conference, I outlined the problem as being the result of our inability to understand structure and its relationship to form in a paper titled, "The Meaning of Structure".

Field Structure Theory (FST) working in the mencroscale discovered a topology (Structural Skew Topology - SST) that could be applied to all scales of structure. FST does this by delineating form and structure using only loops of action. Because form and structure are fractal in nature, they are scalable. This allows mencroscale forms to be replicated at larger or smaller scales. Once a way to delineate how action becomes energy and the energy interacts to build form, momentum and position can be known simultaneously. FST reveals what a multiple certainty looks like, how fields produce multiple certainties, and how matter is not localized as it appears to be in a field. Multiple Certainties postulates that at the quantum scale both position and momentum can be known concurrently by recognizing that where something is, is determined by knowing the number of loops in the quantum system and the number of places the loops interact in the field. This can be known by building the model knowing only the frequency of the form and Planck's constant. Applying fieldstructure formalism to spectral analysis, it can then be understood that depending on its energy, a particle has a discrete number of places it can be found and where those places are within the field.

## 1. Introduction

"Multiple Certainties" have been lightly mentioned in my previous papers and even more lightly received. This paper will attempt to show that the Uncertainty Principle of Heisenberg is an outcome of the method of analysis and not a fundamental property of Nature. The end of determinism was proclaimed by the Copenhagen conference in 1920, over Einstein's objection I should add, where it was adopted as a cornerstone of quantum mechanics. Using the mathematical approach to physics, it seemed to many to be a reasonable conclusion. Thus fundamental structure was to be understood as a probability of something happening, not a certainty.

Wikipedia states [1]:

*"The central assumption behind the Uncertainty Principle is that the classical concept of motion does not fit ("hold inviolate", personal comment) at the quantum level, and that electrons in an atom do not travel on sharply defined orbits. Rather, the motion is smeared out in a strange way: the Fourier transform of time only*

*involve those frequencies that could be seen in quantum jumps. Heisenberg uncertainty principle states a fundamental limit on the accuracy with which certain pairs of physical properties of a particle, such as position and momentum, can be simultaneously known."*

This statement by Wikipedia will be shown to be wrong.

If this were regarded as the "way it is", then any attempt to *discretely* understand the form and structure of fundamental quantum scale reality would be impossible. Since this is felt to be true, efforts to understand the atom and particles with geometry have been abandoned. String Theory in recent times has reintroduced geometry, although unsuccessfully. Field Structure theory has found that what quantum mechanics accept as principle is not a restriction imposed by Nature, but rather is a restriction imposed by the quantum mechanical mode of analysis. The question is then, "If Nature is not limited by the Uncertainty Principle and is in fact determinate, how can we achieve determinacy since mathematics is the only tool we have assumed that can look at the properties of nature where empirical observation is not technically possible?"

The Uncertainty Principle makes it abundantly clear that the analytical methods used by quantum mechanics cannot result in determinism. The integrity of the quantum mechanical (QM) math is rock solid and yet as the physicist Richard Feynman has said, "I think I can safely say that nobody understands quantum mechanics." This statement has to be made when the structure of something is unknown, and the structure cannot be known if the Uncertainty Principle prevails. Knowing this, physics gave up on knowing in any deterministic sense fundamental form and structure. As mentioned, string theorists have attempted to reintroduce geometry, but without conclusive success, which in my view is because they have not had a geometry/topology that performs as does natural form and structure.

QM's ability to *generalize* conditions with probabilities is impressive and not in question. Nevertheless, Nature must be using some other mathematics than that used by quantum mechanics. The popular view is:

*"The electron does anything it likes. It just goes in any direction at any speed, forward or backward in time, however it likes, and then you add up the amplitudes and it gives you the wave-function."*

-- Freeman J. Dyson, 1980, quoted in [2]

This chaotic, laissez-faire, conclusion is to admit defeat that physic will ever understand how this universe works. Personally, it is intuitively unacceptable and furthermore found to be untrue. Nature can be understood. Till now, physics has been gestating in the womb of theory. Physics will be born once we understand natural form and structure. Excuse my exuberance, but once born, we humans will be free to roam in our homeland of the heavens.

If true the quote by Dyson above is not encouraging for the structuralist. Quantum mechanics is great at understanding the behavior of large groups of self-similar objects (electrons, for instance), and useless for understanding the behavior of a single object (a single electron). While group behavior is useful knowledge, having an understanding of the unit comprising the group would be superior since it would remove the ghost and paradoxes that plague physicists; the Uncertainty Principle being at the heart of the problem. Regarding itself as an exact science, physics has had to swallow its pride and accept uncertainty, which they do by doggedly proclaiming uncertainty to be the way nature is and not of their own creation. The truth is that Uncertainty is a man-made science.

A conclusion of FST is that group behavior has a structural connectivity to individual behavior. That idea challenges the core beliefs of QM, which forbids the knowing of individual behavior. In FST there is an understanding of the structural operatives that work through all forms and structures in Nature, no matter how many or few units may be involved. FST sees group behavior verses individual behavior as fractal iterations of complexity, and not as the operation of two unconnected systems of organization, i.e., position being geometry and momentum being calculus [7]. The fact atoms do not behave, as do molecules is not a problem once the fractal fieldstructure of Nature is understood. Each platform of Nature (particles, atoms, molecules) has a unique manner of expressing structure. This does not mean each has to have its own set of rules, as is currently the case in physics where the rules for particle behavior have no connection to the rules of ga-

lactic behavior. In FST the same rules apply throughout the form and structure spectrum.

*This paper is not challenging the correctness of the math behind the Uncertainty Principle, but rather to suggest that by using other models of analysis, that of Structural Skew Topology, and Field Structure Theory (FST), physics can precisely know the exact shape of the orbit of an electron, the exact number of places where the electron can be found and the momentum of the electron at each location.*

The basic assumptions and postulates of FST are these: That each platform of structure in Nature, beginning with the structure of the plenum (dependant aether) and proceeding up the hierarchy to EM waves, particles, atoms, molecules, etc., is deterministic. Because the mode of analysis begins with discrete entities (loops) that conform and express the constants of nature, energy and mass, it becomes possible to determine with precision their exact momentum and position. Using Structural Skew Topology, the event, defined by its position and momentum, will be found to be in a discrete number of multiple locations. Each energy state that is allowed by the fractal hierarchy of the structural platform in which the event is located is determined by the number of loops and the number of places the loops interact within the field (field of action).

## 2. The Bottom up Five Platforms of Structure

1. plenum<sup>1</sup> = the loop matrix substratum
2. energy = interacting loops of plenum
3. particle = interacting loops of energy
4. atomic = interacting particle loops
5. molecular = interacting atomic loops

Each platform is a progressive fractal iteration that releases a new potential for structural complexity not available in a lesser complex fractals. Natural fractals mean all platforms of form and structure are evolved or devolved (depending on which direction you are going) from a base set of operating principles (the axioms of the geometry/topology in List 1 and the constants of nature). These fractal hierarchies have been discussed in previous NPA papers.

To explain this hypothesis, it is necessary to begin by using the geometry used by Nature. By that it is meant a geometry that

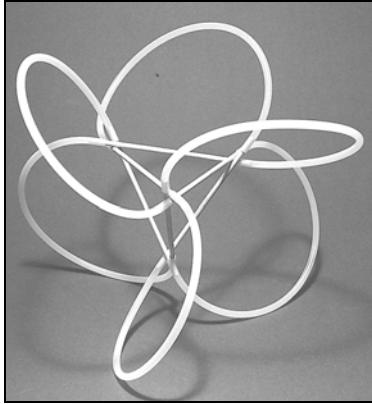
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<sup>1</sup>Plenum is different from aether (ether). Plenum is background dependant whereas aether is thought of as being background independent. In Plenum, the conception is that a particle is made from the stuff of the plenum. A human being is background dependant. A robot is background independent. Hence, the background from which particles arise is structurally a part of plenum. Particles are derived from the plenum. In the aether conception, particles are detached and independent of the aether. The particle and the plenum are the same stuff, just as a knot is inseparable from the string on which it is tied. The particle cannot exist apart from the plenum. This explains why in the Michelson-Morley experiment found no drag on light. The experiment did not prove there was no such thing as a plenum. It proved the plenum is not detached from the particle just as a knot is not detached from the string. It is the difference between a knot moving on a string and a pearl moving on a string. The pearl is detached from the string and will experience frictional drag as it moves along the string, but a knot is the string itself and cannot produce drag on itself.

uses natural structuring to produce form. This geometry differs from Greek geometry and its modern derivatives.

### 3. List 1: Axioms of Structural Geometry

1. *Lines are loops.* Lines don't end.
2. *Lines have dimension.* Lines are not infinitesimally thin.
3. *Lines interact.* Lines do not intersect.
4. *Taken together (axioms 1 through 3), lines of action define space and time*<sup>2</sup>.



**Fig. 1.** A fieldstructure creating space by interacting loops. A *fieldstructure*, this one called a "Tet-Structor" creates space, a tetrahedron, by interacting three identical loops. The form has four vortices that define space and introduce an extra unit of time not indicated by three separated loops.

The loop satisfies the axioms of structure and at the same time is the ultimate simplification of form. But a loop is a one-dimensional form (1-D). We live in a three-dimensional world (3-D). By interacting three loops three-dimensionally, four places or more intersections occur. These are the four vortices (vertices) of the *fieldstructure* in Fig. 1.

The number of loops defines space in Field Structure Theory (FST). This is a new discovery that is crucial to understanding the meaning of structure. In doing this it achieves the ideal of Occam's Razor [5], that of finding and using a form that can have no further reduction in concept and yet able to generate any and all spatial events. Any spatial form that can be defined by vertices (vortices), lines, edges or faces can be formed and defined by interacting loops no matter how complex.

Space is defined by loops of action and the interactions of those loops. We live in a complex of loops, some smaller (atoms, molecules) some larger (solar systems, galaxies). Electrons loop around the nuclei while stars loop around galaxies. What is new is to realize what William Day has been saying for years [6], all motion is orbital, i.e. a loop, the loop being defined by its energy. Looking at solar structure what is going on is that the planets are the places where the vortices of interaction have condensed due to the gravity and harmonics of the loop, the same process found at the atomic scale where the mass of the particles is where the interaction of the field loops occurs. The atom is a spherical because gravity is only nominally existent. At the solar scale the energy of the loop condenses where the planets are found. The position of a planet is determined by the fieldstructure of the so-

lar system as are electrons determined by fieldstructure of the atom. Everything about our perception of space is defined and delineated by loops, either larger loops *in* which we live, or little loops *on* which we live.

Previous papers presented at NPA conferences have shown how loops interact to form waves, waves interact to form particles, particles interact to form atoms, atoms interact to form molecules, etc., etc. All these platforms of form can be shown to be the product of interacting loops (of action) without the need of any extraneous devise to hold the structure together, be the extraneous device glue in a micoscale model or a gluon in a microscale model. Glue and gluons are not needed in FST. When the loop is viewed as a circuit of action, how Nature achieves form and structure is understood. The purity of the structural experience (producing form with only loops) is found in plenum and is transmitted to the wave, to particle, to atom all the way up the structural hierarchy to the universe itself.

From the FST perspective, we live in a world of interactions. The physicist Richard Feynman, who said, "all mass is interaction", has noted this fact [6]. FST has shown how interacting loops (of action) create 3-D form (polyhedra) and by charting the hierarchy of loops as they increase in interactive complexity, the mass values of particle (mass) can be derived. This has been published in the NPA Proceedings and is there to inspect.

Feynman is right. It is all about *interaction*. The forms of those interactions are determined by the geometry of the loops that define the space. While Greek inspired geometries that defines space with line segments having no dimension that terminate when they intersect other lines, *fieldstructure geometry* using dimensional lines-loops that interact, but do not intersect, not only define space, but also how space is generated in the first case. Space is a property that arises from loop interaction. The big news is, "space itself has structure".

To investigate three-dimensional form (and at any one particular instant our world is limited to three-dimensions), the simplest form that satisfied the three axioms of is a loop, a closed circuit of action. With this established, the concept of Multiple Certainty can be derived and explored.

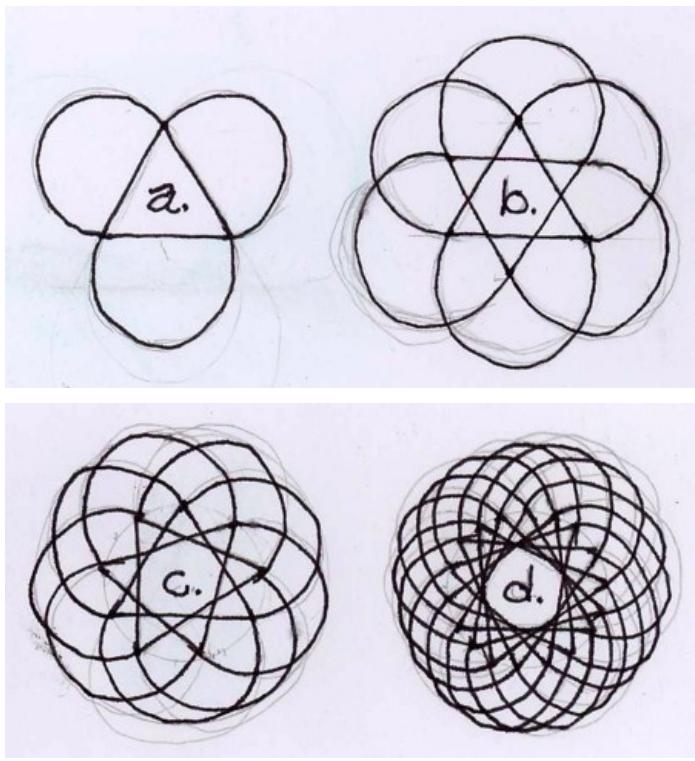
#### 3.1. Constructing a "Multiple Certainty"

For simplicity, let's begin with Fig. 2, which are examples of simple one-dimensional loop precessions producing a 2-D space. Fig. 2a has three loops on one circuit.

The loops interact where they cross another loop. In the 1-D rendering of Fig. 2, the number of places the lines cross, which are places of interaction, can be seen as becoming geometrically more numerous as the number of loops increase. These renderings are not to be understood as three-dimensional objects. Consider only the fact the lines form loops and the loops cross one another. The crossings are important because this shows that where lines of action (force) interact, phenomenon will manifest.

For the sake of argument, if the forms in Fig. 2 represented an electron, the electron be would be found where the lines cross. The line isn't the electron; the places where the lines interact are the electron. That means there are a multitude of virtual electrons in the electron orbital loop.

<sup>2</sup> Time is dealt with in detail in [4].



**Fig. 2.** Processional loops having (a) 3 loops on 1 circuit, (b) 6 loops on 2 circuits (c) 9 loops on 3 circuits, and (d) 18 loops on 2 circuits.

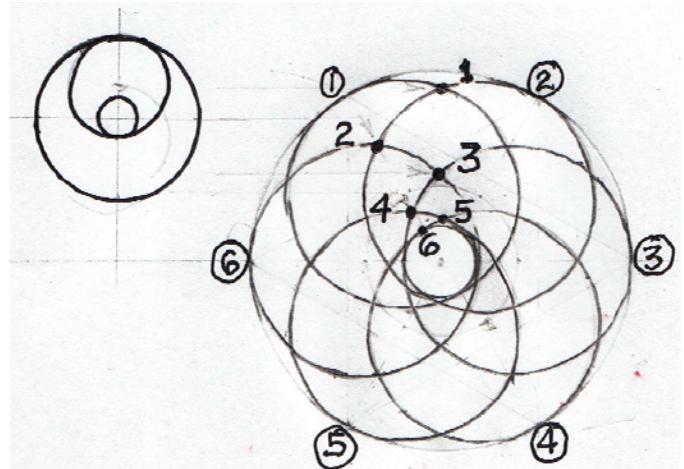
Loopage Name	# of Loops	# of Intersections
a	3	3
b	6	18
c	9	35
d	18	180

**Table 2.** Loops and places of interaction generated by looping

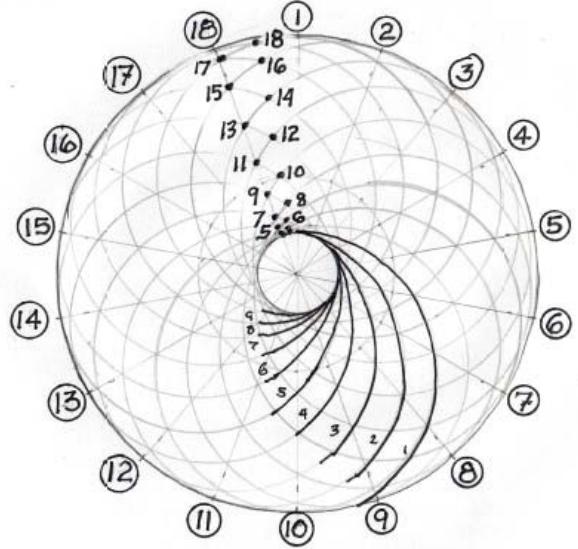
The number of places the electron can be found is the number of line crossings in each loop. The more energy the form has, the more loops in the form and more places the electron can be found in a single loop. To "see" the electron, means a measuring instrument has to intersect the loop at the places of interaction. That act in essence collapses the energy of the wave to that point and the "electron" is found. As in QM where you insert the electron detector is where you find the electron, but because you know how many loops there are, you know the energy of the system, which means you know momentum and the detector shows the position. But since the entire loopage of lines is one line, this diagrams a single electron. Hence the electron can to be found at each place the line crosses itself. This means there are a multitude of places the electron can be found. Hence there is a Multiple Certainty of finding an electron and they will be found only where the line of action interacts with another line. If the sensor is inserted at any place where the line of action is crossing itself, the electron would be found there and nowhere else along the line. The electron would not be found where the line is not being crossed, even though the line of action is connecting the dots. The electron as a particle does not exist as a particle where there is no interaction. It exists only as a wave between interactions. There is nothing to "see" where there is no interaction, because EM waves do not reveal themselves until they interact with mat-

ter. This is holographic in nature. Meanwhile, at all the places the wave loop interacts, there is a particle and to prove it, simply insert a sensor and it will be there. Hence if you know the number of loops, then you know the number of places interaction occurs.

*Fig. 3 and 4 show that the number of intersections raise geometrically by the square, while the number of loops rises arithmetically.* In FST the number of loops is related to mass values, while the number of intersections is related to the energy of the system. The number of interactions (energy) increases by the square of the number of loops (loops). This conforms to the  $E = mc^2$  equation, where by  $m = \# \text{ of loops}$  and  $c^2 = \# \text{ of interactions}$ .



**Fig. 3.** 6 loops having 36 interactions ( $6^2$ )



**Fig. 4.** 18 loops having 324 interactions ( $18^2$ ), 18 loops per section times 18 sections = 324.

Note that in Fig. 3 and 4, the geometry is that of the inverse square. The number of interactions squares per unit of distance. This geometry means that as the system increases in space volume the amount of energy (number of interactions) increases by the square showing how space and energy are related. As the space becomes occupied with a higher number of multiple certainties, the energy of the space increases and when translated

into 3-D, the number of time units increase as well. Time and space march together.

The more energetic the event, the more interactions will be found, the high frequency of the system. Each interaction is where something is happening, the electron can be found. If the atom is being modeled, the number of places where interaction is occurring is the number of places an electron in the atomic "cloud" (the electromagnetic field) is happening. In other words, in the example of the atom, the energy of the atom determines the number of places a particular electron at a particular energy, can be found. What is unique in this analysis is that there is a discrete number of places where the electron will be found *and at no other places*. It is not a question of probabilities. In other words, there is a *multiple certainty* of finding an electron at an exact position for each energy state of the electron. Increase the energy of an atom and the electron can be found at an increased number of locations, but only at those locations. Now the problem is to show this conclusively if possible.

Does this mean in the case of hydrogen with one electron that there is only one location the electron can be found? Not at all. The orbital circuitry of the electron be it alone or in the company of 92 other electrons, is determined by the number of loops the electron makes to complete its orbital. The more energy an atom has the more multiple certainties there are. Each electron has its unique orbital. In Fig. 2 each form has one two or three circuits but each circuit can have a great number of loops. In the case of hydrogen with a single electron, the energy of the atom can vary because the number of times a single circuit of action can loops can vary. Translating this geometry to physics, the number of places where the electron can be found is shown to increase with temperature. It would be an interesting experiment to take a hydrogen atom to as close to absolute zero temperature as possible and see if the number of loops could be somehow counted when their number gets maximally reduced. If successful, it would support the idea of multiple certainties.

### 3.2. Going from 1-D to 3-D to see How the Idea Holds Up

Figures 2a, b, c, and d are one-dimensional diagrams of looping. Such figures do not exist in a three-dimensional world. Looping doesn't look like that in our 3-D natural world. By dimensionally increasing the idea of interacting loops to a three-dimensional form, a truer picture of structure emerges. Doing this produces a form called a *fieldstructure*, such as the Tet-Structor in Fig. 1. Any depiction of orbital motion has to be three-dimensional. Natural form does not live in three-dimensions as a guest, it produces the space it lives in. The Fig. 2 drawings are one-dimensional. Fig. 1 photo is of an actual three-dimensional structure.

Lines moving in three-dimensional space do not make the line three-dimensional. Setting up three imagery axes and considering that a definition of space is not how Nature does it. If Nature did do that, physics would have long since achieved unification. Three-dimensional space only appears when lines interact to produce fieldstructures with themselves, or with other lines, and not because a line is moving in some imagined three-dimensional volume. FST first creates space, then and only then, is there a meaningful context in which to observe mass and energy. Mass and energy have no meaning without they being linked

to time and space to provide a structural context. The lines of action themselves create space. This is why in FST the plenum is always attached to the forms created by the plenum. Particles are attached to space and to time. *Every form in Nature constructs its own space and its own time and then lives in those spaces.*

From a structuralist's view, presently physicists are inventing space and then arbitrarily placing objects in the space. The causal connection between space/time and mass/energy are not recognized nor understood. Fields are treated in the same way as space is treated. Nature however treats particles and fields as a knot is related to a string. Without the connectivity of a field to the field object (particle) there would be no way of generating space from first principles. Most physicists envision space as detached and unaffected by the mass and energy forms that live in the space. The concept of an aether space is visualized in this way. Aether is thought of as an imaginary passive space that has no connection to mass and energy. While gravity in General Relativity is said to bend space, no casual structural mechanism is proposed. Those postulating aether realized that their concept of aether space would act as a drag on any particle moving in such a space and thus when Michelson and Morley could not find a drag scientist assumed it meant there was no aether.

Additionally, *ethereal space is not thought of as having a connection to time*. This mistake is not made in FST. Space/time and mass/energy are interdependent, relational and unified. The greatest mistake made in physics is to view space and time as separate from mass and energy. This mistake occurred because they have not had natural geometry/topology for space/time.

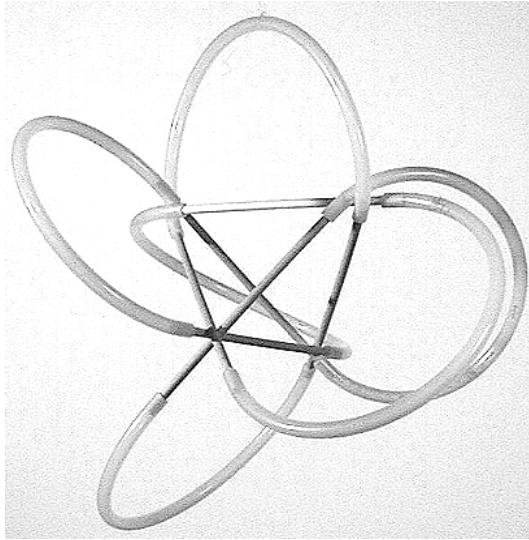
### 3.3. Three-dimensional Looping

It may seem like a diversion from the stated goal of superseding the Uncertainty Principle with the Principle of Multiple Certainties, but the previous points had to be made before presenting the principle of Multiple Certainties. Fig. 1 shows the absolute minimum number of loops (3) and intersections necessary (4) to produce a three-dimensional event. When the looping is in 3-D, something very interesting happens. More interactions occur than can in one or two dimensional looping. In 3-D, three loops intersect four times instead of three times as they do in Fig. 2a. Furthermore, fieldstructure interactions have three lines interacting at each vortex instead of two.

Fig. 1 shows three individual loops are needed to make a tetrahedron, whereas in Fig. 2a one loop loops three times. The number of degrees of rotation is the same in Fig. 2a and Fig. 1. It may be argued that the rules have been unfairly changed, since Fig. 2a has only one line making the three loops whereas Fig. 1 has three lines making three loops. No problem, a 3-D tetrahedron can be made with only one loop (Fig. 3). A single circuit tetrahedron will have three loops just as Fig. 2a has a single circuit with three loops. The difference is that the 3-D single circuit tetrahedron will be an isosceles tetrahedron, which is a tetrahedron with one equilateral triangle and three isosceles triangles as shown in Fig. 3.

The appearance of another interaction not seen in Fig. 2a, but seen in Fig. 1, shows that while we live in a three-loop three-dimensional world, we experience something extra; we experience time. Physics is now used to thinking of our world as having four-dimensions, with time being the fourth dimension.

While there may be only three "spatial" dimensions to be seen, time has to be considered, because those three dimensions somehow or other produce time.



**Fig. 5.** Single circuit fieldstructure producing an isosceles tetrahedron (this case called an *Iso-Tet-Structor*).

Fieldstructures show from where that extra event we call "time" appears. A loop by itself is not a unit of time, nor can it by itself produce or occupy space. However, when loops interact three-dimensionally with themselves or other loops, they produce space. A loop by itself is not a temporal event. Temporal events only occur in three-dimensions as far as we who are 3-D viewers can experience time. A loop by and of itself may be considered an absolute event occurring neither in time nor as a result of time. Time and space arise only after loops interact. When loops interact and produce a fieldstructure, space and time arise. Space is defined by the geometry of the polyhedron created by the interacting loops. That is easy to see. Time is easy to see as well once you know what to look for. This means time and space are meaningless concepts at the plenum level.

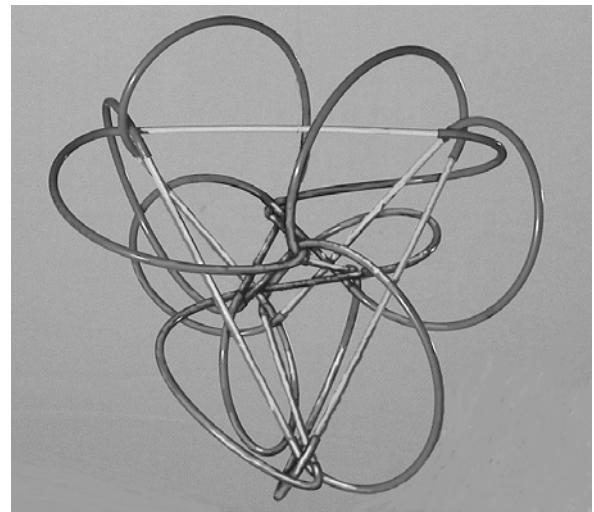
Time "appears" as the extra, unexpected, interaction not found when the loops are not interacting; the additional interaction that three loops produce when they make a 3-D knot. Time accelerates or decelerates when larger numbers of interactions input or output the system. The "acceleration" is in the fact that action has to travel further in the same amount of time; the more vast the loopage, the slower the time. Light takes longer to passing through a diamond that it does through the same volume of vacuum space. It is not that light no longer goes at the speed of light, rather it is the fact that light has a much longer pathway, one that is highly looped and lengthy like a wound ball of string.

The more complex (energetic) the interaction, more loopage, more interactions occur and the more units of time are involved, the slower something seems to move.

The interpretation I give to the fact the number of units of time increase (by the square of the number of loops) with the energy of the event would mean that the more complex the event the more event rich the event becomes. Complex event rich events will contain more experiences-events. They will be richer multi-faceted experiences; the way an events for human beings will have more complexity, larger life experiences, than that of

worms. Hydrogen by itself is an extremely limited experience, but long hydrogen molecules chains with a few carbon and oxygen molecules make organic molecules with which Nature builds life, all of which are long loops linking one particle to another, which link one atom to another, which link one molecule to another, one cell to another, one organism to another, one human to another.

The fieldstructure called a *SuperStructor* (Fig. 6) is the structural platform used by atoms according to FST. Fig. 1 is the structural platform of a particle. Here in Fig. 6 the loops create both a nuclear loopage (the small tetrahedral) surrounded by an action field loopage (a larger tetrahedral electron cloud). Uncertainty at this larger than particle scale shows up clearly where a group of particles interact. Unlike the SM (Standard Model), the FS (FieldStructure) model shows that all particles are essentially condensed waves on a loop. A condensed wave produces a *fermions*, a particle having mass. Should the condensed wave deploy, a *bosons*, a field particles is produced. Deployed and condensed concepts are explained in previous NPA papers [7,8].



**Fig. 6.** SuperStructor – small polyhedron nucleus inside a large polyhedron atomic cloud.

In the atom, the nucleus is 100,000 times smaller than the electron cloud action field. Figure 4 does not show the 100,000 to one size relationship of an atom, because the model does not take into consideration the energy of the system, only the loopage, which has only nominal unit of energy. Were the proper energy inputted into the model by introducing twisting on the loops, the volume of the field (the overall volume of the form) would increase dramatically to the dimensions of the atom, while the size of the nuclear domain remained unchanged. How this is done has been show in previous mentioned NPA papers [7,8].

The nucleus can be a polyhedron of great complexity, meaning a great number of vortices produced by a great number of loops made by a few number of circuits.<sup>3</sup> Places of interaction are called "vertices" in Euclidian geometry and "vortices" in FST. The nuclear polyhedron can be circuited to the electron cloud

<sup>3</sup> Here we have to make a distinction between loops and circuits. A circuit can be a single loop or a billion loops. A loop is whenever a circuit, a line of action, makes a 360° rotation. A circuit can have a multitude of loops.

polyhedra in shells each of which collectively have the same number as vortices in the singular nuclear polyhedron, preserving the one to one connection between protons and electrons in the atoms [9,10].

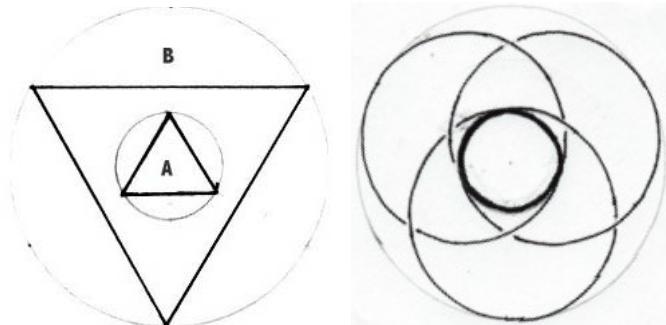


Fig. 7A. Linear nuclear triangle domain A) to field triangle domain (B).

Fig. 7B. Curvilinear version of 7A, shown as a single orbital

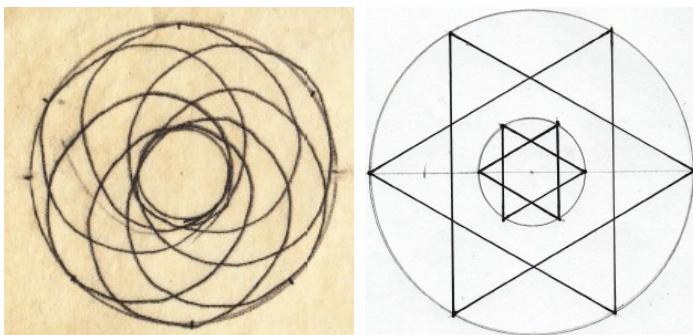


Fig. 8A. Linear 2 nuclear triangles connected to 2 field triangles.

Fig. 8B. Curvilinear orbits of 8A. Each line cross is one e- Multiple Certainty.

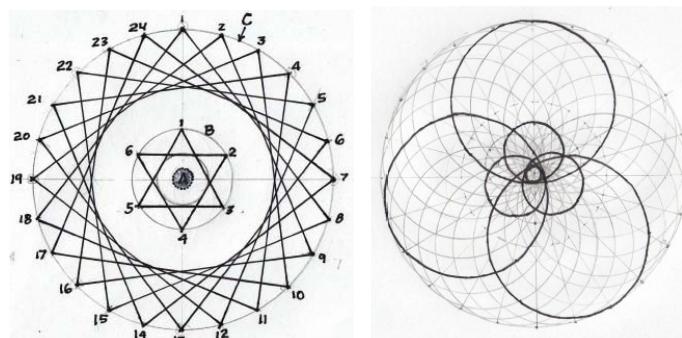


Fig. 9A. Lithium with 2 e- in 1<sup>st</sup> shell and 1 e- in 2<sup>nd</sup> shell.

Fig. 9B. Orbitals of 1<sup>st</sup> and 2<sup>nd</sup> shells of the Lithium atom.

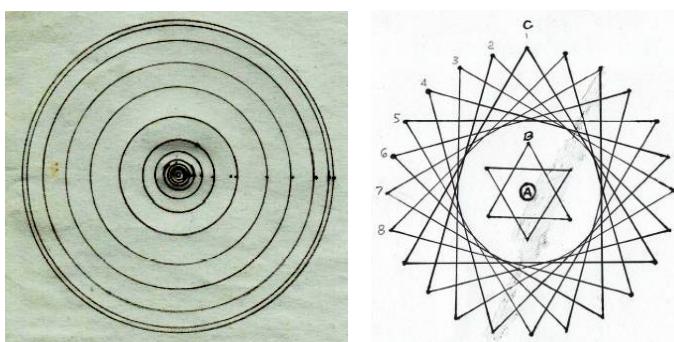


Fig. 7C. Probability diagram of Lithium.

Fig. 8. Neon with 2 e- in 1<sup>st</sup> shell and 8 e- in 2<sup>nd</sup> shell.

The idea of associating complexity with time and showing it in fixed structural relationships that can be modeled at all scales of form is revolutionary to say the least. Modeling time and space has never been done and to my knowledge. There has been no way of keeping mass and energy synchronized as these factors change within a platform, much less between platforms (particle, atom, molecule). There has to be a controlling mechanism that keeps time consistent all the way through the spectrum of form and structure so that the blindly fast speeds seen in atoms are in sync with the almost undetectable apparent motions of distant stars and galaxies.

To understand the geometry of time, FST views the multiplicity of events in a field to be time events. The possible positions an electron can have in the deployed field of the atomic cloud, or the condensed nuclear field, adjust time so the *instant* is persevered. The field, the quantum system, acts as an instant no matter how extended the field or compressed the field may be. This accounts for the results of the Alain Aspect Experiment of 1982 [11] that showed a quantum system behaves instantaneously. As the form adds energy it adds events, which are the places in the field where field objects (electrons in the atomic cloud or nucleons in the nuclear field) can be found. Adding energy adds time as it does add space. Adding energy is like adding seconds to a minute, which gives a minute a fuller experience and an internal structure.

By way of example, if time for a minute particle event is divided into seconds, time in an atom maybe divided into minutes. Each platform (particle, atom, molecule) is made in units of time that becomes the unit of time of a larger platform. *The lower platform becomes the unit of time for the higher platform. This makes time fractal in nature. Space is determined by the number of loops and time is determined by the number of event interactions in the system.* An event is where the lines of action interact, which is where the field object, electron for instance, can be found. This means there are a multiplicity of events and thus a multitude of places in the field where the electron can be found. This is the idea behind *Multiple Certainties*.

### 3.4. Summary

The geometry of an event is determined by the number of loops and the number of places the loops interact. When a Line of Action (LOA) interacts with itself or other LOA, an event occurs. Time is the extra events that happen when loops interact in three-dimensions. The more energetic the event, the more "extra" events are generated and longer the event takes to "run its course". In fieldstructures the number of extra events is the number of loops squared thus satisfying the energy equation of fermions  $E=mc^2$ , whereby  $m = \#$  of loops and  $c^2$  equals  $\#$  of loops squared. Each event is a multiple certainty of there being a particle(s) at that position in the energy system. The number of event positions is determined by the energy of the particle. If you know the energy you know the position because you know the geometry of the system.

The relationship between time/space and mass/energy is coordinated by the geometry and topology of the fieldstructure. In conclusion, a quantum system has a multitude of places its defining events are at an instant in time. Where the events (particles) are determined by a sensor, the energy of the wave condenses on

the loop to a single location. Matter is an electromagnetic wave until condensed by a sensor whereupon it becomes a particle. The energy of the wave determines how many multiple certainties there are where the mass can condense and become localized.

## References

- [ 1 ] [http://en.wikipedia.org/wiki/Uncertainty\\_Principle](http://en.wikipedia.org/wiki/Uncertainty_Principle).
- [ 2 ] Nick Herbert, **Quantum Reality: Beyond the New Physics** (Anchor, 1987).
- [ 3 ] [http://en.wikipedia.org/wiki/Atomic\\_orbital](http://en.wikipedia.org/wiki/Atomic_orbital). In chemistry, Schrödinger, Pauling, Mulliken and others noted that the consequence of Heisenberg's relation was that the electron, as a wave packet, could not be considered to have an exact location in its orbital. Max Born suggested that the electron's position needed to be described by a probability distribution which was connected with finding the electron at some point in the wave-function which described its associated wave packet. The new quantum mechanics did not give exact results, but only the probabilities for the occurrence of a variety of possible such results. Heisenberg held that the path of a moving particle has no meaning if we cannot observe it, as we cannot with electrons in an atom.
- [ 4 ] Don Briddell, ““Building Particles and Atoms: With Loops, Twists, and Knots The Field Structure Theory (FST) of How Nature Does It”, unpublished (2010).
- [ 5 ] [http://en.wikipedia.org/wiki/Occam%27s\\_razor/](http://en.wikipedia.org/wiki/Occam%27s_razor/). Occam's razor is the law of parsimony, economy or succinctness. It is a principle urging one to select among competing hypotheses that which makes the fewest assumptions and thereby offers the simplest explanation of the effect.
- [ 6 ] William Day,
- [ 7 ] Don Briddell, “The Meaning of Structure: The Structural Approach to Understanding Nature”, *Proceedings of the NPA* 7: 53-61 (2010).
- [ 8 ] Don Briddell, “The Neutron: Modeled as a Fieldstructure”, *Proceedings of the NPA* 8: 75-84 (2011).
- [ 9 ] Both the nucleus and the electron cloud surrounding the nucleus are fields. The *nuclear field* refers to protons and neutrons, while the electrons in the electron cloud are called *field objects*. The nuclear field is a *condensed* right-handed electromagnetic wave, while field objects, the electrons, are *deployed* left-handed electromagnetic waves.
- [ 10 ] [http://en.wikipedia.org/wiki/Electron\\_shell](http://en.wikipedia.org/wiki/Electron_shell). List of electrons in each shell.
- [ 11 ] [http://en.wikipedia.org/wiki/Alain\\_Aspect](http://en.wikipedia.org/wiki/Alain_Aspect).