The Geometry of Light

Michael R. Evans
442 Ocean Avenue, Laguna Beach, California 92651
e-mail: michaelrevans@mac.com

The Trion-Re' is a fundamental structural unit of 3-D space on the basis of which a new geometry of 3-D space can be built: namely, the 3-D space in which no straight lines exist. To account for the curvature of space, this modification shifts the rules for a platonic solid, making the Trion-Re' the sixth such regular solid and a unique structure of space/time. Traditionally, there are five Platonic Solids with congruent angles and equal, flat faces. However, we must modify the rule and include curved surfaces; in which case a new solid emerges more rudimentary than the tetrahedron. Henceforth called the Trion-Re', this new solid is described as follows: 2-vertices, 3-flexible edges, 3-equal faces, an inside and an outside and spin ability. The Trion-Re' can be used to generate new versions of the other five Platonic Solids. **Keywords:** Anthropic Theory, Atoms, Convergence, Geometry, Holon, Light, Matter, Membranes, Planck Length, Particle Physics, Platonic Solids, Quantum Gravity, Space/Time, String Theory, Topological Matrix, Trion-Re', Wave/Particle Theory of Light.

1. Introduction

In this formal proposal the Platonic Solids are categorically being extended from five to six in number, yielding possibly the most basic structure of space/time, a dynamic three-sided object that is totally closed and considered characteristically unique. The 5 regular polyhedra are composed of equal line segments and have all equal faces and angles. Of these regular polyhedra composed of identical line segments, the Trion-Re' is the sixth, with the 3-D line segment composing the other polyhedra. If we modify Euler's rule and include curved surfaces, a new solid emerges more rudimentary than the tetrahedron. *Fig. 1*

There are two points: one for the beginning and one for the end of each event which light and time undergo. Thus the Trion-Re' can be taken advantage of as a representation of "all that is created by light." Gravity is explained as the force that causes the curvature of space/time in Relativity, but in this case it is quantified, not just with magnitude, but also with a specifically defined geometric structure and volume - The Trion-Re'. It is perceived as spinning, having flexibility, and occupying a specific amount of space. Its spin-rate may be determined by its frequency. Its flexibility gives it the ability to be bent and reflected, and the space it occupies quantifies a certain volume of space time.

The volume of the Trion-Re' at one Planck length has been determined experimentally to be 8.889386×10^{-36} meters cubed. The ratio of its length to its volume is 0.1818.

2. Light

This paper introduces a new theory that light is a solid object. It points out that the curvature of space/time means that in a higher dimensional sense there is no first nor second dimension; everything has volume. The ratio of the volume of the Trion-Re' to its length is given as eleven halves in units squared. When this ratio is multiplied by Planck's length, it gives the minimum volume. When this volume is multiplied by the energy density of pure space, it gives the minimum energy. This minimum energy should correlate to the fundamental charge of the electron by another coefficient which correlates energy with charge.

In order to explain the nature of light, this proposal expands the current notion of the wave/particle duality of light, and introduces a third criterion: light is a solid which occupies space. This solid can form all other structures by "connecting the dots" from one point to the next, and as such, a simple archetypal form.

With regards to time, time is both curved and "quantized." Curved, because all of space is expanding and being bent by gravity, which is time; quantized, because the Planck second is considered the smallest unit of sensical time. The Trion-Re' represents both of these aspects and shows how the wave/particle duality is really represented by a single thing - a solid.

There is no first and second dimension, only a 3-D object which connects the two closest distances in space, the Planck length, which is the smallest you can imagine a photon to be. So the minimum volume of the Trion-Re' represents the quantization of space and the deduction of the structure of the universe to a simplest form.

3. The Ultimate, Indivisible Unit of Matter

At least as early as 400 BC, Democritus was teaching and writing that the hidden substance in all physical objects consists of different arrangements of atoms and void. Both atoms and the void were never created, and they will be never ending.[1] The noted scientist Leonard Susskind says we need a new set of "Tinker Toys" to find it. The artist Delacoix once speculated, "It would be worthy to investigate whether straight lines exist only in our brains."[2] Delacoix had the right idea. This elemental unit or quanta has remained unknowable because we cannot see it in the idea of a straight line. Straight lines are inventions of our brains. It is only when we explore the world of no straight lines that the space between becomes visible.

In physics and philosophy, a relational theory is a framework to understand reality or a physical system in such a way that the position and other properties of the objects are only meaningful relatively to other objects. In a relational theory, space does not exist unless there are objects in it.[1] (See figs. *5, 8, 9, 11*) In particle physics, an elementary particle is a particle of which other, larger particles are composed. For example, atoms are made up of smaller particles known as electrons, protons, and neutrons.

The proton and neutron, in turn, are composed of more elementary particles known as quarks.

One of the outstanding problems of particle physics is to find the most elementary particles or the so-called fundamental particles - which make up all the other particles found in Nature, and are not themselves made up of smaller particles.1 We are saying these particles are regular solids – Trion Re'.

It is accepted that a straight line is, roughly speaking, an (infinitely) thin, (infinitely) long, straight geometrical object, i.e. a curve is not always a line. Given two points, in Euclidean geometry, one can always find exactly one line that passes through the two points; the line provides the shortest connection between the points.[1] *Fig. 13*

The concept of a straight line must be revised as follows: The distance between two points is always a volume with a minimum of three curved lines that pass through any two points. Straight lines do not exist. It is only a means to describe a non-existent one dimension and time. The first real dimension is the third dimension 1=3. The idea of a plane or a line exists only as a concept or an invention of man; but not as a reality in the sub atomic world. *Fig 13*

In chemistry and physics, matter is commonly defined as the substance of which physical objects are composed, not counting the contribution of various energy or force-fields, which are not usually considered to be matter per se (though they may contribute to the mass of objects). Matter constitutes much of the observable universe, although again, light is not ordinarily considered matter.

4. Topological Matrix

Topological spaces are structures that allow one to formalize concepts such as convergence, connectedness and continuity. They appear in virtually every branch of modern mathematics and are a central unifying notion. Roughly speaking a topological space is a geometric object and the homeomorphism is a continuous stretching and bending of the object into a new shape. A common problem in topology is to decide whether two topological spaces are homeomorphic or not. To prove that two spaces are *not* homeomorphic, it is sufficient to find a topological property which is not shared by them.

In mathematics, differential topology is the field dealing with differentiable functions on differentiable manifolds. It arises naturally from the study of the theory of differential equations. These fields are adjacent, and have many applications in physics, notably in the theory of relativity. Together they make up the geometric theory of differentiable manifolds - which can also be studied directly from the point of view of dynamical systems.

Self-organization refers to a process in which the internal organization of a system, normally an open system, increases automatically without being guided or managed by an outside source. Self-organizing systems typically (though not always) display emergent properties.

Nothing exists out of context. Everything is a part of everything else. One leads to another. A constant flow, in an infinite vibrating, self organizing, multi-dimensional fluid matrix composed of an infinite stream of holons -Trion Re'. This process is referred to as causality, which means that empty space/time has a structure that allows us to distinguish unambiguously between cause and effect. It is an integral part of special and general relativity.

The theory of quantum gravity aims to describe the nature of space/time on the smallest scales-the voids in between the smallest known particles. Past attempts to explain the quantum structure of space/time as a process of emergence has had limited success because of the basic concept of immaterial, structure less particles.

Space/time is not empty it is filled with a material substance, consisting of a large number of Planck length volumetric structures, Trion-Re', that interact with one another according to the rules of gravity and spontaneously arrange themselves into geometric solids creating multi-dimensional field manifold.

The flat bug in Einstein's 3-sphere theory may inevitably return to the same place in space that it started; but in the 4-sphere it could transcend to another space all together if, it could become aware of the space between. It is not a closed universe. It is not a question of the size of the diameter of a circle or a sphere it is about the process of the evolution of a circle or a sphere and their relationship to each other. *Fig.9* The balloon does not pop it reproduces itself in twelve directions, constantly creating new spaces between the spheres and the center is everywhere and the options abound.

Buckminister Fuller defined the Bucky Ball, *Fig.10,* which describes the surface of the sphere; but what is the geometry of the space between the surface and the core. It is this empty space that we should explore. What is the convergent geometry that is required to form a self organizing matrix that would form all the regular geometric solids in the process of exponential growth emergence to a sphere with all the interior space described? *Fig. 9*

In 1972 I built a sphere geometrically described from the core all the way to the surface. I called it the "Micky Ball". *Fig. 9* I began building tetrahedrons and connecting them to more tetrahedrons. In the process the other Platonic solids began to appear until the structure emerged to become a sphere. The core was an icosehedral structure, surrounded by tetrahedral cubes and octahedral structures forming a complex dodecahedron. (The space within the surface of the dodecahedron was not empty but geometrically described.) Beyond the dodecahedron, the same self-organizing process continued till the surface revealed a sphere.

Nothing exists out of context. Everything is a part of everything else. One leads to another. It is in the overlap of the cusps that each structure shares a common connection. Therefore, it is a constant flow, in an infinite vibrating, self organizing, twenty-dimensional interconnected universe - twenty-one if you add the dimension of time.

5. Strings, Emergence and Dimensions

There are no straight or curved one-dimensional lines and no two-dimensional planes. We must look at these concepts by revising our concept of the first and second dimensions. The first dimension is the third dimension. It would appear that the definition of string theory (below) would have to be revised, along with every other theory that accepts the concept of a 0-dimension-point, line or plane. We may want to call it "Space Cluster Theory."

Accepted string theory is a model of fundamental physics whose building blocks are ***one-dimensional*** extended objects (strings) rather than the zero-dimensional points (particles) that are the basis of the Standard Model of particle physics. For this reason, string theories are able to avoid problems associated with the presence of point-like particles in a physical theory. Study of string theories has revealed that they require not just strings but other objects, variously including points, membranes, and higher-dimensional objects.

We must update string theory by accepting a fundamental string has mass and consists of two vectors located on a regge trajectory, 3 curved tensed edges emanate from zero point located along the regge trajectory. Spin occurs along the three edges that radiate from one singularity zero point to an event horizon then gravitates and compresses to another zero point. it is at these zero points that the intersection of forces merge with like quanta, forming the continuous string.

As cosmic structure grows more complex (dense) it compresses the arc of the three curved edges of the "Trion-Re". The points of convergence become shorter in time but the distance the light must travel remains the same. This process causes tension that compress into smaller and smaller regular geometric spaces, creating gravity as it continues to spin and compress. It is this process of compression or stored energy that may explain $E = mc^2$.

A Trion Re' is the "cosmic glue that holds everything together." It can be described as energetic matter using the principles of force (pushing), gravity (pulling), and radiation (spinning). It is the fundamental string segment. *Fig. 13*

6. The Anthropic View

In cosmology, the anthropic principle in its most basic form states that any valid theory of the universe must be consistent with our existence as carbon-based human beings at this particular time and place in the universe. In other words, "If something must be true for us, as humans, to exist; then it is true simply because we exist." Attempts to apply this principle to develop scientific explanations in cosmology have led to some confusion and much controversy.

Imagine a loom for weaving a rug, not a two-dimensional loom, but a multi-dimensional, self-organizing loom. With a shuttle cock made of a continuous thread of light, "Star Seeds, Trion Re', " radiating from an infinite number of sources coming from an infinite amount of places for an infinite amount of time un-manifest in the emptiness of space until they find and penetrate the atmosphere of a planet, a womb, mother earth.

If we wish to know the preconditions of organic life, we must reconstruct and examine the environment of the processes operative before and during its appearance. In the early history of our earth, the entire planet was a fiery mass from which the preconditions of life were absent. Over eons of time the earth began to cool, with the change of temperature many of the elements of earth came into being. After more eons, we see the progressive appearance of an atmosphere with air and boiling water and the ever-increasing solidification of magna into solid earth.

The appearance of life can only manifest between acceptable ranges of temperatures. At the outer edge of the atmosphere, temperatures were too cold to support life and the boiling waters of the surface were too hot. Above these warm masses of water existed a great zone of vapor, which was not as hot as the water and not as cold as the upper reaches of the atmosphere. It is in this "space between" that these elemental life forms could have first appeared, even if for a brief time. As they fell into the boiling seas, they were they died or they were carried on the currents of vapor into the higher cold zone where they also died. Life existed but, for only a brief moment.

After millions of more years, the space between the cold zone and the warm zone expanded and these first beginnings of life became larger, heavier, developing a thicker skin. It is in this "space between" that we observe the process of not only the beginnings of life on this planet and its evolution to the present.

We must now examine the structure of our Trion Re' ("star seed."). As this individual ray of light enters our atmosphere it is traveling at the speed of light, for it is light itself. It spins as it moves, creating an electromagnetic field that attracts the matter that is mingled in the vapors of the atmosphere. Matter attaches itself to the membrane "Trion Re" but has a vulnerable, ephemeral skin or membrane, which is quickly burned away, as it descends to its fiery demise or shatters in the cold upper atmosphere.

However, as the process of cooling continues, the amount of matter that is attracted to the magnetic field created by our spinning "star seeds" increases, giving it greater protection from the environment and its existence is prolonged.

As this process continues over millennia, our "light beings" grow and become more complex. They become heavier and begin to fall into the now temperate oceans containing more chemicals than existed in the vapor. This enrichment produces a greater variety of the forms of life; new species appeared and a greater diversity of life evolves.

Science, religion, philosophy, all ask the same question, "Is there an ultimate, indivisible unit, the one fountainhead of all things a stream connecting and creating all form, in all places for all time?" Form gives way to the advantage of stream.

The Flower of Life is a geometrical figure composed of multiple evenly-spaced, overlapping circles, creating common cusps that are arranged so that they form a flower-like pattern with a six-fold symmetry like a hexagon. In other words, the center of each circle is on the circumference of six surrounding circles of the same diameter.

The Temple of Osiris at Abydos, Egypt contains the oldest example to date. It is carved in granite and may possibly represent the Eye of Ra, a symbol of the authority of the pharaoh.

7. Conclusion

In closing, modifying the rules for the Platonic Solids to account for the curvature of space introduces a new solid with only three faces, more rudimentary than the tetrahedron. This solid can then be used to construct the remaining five solids. By analogy, it is hypothesized that this shape is the structure of the most basic element of the universe, light itself.

By taking the volume of the Trion Re' at one Planck length, it is predicted applications may be found to determine the basis of certain physical constants. We highly encourage more parties to

study the possibilities of this new geometric proposal for an overarching theory of the structure of the universe based on a characteristic solid.

It may be that the universe is composed of Trion-Re structures within Trion-Re structures within ... (that is, the Trion-Re is the "Holon"), and that the density of space is rationally (in ratio) proportional to the number and the compound structure of a given Trion-Re structural space. Thus, space is continuous (a continuum of the Trion-Re) and yet discrete (Trion-Re's within Trion-Re's within ...).

The theory of the Trion Re' is based on three simple principals: No straight lines, from the one comes the many and that light is a regular solid. A regular solid must occupy space and act as a container. It is my contention that contained within every individual ray of light is life itself. The Trion- Re' is the conduit of all things living and material. It is the path and matrix, of light that we must follow to find how life and matter form throughout the universe.

If we can understand the one indivisible unit of matter and the dynamic manifold it creates, we become aware of their relationships to each other and eventually see the unity behind them. Multiplicity dissolves into unity. This knowledge will improve our ability to create new models that will be tuned to the natural processes of creation in the fields of Photonics, Energy Production, Chemistry, Nano Technology, Electronic Circuitry, Physics and more.

Figures

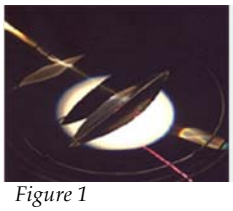

Figure 1
Side View Trion-Re'

Figure 2
3-Trion-Re' membrane segment

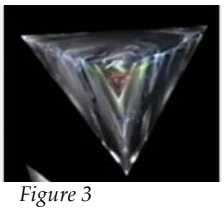

Figure 3
Front of Trion-Re'

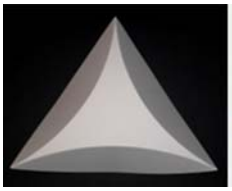

Figure 4
Space between 6 Trion- Re' – A Tetron

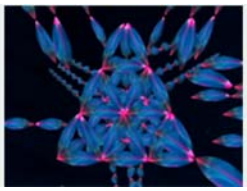

Figure 5
Trion-Re' forming a 10-stack tetrahedron

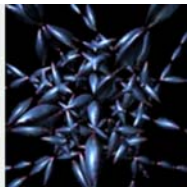

Figure 6
Trion-Re' forming an icosahedron

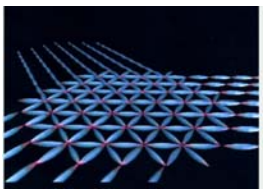

Figure 7
Trion-Re' forming surface of membrane

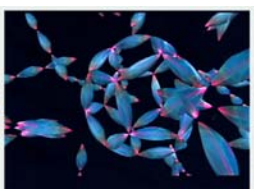

Figure 8
Trion-Re' forming a dodecahedron

Figure 9
Micky Ball (1972)
Michael R. Evans

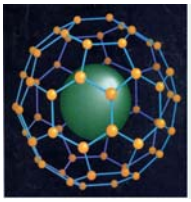

Figure 10
Bucky Ball (1991)
Buckminister Fuller

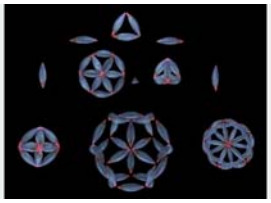

Figure 11
6-Trion regular solids
10-stack tetrahedron

Figure 12
4-dynamic states of regular solids – imploding, exploding, perceived, at rest

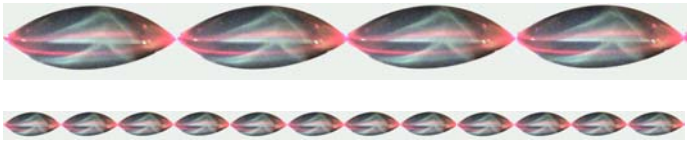

Figure 13 A scale line of Trion-Re'

Acknowledgements

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Richard Reiser

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[2] Leonard Shlaind, **Art & Physics** (William Morrow and Company Inc. , 1991) p. 33

[3] Paul C. Vitz & Arnold B. Glimcher, **Modern Art and Modern Science** (New York: Praeger, 1984), p. 183

[4] WEB www.msnbc.com/news/202284.asp *This article is based on material from "Hyperspace" and "Visions" by Michio Kaku.*

[5] Robert S. Auerbach was an obscure geometer who first discovered the projective geometry of Space Clusters. It was his work that inspired my investigations into the space between. I call his geometry "The Auerbachian Way." Robert S. Auerbach, Geometer, Transcended February, 14th 2001.

Recommended Reading

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