622.00 **Polarization of Tetrahedron**

622.01 The notion that tetrahedra lack polarity is erroneous. There is a polarization of tetrahedra, but it derives only from considering a *pair* of tetrahedral edge vectors that do not intersect one another. The opposing vector mid-edges have a polar interrelationship.

622.10 **Precessionally Polarized Symmetry:** There is a polarization of tetrahedra, but only by taking a *pair* of opposite edges which are arrayed at 90 degrees (i.e., precessed) to one another in parallelly opposite planes; and only their midpoint edges are axially opposite and do provide a polar axis of spin symmetry of the tetrahedron. There is a fourfold symmetry aspect of the tetrahedron to be viewed as precessionally polarized symmetry. (See Sec. 416.01.)

622.20 **Dynamic Equilibrium of Poles of Tetrahedron:** There is a dynamic symmetry in the relationship between the mid-action, i.e., mid-edge, points of the opposing pair of polar edges of the tetrahedron. The one dot represents the positive pole of the tetrahedron at mid-action point, i.e., action center. The other dot represents the negative pole of the tetrahedron at mid-action point, i.e., at the center of negative energy of the dynamical equilibrium of the tetrahedron.

622.30 **Spin Axis of Tetrahedron:** The tetrahedron can be spun around its negative event axis or around its positive event axis.

623.00 **Coordinate Symmetry**

623.10 **Cheese Tetrahedron:** If we take a symmetrical polyhedron of cheese, such as a cube, and slice parallel to one of its faces, what is left over is no longer symmetrical; it is no longer a cube. Slice one face of a cheese octahedron, and what is left over is no longer symmetrical; it is no longer an octahedron. If you try slicing parallel to one of the faces of all the symmetrical geometries, i.e., all the Platonic and Archimedean "solids," each made of cheese, what is left after the parallel slice is removed is no longer the same symmetrical polyhedron—but with one exception, the tetrahedron.

623.11 Let us take a foam rubber tetrahedron and compress on one of its four faces inward toward its opposite vertex instead of slicing it away. It remains symmetrical, but smaller. If we pull out on a second face at the same rate that we push in on the first face, the tetrahedron will remain the same size. It is still symmetrical, but the pushing of the first face made it get a little smaller, while the pulling of the second face made it get a little larger. By pushing and pulling at the same rate, it remains the same size, but its center of gravity has to move because the whole tetrahedron seems to move. As it moves, it receives one positive alteration and one negative alteration. But in moving it we have acted on only two of the tetrahedron's four faces. We could push in on the third face at a rate different from the first couple, which is already operating; and we could pull out the fourth face at the same rate we are pushing in on the third face. We are introducing two completely different rates of change: one being very fast and the other slow; one being very hard and the other soft. We are introducing two completely different rates of change in physical energy or change in abstract metaphysical conceptuality. These completely different rates are coupled so that the tetrahedron as a medium of exchange remains both symmetrical and the same size, but it has to change its position to accommodate two alterations of the center of gravity positioning but not in the same plane or the same line. So it will be moving in a semihelix. This is another manifestation of precessional resultants.

623.12 The tetrahedron's four faces may be identified as A, B, C, and D. Any two of these four faces can be coupled and can be paired with the other two to provide the dissimilar energy rate-of-exchange accommodation. $(N^2 - N)/2$ = the number of relationships. In this case, N = 4, therefore, (16 - 4) / 2 = 6. There are six possible couples: AB, AC, AD, BC, BD, CD, and these six couples may be interpaired in $(N^2 - N)/2$ ways; therefore, (36 - 6)/2=15; which 15 ways are:

(1) AB-AC	(6) AC-AD	(11) AD-BD
(2) AB-AD	(7) AC-BC	(12) AD-CD
(3) AB-BC	(8) AC-BD	(13) BC-BD
(4) AB-BD	(9) AC-CD	(14) BD-CD
(5) AB-CD	(10) AD-BC	(15) BD-CD

Thus any one tetrahedron can accommodate 15 different *amplitude* (A) and, or *frequency* (F) of interexchanging without altering the tetrahedron's size while, however, always changing the tetrahedron's apparent occurrence locale; therefore the number of possible alternative exchanges are three; i.e., AA, AF, FF;

therefore, 3 × 15 = 45 different combinations of *interface couplings* and message contents can be accommodated by the same apparent unit-size tetrahedron, the only resultants of which are the 15 relocations of the tetrahedrons and the 45 different message accommodations.

623.13 Tetrahedron has the extraordinary capability of remaining symmetrically coordinate and entertaining 15 pairs of completely disparate rates of change of three different classes of energy behaviors in respect to the rest of Universe and not changing its size. As such, it becomes a universal joint to couple disparate actions in Universe. So we should not be surprised at all to find nature using such a facility and moving around Universe to accommodate all kinds of local transactions, such as coordination in the organic chemistry or in the metals. The symmetry, the fifteenness, the sixness, the foumess, and the threeness are all constants. This induced "motion," or position displacement, may explain all apparent motion of Universe. The fifteenness is unique to the icosahedron and probably valves the 15 great circles of the icosahedron.

623.14 A tetrahedron has the strange property of *coordinate symmetry,* which permits local alteration without affecting the symmetrical coordination of the whole. This means it is possible to receive changes in respect to one part or direction of Universe and not in the direction of the others and still have the symmetry of the whole. In contradistinction to any other Platonic or Archimedean symmetrical "solid," only the tetrahedron can accommodate local asymmetrical addition or subtraction without losing its cosmic symmetry. Thus the tetrahedron becomes the only exchange agent of Universe that is not itself altered by the exchange accommodation.

623.20 **Size Comes to Zero:** There are three different aspects of size—linear, areal, and volumetric—and each aspect has a different velocity. As you move one of the tetrahedron's faces toward its opposite vertex, it gets smaller and smaller, with the three different velocities operative. But it always remains a tetrahedron with six edges, four vertexes, and four faces. So the symmetry is not lost and the fundamental topological aspect—its 60-degreeness—never changes. As the faces move in, they finally become congruent to the opposite vertex as all three velocities come to zero at the same time. The degreeness, the six edges, the four faces, and the symmetry were never altered because they were not variables. The only variable was size. Size alone can come to zero. The conceptuality of the other aspects never changes.

624.00 Inside-Outing of Tetrahedron

624.01 The tetrahedron is the only polyhedron, the only structural system that can be turned inside out and vice versa by one energy event.

624.02 You can make a model of a tetrahedron by taking a heavy-steel-rod triangle and running three rubber bands from the three vertexes into the center of gravity of the triangle, where they can be tied together. Hold the three rubber bands where they come together at the center of gravity. The inertia of the steel triangle will make the rubber bands stretch, and the triangle becomes a tetrahedron. Then as the rubber bands contract, the triangle will lift again. With such a triangle dangling in the air by the three stretched rubber bands, you can suddenly and swiftly plunge your hand forth and back through the relatively inert triangle . . . making first a positive and then a negative triangle. (In the example given in Sec. 623.20, the opposite face was pumped through the inert vertex. It can be done either way.) This kind of oscillating pump is typical of some of the atom behaviors. An atomic clock is just such an oscillation between a positive and a negative tetrahedron.

624.03 Both the positive and negative tetrahedra can locally accommodate the 45 different energy exchange couplings and message contents, making 90 such accommodations all told. These accommodations would produce 30 different "apparent" tetrahedron position shifts, whose successive movements would always involve an angular change of direction producing a helical trajectory.

624.04 The extensions of tetrahedral edges through any vertex form positive-negative tetrahedra and demonstrate the essential twoness of a system.

624.05 The tetrahedron is the minimum, convex-concave, omnitriangulated, compound curvature system, ergo, the minimum sphere. We discover that the additive twoness of the two polar (and a priori awareness) spheres at most economical minimum are two tetrahedra and that the insideness and outsideness complementary tetrahedra altogether represent the two invisible complementary twoness that balances the visible twoness of the polar pair.

624.06 When we move one of the tetrahedron's faces beyond congruence with the opposite vertex, the tetrahedron turns inside out. An inside-out tetrahedron is conceptual and of no known size.

624.10 **Inside Out by Moving One Vertex:** The tetrahedron is the only polyhedron that can be turned inside out by moving one vertex within the prescribed linear restraints of the vector interconnecting that vertex with the other vertexes, i.e., without moving any of the other vertexes.

624.11 Moving one vertex of an octahedron within the vectorial-restraint limits connecting that vertex with its immediately adjacent vertexes (i.e., without moving any of the other vertexes), produces a congruence of one-half of the octahedron with the other half of the octahedron.

624.12 Moving one vertex of an icosahedron within the vectorial-constraint limits connecting that vertex with the five immediately adjacent vertexes (i.e., without moving any of the other vertexes), produces a local inward dimpling of the icosahedron. The higher the frequency of submodulating of the system, the more local the dimpling. (See Sec. 618.)

625.00 **Invisible Tetrahedron**

625.01 The Principle of Angular Topology (see Sec. 224) states that the sum of the angles around all the vertexes of a structural system, plus 720 degrees, equals the number of vertexes of the system multiplied by 360 degrees. The tetrahedron may be identified as the 720-degree differential between any definite local geometrical system and finite Universe. Descartes discovered the 720 degrees, but he did not call it the tetrahedron.

625.02 In the systematic accounting of synergetics angular topology, the sum of the angles around each geodesically interrelated vertex of every definite concave-convex local system is always two vertexial unities less than universal, nondefined, finite totality.

625.03 We can say that the difference between any conceptual system and total but nonsimultaneously conceptual—and therefore nonsimultaneously sensorial—scenario Universe, is always one exterior tetrahedron and one interior tetrahedron of whatever sizes may be necessary to account for the balance of all the finite quanta thus far accounted for in scenario Universe outside and inside the conceptual system considered. (See Secs. 345 and 620.12.)

625.04 Inasmuch as the difference between any conceptual system and total Universe is always two weightless, invisible tetrahedra, if our physical conceptual system is a regular equiedged tetrahedron, then its complementation may be a weightless, metaphysical tetrahedron of various edge lengths—ergo, non-mirror-imaged—yet with both the visible and the invisible tetrahedra's corner angles each adding up to 720 degrees, respectively, though one be equiedged and the other variedged.

625.05 The two invisible and *n*-sized tetrahedra that complement all systems to aggregate sum totally as finite but nonsimultaneously conceptual scenario Universe are mathematically analogous to the "annihilated" left-hand phase of the rubber glove during the right hand's occupation of the glove. The difference between the sensorial, special- case, conceptually measurable, finite, separately experienced system and the balance of nonconceptual scenario Universe is two finitely conceptual but nonsensorial tetrahedra. We can say that scenario Universe is finite because (though nonsimultaneously conceptual and considerable) it is the sum of the conceptually finite, after-image-furnished thoughts of our experience systems plus two finite but invisible, *n*-sized tetrahedra.

625.06 The tetrahedron can be turned inside out; it can become invisible. It can be considered as antitetrahedron. The exterior invisible complementary tetrahedron is only concave having only to embrace the convexity of the visible system and the interior invisible complementary tetrahedron is only convex to marry the concave inner surface of the system.

625.10 **Macro-Micro Invisible Tetrahedra**

625.11 In finite but nonunitarily conceptual Scenario Universe a minimum-system tetrahedron can be physically realized in local time-and-space Universe—i.e., as tune-in- able only within human-sense-frequency-range capabilities and only as an inherently two- in-one tetrahedron (one convex, one concave, in congruence) and only by concurrently producing two separate invisible tetrahedra, one externalized macro and one internalized micro—ergo, four tetrahedra.

625.12 The micro-tetra are congruent only in our Universe; in metaphysical Universe they are separate.

626.00 **Operational Aspects of Tetrahedra**

626.01 The world military forces use reinforced concrete tetrahedra for military tank impediments. This is because tetrahedra lock into available space by friction and not by fitting. They are used as the least disturbable barrier components in damming rivers temporarily shunted while constructing monolithic hydroelectric dams.

626.02 The tetrahedron's inherent refusal to fit allows it to get ever a little closer; in not fitting additional space, it is always available to accommodate further forced intrusions. The tetrahedron's edges and vertexes scratch and dig in and thus produce the powerfully locking-in-place frictions . . . while stacks of neatly fitting cubes just come apart.

626.03 This is why stone is crushed to make it less spherical and more tetrahedral. This is why beach sand is not used for cement; it is too round. Spheres disassociate; tetrahedra associate spontaneously. The limit conditions involved are the inherent geometrical limit conditions of the sphere enclosing the most volume with the least surface and the fewest angular protrusions, while the tetrahedron encloses the least volume with the most surface and does so with most extreme angular vertex protrusion of any regular geometric forms. The sphere has the least interfriction surface with other spheres and the greatest mass to restrain interfrictionally; while the tetrahedra have the most interfriction, interference surface with the least mass to restrain.

630.00 **Antitetrahedron**

631.00 **Minimum of Four Points**

631.01 We cannot produce constructively and operationally a real experience-augmenting, omnidirectional system with less than four points. A fourth point cannot be in the plane approximately located, i.e., described, by the first three points, for the points have no dimension and are unoccupiable as is also the plane they "describe." It takes three points to define a plane. The fourth point, which is not in the plane of the first three, inherently produces a tetrahedron having insideness and outsideness, corresponding with the reality of operational experience.

631.02 The tetrahedron has four unique planes described by the four possible relationships of its four vertexes and the six edges interconnecting them. In a regular tetrahedron, all the faces and all the edges are assumed to be approximately identical.

632.00 **Dynamic Symmetry of the Tetrahedron**

632.01 There is a symmetry of the tetrahedron, but it is inherently four-dimensional and related to the four planes and the four axes projected perpendicularly to those planes from their respective subtending vertexes. But the tetrahedron lacks three-dimensional symmetry due to the fact that the subtending vertex is only on one side of the triangular plane, and due to the fact that the center of gravity of the tetrahedron is always only one- quarter of its altitude irrespective of the seeming asymmetry of the tetrahedron.

632.02 The dynamic symmetry of the tetrahedron involves the inward projection of four geodesic connectors with the center of area of the triangular face opposite each vertex of the tetrahedron (regular or maxi-asymmetrical); which four vertex-to-opposite- triangle geodesic connectors will all pass through the center of gravity of the tetrahedron—regular, mini- or maxi-asymmetric; and the extension of those geodesics thereafter through the four centers of gravity of those four triangular planes, outwardly from the tetrahedron to four new vertexes equidistant outwardly from the three corners of their respective four basal triangular facet planes of the original tetrahedron. The four exterior vertexes are equidistant outwardly from the original tetrahedron, a distance equal to the interior distances between the centers of gravity of the original tetrahedron's four faces and their inwardly subtending vertexes. This produces four regular tetrahedra outwardly from the four faces of the basic tetrahedron and triple-bonded to the original tetrahedron.

632.03 We have turned the tetrahedron inside out in four different directions and each one of the four are dimensionally similar. This means that each of the four planes of the tetrahedron produces four new points external to the original tetrahedron, and four similar tetrahedra are produced outwardly from the four faces of the original tetrahedron; these four external points, if interconnected, produce one large tetrahedron, whose six edges lie outside the four externalized tetrahedra's 12 external edges.

633.00 **Negative Tetrahedron**

633.01 As we have already discovered in the vector equilibrium (see Sec. 480), each tetrahedron has its negative tetrahedron produced through its interior apex rather than through its outer triangular base. In the vector equilibrium, each tetrahedron has its negative tetrahedron corresponding in dynamic symmetry to its four-triangled, four- vertexed, fourfold symmetry requirement. And all eight (four positive and four negative) tetrahedra are clearly present in the vector equilibrium. Their vertexes are congruent at the center of the vector equilibrium. Each of the tetrahedra has one internal edge circumferentially congruent with the other tetrahedra's edge, and each of the tetrahedra's three internal edges is thus double-bonded circumferentially with three other tetrahedra, making a fourfold cluster in each hemisphere. This exactly balances a similarly bonded fourfold cluster in its opposite hemisphere, which is double-bonded to their hemisphere's fourfold cluster by six circumferentially double-bonded, internal edges. Because there are four equatorial planes of symmetry of the vector equilibrium, there are four different sets of the fourfold tetrahedra clusters that can be differentiated one from the others.

633.02 Each of the eight tetrahedra symmetrically surrounding the nucleus of the vector equilibrium can serve as a nuclear domain energy valve, and each can accommodate 15 alternate intercouplings and three types of message contents; wherefore, the vector equilibrium cosmic nucleus system can accommodate 4 × 45 = 180 positive, and 4 × 45 = 180 negative, uniquely different energy—or information—transactions at four frequency levels each. We may now identify (a) the four positive-to-negative-to positive, triangular intershuttling transformings within each cube of the eight corner cubes of the two- frequency cube (see Sec. 462 *et seq*.); with (b) the 360 nuclear tetrahedral information valvings as being cooperatively concurrent functions within the same prime nuclear domain of the vector equilibrium; they indicate the means by which the electromagnetic, omniradiant wave propagations are initially articulated.

634.00 **Irreversibility of Negative Tetrahedral Growth**

634.01 When the dynamic symmetry is inside-outingly developed through the tetrahedron's base to produce the negatively balancing tetrahedron, only the four negative tetrahedra are externally visible, for they hide entirely the four positive triangular faces of the positive tetrahedron's four-base, four-vertex, fourfold symmetry. The positive tetrahedron is internally congruent with the four internally hidden, triangular faces of the four surrounding negative tetrahedra. This is fundamental irreversibility: the outwardly articulated dynamic symmetry is not regeneratively procreative in similar tetrahedral growth. The successive edges of the overall tetrahedron will never be rationally congruent with the edges of the original tetrahedron. This growth of dissimilar edges may bring about all the different frequencies of the different chemical elements.

635.00 **Base-Extended Tetrahedron**

635.01 The tetrahedron extended through its face is pumpingly or diaphragmatically inside-outable, in contradistinction to the vertexially extended tetrahedron. The latter is single-bonded (univalent); the former is triple-bonded and produces crystal structures. The univalent, single-bonded universal joint produces gases.

636.00 **Complementary to Vector Equilibrium**

636.01 In the vector equilibrium, we have all the sets of tetrahedra bivalently or edge-joined, i.e., liquidly, as well as centrally univalent. Synergetics calls the basally developed larger tetrahedron the *non-mirror-imaged complementary* of the vector equilibrium.[2] In vectorial-energy content and dynamic-symmetry content lies the complementarity.

(Footnote 2: The non-mirror-imaged complementary is not a negative vector equilibrium. The vector equilibrium has its own integral negative.)

637.00 **Star Tetrahedron**

637.01 The name of this dynamic vector-equilibrium complementary tetrahedron is the *star tetrahedron.* The star tetrahedron is one in which the vectors are no longer equilibrious and no longer omnidirectionally and regeneratively extensible. This star tetrahedron name was given to it by Leonardo da Vinci.

637.02 The star tetrahedron consists of five equal tetrahedra, four external and one internal. Because its external edges are not 180-degree angles, it has 18—instead of six—equi-vector external edges: 12 outwardly extended and six inwardly valleyed; ergo, a total of 18. It is a compound structure. Four of its five tetrahedra, which are nonoutwardly regenerative in unit-length vectors, ergo, non-allspace-filling, are in direct correspondence with the five four-ball tetrahedra which do close-pack to form a large, regular, three- frequency tetrahedron of four-ball edges, having one tetrahedral four-ball group at the center rather than an octahedral group as is the case with planar and linear topological phenomena. This is not really contradictory because the space inside the four-ball tetrahedron is always a small concave octahedron, wherefore, an octahedron is really at the center, though not an octahedron of six balls as at the center of a four, four-ball tetrahedral "pyramid."

638.00 **Pulsation of Antitetrahedra**

638.01 The star tetrahedron is a structure—but it is a compound structure. The fifth tetrahedron, which is the original one, and only nuclear one accommodates the pulsations of the outer four. Its outward pulsings are broadcast, and its inward pulsings are repulsive—that is why it is a star. The four three-way—12 in total—external pulsations are unrestrained, and the internal pulsations are compressionally repulsed. Leonardo called it the star tetrahedron, not because it has points, but because he sensed intuitively that it gives off radiation like a star. The star tetrahedron is an impulsive-expulsive transceiver whose four, 12-faceted, exterior triangles can either (a) feed in cosmic energy receipts which spontaneously articulate one or another of the 15 interpairings of the six A, B, C, D, interior tetrahedron's couplings, or (b) transmit through one of the external tetrahedra whose respective three faces each must be refractively pulsated once more to beam or broadcast the 45 possible AA, AF, FF messages.

638.02 There is a syntropic pulsation receptivity and an outward pulsation in dynamic symmetry of the star tetrahedron. As an energy radiator, it is entropic. It does not regenerate itself internally, i.e., gravitationally, as does the isotropic vector matrix's vector equilibrium. The star tetrahedron's entropy may be the basis of irreversible radiation, whereas the syntropic vector equilibrium's reversibility—inwardly-outwardly—is the basis for the gravitationally maintained integrity of Universe. The vector equilibrium produces conservation of omnidynamic Universe despite many entropic local energy dissipations of star tetrahedra. The star tetrahedron is in balance with the vector equilibrium—pumpable, irreversible, like the electron in behavior. It has the capability of self-positionability by converting its energy receipts to unique refraction sequences, which could change output actions to other dynamic, distances-keeping orbits, in respect to the—also only remotely existent and operating—icosahedron, and its 15 unique, great-circle self-dichotomizing; which icosahedra can only associate with other icosahedra in either linear-beam export or octahedral orbital hover-arounds in respect to any vector equilibrium nuclear group. (See Sec. 1052.)

638.03 The univalent antitetrahedra twist but do not pump. The singlebonded tetrahedra are also inside-outable, but by torque, by twist, and not by triangular diaphragm pumping. The lines of the univalent antitetrahedron are non-self-interfering. Like the lamp standards at Kennedy International Airport, New York, the three lines twist into plus (+) and minus (-) tetrahedra. MN and OP are in the same plane, with A and A ` on the opposite sides of the plane. So you have a *vertexial* inside-out twisting and a basal inside- out pumping.

638.10 **Three Kinds of Inside-Outing:** Of all the Platonic polyhedra, only the tetrahedron can turn inside out. There are three ways it can do so: by single-, double-, and triple-bonded routes. In double-bonded, edge-to-edge inside-outing, there are pairs of diametric unfoldment of the congruent edges, and the diameter becomes the hinge of reverse positive and negative folding.

639.00 Propagation

639.01 The star tetrahedron is nonreversible. It can only propagate outwardly. (The vector equilibrium can keep on reproducing itself inwardly or outwardly, gravitationally.) The star tetrahedron's four external tetrahedra cannot regenerate themselves; but they are external-energy-receptive, whether that energy be tensive or pressive. The star tetrahedron consists only of A Modules; it has no B Modules. The star tetrahedron may explain a whole new phase of energetic Universe such as, for instance, Negative Universe.

639.02 The vector equilibrium's closest-packed sphere shell builds outwardly to produce successively the neutron and proton counts of the 92 regenerative chemical elements. The star tetrahedron may build negatives for the post-uraniums. The star tetrahedron's six potential geodesic interconnectors of the star tetrahedron's outermost points are out of vector-length frequency-phase and generate different frequencies each time they regenerate; they expand in size due to the self-bulging effects of the 15 energy message pairings of the central tetrahedron. Because their successive new edges are noncongruent with the edges of the original tetrahedron, the new edge will never be equal to or rational with the original edge. Though they produce a smooth-curve, ascending progression, they will always be shorter—but only a very little bit shorter—than twice the length of the original edge vectors. Perhaps this shortness may equate with the shortening of radial vectors in the transition from the vector equilibrium's diameter to the icosahedron's diameter. (See Sec. 460, Symmetrical Contraction of Vector Equilibrium.) This is at least a contraction of similar magnitude, and mathematical analyses may show that it is indeed the size of the icosahedron's diameter. The new edge of the star tetrahedron may be the same as the reduced radius of the icosahedron. If it is, the star tetrahedron could be the positron, as the icosahedron seems to be the electron. These relationships should be experimentally and trigonometrically explored, as should all the energy-experience inferences of synergetics. The identifications become ever more tantalizingly close.

Next Section: 640.00
