

986.600 **Surface-Volume Ratios in the Atomic Theater**

986.610 **Considerations, Recalls, and Discoveries**

986.611 Our inventory of considerations, recalls, and discoveries is now burgeoning but remains *omniinterrelevant*. Wherefore we continue recalling and reconsidering with a high probability factor that we will make further discovery based on our past experience.

986.620 **Demass Breakpoint Model of Macrotude-microtude Difference Between Matter and Radiation**

986.621 Let me here introduce a physical experiment that will give us a personal feeling of appreciation of the importance to all humanity of all humanity's being able to *see with its own eyes* what Einstein's equation represents—the breakpoint between matter and radiation (critical mass and atomic-energy release)—and above all to give all humanity experienceable, knowable access to all that science has ever discovered regarding Universe, plus much more than science has ever discovered. With all this experienceability of most advanced scientific discovery all humanity will come to appreciate the otherwise utterly incredible exquisiteness of mathematical exactitude with which Universe (which is nature) functions.

986.622 What we employ for such self-instruction at a human-sense-detectable level to appreciate the meager difference between the "T" square's 0.9995 edge length and the "E" square's 1.00000 (alpha) edge length is to perform the physical task of producing two squares, which the human eyes can see and fingers can feel are of different sizes. Unaided by a lens, only the most skilled human eyes can see something that is one one-hundredth of an inch (expressed as 0.01 inch). A carpenter works at no finer than 1/32nd of an inch. To make a difference of 0.0005 undeniably visible to any average human we would have to use the popularly adopted 1/16th of an inch, which is that of the common school ruler. This 1/16th of an inch is expressed decimally as 0.0625. To make 0.005 of an inch visible we multiply it by 100, which makes it 0.05. One hundred inches is eight and a half feet—the average room-ceiling height. If we make two squares with 100-inch edges (8 1/2 feet "square") out of wooden planks and timber, we cannot hold their dimensions to such a close tolerance of error because the humidity and temperature variations will be greater than 0.05 inch. Even if we make the 8 1/2-foot squares of steel and aluminum plate, the expansion and contraction under common weather temperature changes will be greater than 0.05 inch.

986.623 Using machine tools machinists can "dress" their products to tolerances as fine as 0.0001 inch.

986.624 Fiberglass-and-epoxy resin is the substance that has the minimum presently known temperature-and-humidity-caused expansion and contraction rates of all practically producible materials. Wherefore: two square plates two inches thick with edge lengths of 8 1/2 feet could be machine-tool "dressed" and placed vertically face to face in a temperature-controlled slot with one of each of both of their bottom innermost 90-degree corners jammed tightly into a "machined" corner slot, which would then make it possible to "see" with human eyes the difference in square size between the "T" and the "E" squares.

986.625 Even if we "machined" two steel cubes with an edge-length difference of .0005 inch, they would stack one on top of the other with their two vertical surfaces appearing as a polished continuum—the space between them being also subvisible.

986.626 But nature's energy-as-matter transformed into energy-as-radiation are operations conducted at a size scale far different from our experientially imagined experiments. Nature operates her matter-to-radiation energy exchanging at the atomic level. The nucleus of the atom is where energy-as-matter is self-interferingly knotted together in most primitive polyhedral-patterning event systems. The atomic nucleus diameter is 1/100,000 the diameter of its electron-orbited domain—which domain is spoken of by scientists as "the atom." One atomic diameter is called the angstrom and is the prime measurement unit of the physicists—macrophysicists or microphysicists, astro or nuclear, as they might well be designated.

986.627 Referring to those two 8 1/2-foot (the size of Barnum's circus human giant) in height and 2-inches-thick square plates of machine-dressed fiberglass-epoxy resin and their minimum-human-sense-detectability difference of dimension, we find that the angstrom-atomic theater of energy-exchanging performance is only 1/126,500,000,000 the size of the minimum average human sense detectability. This figure, put into human- experience-sensing terms, is the distance that a photon of light expanding radially at 186,000 miles per second will travel-reach between the time humans are born and the time they reach their nineteenth birthday.

986.628 What is important for us to realize here is that synergetics mathematics, beginning with the most primitive hierarchy of min-max geometrical relationships, expresses relationships that exist independently of time-size. So we humans can think intimately about structural principles of any size. These primitive structural principles disclose inherent geometrical nuclei in respect to which all of Universe's convergent- divergent, gravitational and radiational, contracting into matter and expanding into electromagnetics, and vice versa, together with their terminal angular and frequency knotting and unknotting events comprehensively and comprehendingly occur. And since the sum-total of both macro- and micro-physical science evidences 100-percent conservation of the energy of eternally regenerative Scenario Universe, each smallest differential fraction is of infinite importance to the integrity of Universe.

986.629 And since Physical Universe demonstrates the principle of least effort, i.e., maximum efficiency to be infallibly operative, Universe does the most important tasks in the most exquisite manner; ergo, it is in the most exquisitely minute fractions that she hides her most important secrets. For all the foregoing synergetics' disclosure of a means of comprehending and operating independently of size provides human mind with not only a cosmic advantage but with all the responsibility such a cosmic decision to invest such an advantage in us implies. With these thoughts we address ourselves now to considering not only the critical cosmic surface-volume relationships but also their unique behavior differentials.

986.630 **Interkinetic Limits**

986.631 In a structural system's interbalancing of compression and tension forces the tensed components will always embrace the compression components—as does gravity always comprehensively embrace all radiation—ergo, tension is always outermost of all systems, macrocosmic or microcosmic.

986.632 Take any bendable substance and bend it. As you do so, the outer part of the bend stretches and the inner part compresses. Tension always has the greater radius-ergo, leverage advantage—ergo, gravity is always comprehensive of radiation (Compare Sec. [1051.50](#))

986.633 In experiential structural reality the so-called sphere is always and only an ultra-high-frequency geodesic polyhedron; ergo, it is always chord-circumferenced and chord-convergent-vertexed rather than arc-circumferenced and arc-vertexed; ergo, it is always and only quasispherical, which quasispherical structural form is experimentally demonstrable as enclosing the most volume with the least surface of any and all symmetrical, equiangular, structural systems. Because of the foregoing we find it desirable to rename the spheric experience, using from now on the word *spheric* in lieu of the nonexistent, experimentally nondemonstrable "sphere."

986.634 As an asymmetrical or polarized structural system, the hemispheric-ended cylinder has the same surface-to-volume ratio as that of a sphere with an identical diameter—the latter cylinders as well as their hemispherical terminals consist structurally only of high-frequency, triangularly chorded structures. The spheric and the hemispheric-terminalled cylinders alike contain the most volume with the least surface of all symmetrical polyhedra. At the other extreme of the surface-to-volume ratio, the equiangular tetrahedron encloses the least volume with the most surface of any and all omnisymmetrical structural systems. The more asymmetrical the tetrahedron, the more surface is required to envelop a given volume. It may be assumed, therefore, that with a given quantity of the same energy invested as molecularly structured, system-containing capability, it is less tensionally stressful to enclose a regular equiangular tetrahedron than it is to enclose any asymmetrical tetrahedron.

986.635 In respect to total surface areas of asymmetrical tetrahedra of unit (i.e., identical volume) enclosure, it is experimentally demonstrable that the greater the difference between the most acute angle and the most obtuse of its 12 surface angles, the greater the surface-to-volume ratio will be, and therefore the greater the tensional stressing of its outermost cohering components—ergo, the greater the challenge to the containment of its structural-system integrity. (See Sec. [923](#) and Fig. [923.10](#).) According to Newton's law the mass interattraction of two separate bodies deteriorates exponentially as the distance apart decreases arithmetically; ergo, the relative interproximity of the atoms within any molecule, and the relative interproximity of the molecules as structurally interarrayed within any and all volume-containment systems—and the resultant structural-integrity coherences of those systems—trend acceleratingly toward their theoretical atom- and-molecule-interattractive-proximity limits. These chemical-structure-integrity limits are visibly demonstrated to the human eyes by the bursting of bubbles or of children's overfilled balloons or of any other internally overpressured fluid-pneumatic,

molecular- membraned containers when the membrane impinging and ricocheting interkinetic acceleration of an increasingly introduced population of contained gas molecules separates the molecules of the container membrane beyond their critical-proximity limits. These critical-atomic-and-molecular-proximity limits are mathematically and gravitationally similar to the proximity limits governing the velocity and distance outward from planet Earth's surface at which a rocket-launched vehicle can maintain its orbit and not fall back into the Earth.

986.700 **Spheric Nature of Electromagnetic Waves**

986.701 **Consideration 16: and Realization of Synergetic Significance**

986.702 Since we have learned that nature's second-powering is triangling and not squaring (Sec. [990](#)), and since each square is always two similar triangles, we must express Einstein's equation, where E is the product of M and c^2 , as:

$$E = 2 V^2$$

986.710 **Recapitulation of Geometry-and-energy Recalls**

986.711 I must add to the inventory of only-synergetically-interrevealing significant discoveries of this chronicle a recapitulation of additional "recalls ":

1. The absolute constancy of cheese polyhedra;
2. that the tetrahedron is the quantum of energy;
3. that the nonpolar vertexes of the polar-edge-"tuned" tetrahedron can connect any other two points in Universe;
4. that the unit-volume progression of quanta modules accounts for electromagnetic intertuning;
5. that the tetrahedron in turning itself inside-out accounts for electromagnetic- wave propagation;
6. that polyhedra should be reidentified as *polyvertexia*, the simplest of which is the *tetravertex*;
7. that the tetravertex is the simplest spheric system;
8. that the vector equilibrium provides a field for universal energy accommodation; and
9. that the vector equilibrium shell growth rate predicts the proton and neutron population of the elements.

986.720 **Absolute Constancy: Cheese Polyhedra**

986.721 My first observation of the polyhedral hierarchy was introduced in Sec. [223.64](#), Table [224.20](#), and Fig. [400.30](#). That hierarchy may be considered as cheese polyhedra in which there is an experimental redemonstrability of absolute constancy of areal, volumetric, topological, and symmetry characteristics, which constancy is exclusively unique to triangles and tetrahedra and is maintained despite any and all asymmetrical aberrations of those triangles and tetrahedra, as caused

- by perspective distortion;
- by interproportional variations of relative lengths and angles as manifest in isosceles, scalene, acute, or obtuse system aspects (see quadrangular versus triangular accounting in Figs. [990.01](#) and [100.301](#).);
- by truncatings parallel to triangle edges or parallel to tetrahedron faces; or
- by frequency modulations,

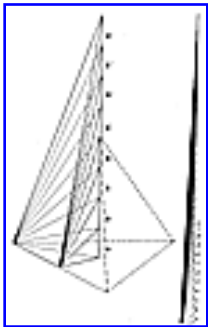
in contradistinction to complete loss of symmetry and topological constancy of all polygons other than the triangle and of all polyhedra other than the tetrahedron as caused by any special-case, time-size alterations or changes of the perspective point from which the observations of those systems are taken.

986.722 In connection with this same cheese tetrahedron recall we remember (1) that we could push in on the face A of the tetrahedron at a given rate of radial contraction of the system, while pulling out face B at a matching rate of radial expansion of the system, which "couple" of local alterations of the system left the tetrahedron unaltered in shape or size throughout the transformation (Sec. [623](#)) and just as it was both before and after the "coupled" transformings took place, the only altered consequence of which was that the tetrahedron's center of volume had migrated; and we remember (2) that we could also push in on the same tetrahedron's face C and pull out on face D at a coupled rate other than the coupled rate of radial expansion and contraction of the A-B face-coupling's intercomplementary transformings; by all of which we learn that the tetrahedron can accommodate two disparate rates of change without in any way altering its own size and only altering its center-of-volume positioning in respect to any other system components of the local Universe consideration. (See color plate 26.)

986.723 It must be noted, however, that because of the generalized nonsimultaneity of cosmic events, there exists an inherent lag between the pushing in of face A and the pulling out of face B, which induces an inherent interim wave-depression or a wave-breaking pulsating of the coupling functionings of the tetrahedron's accommodation of transmission of two disparately frequenced energetic communications.

986.724 Second, I recall—as in Secs. [920.01](#) and [921.10](#) and Fig. [923.10](#)—that the tetrahedron is the quantum of energy.

986.725 Third, I recall that the single-tuned-length axis of the edge-axis-rotatable tetrahedron's two nonaxis polar vertexes may be deployed to connect up with any two other points in Universe without altering the tetrahedron's unit volume or its tuned-axis length. (See Sec. [961.30](#).)



[Fig. 986.726](#)

986.726 Fourth, I recall that the tetrahedron's 24 A Modules and the latter's B, C, D; A', B', C', D'; A'', B'', C'', D''...(alpha) (see Fig. [986.726](#), which is a detail and relabeling of Fig. [923.10B](#)) together with the T and E Modules provide transformative significance of being the constant-unit-volume progression of ever-more-asymmetrically-transforming stages of the constant-unit-volume tetrahedra, with the uniform-stage transforming being provided by five of the six edges of each of the constant-volume tetrahedra being covaryingly and ever-progressively-disparately altered—with the sixth edge alone of each and all stages of the transformation remaining unaltered in frequency and wavelength magnitude. The concurrent

- constant-volume-and-wavelength transformings, and
- system rotating around and angular tilting of the constant, unaltered-in-length, sixth edge's axial altitude in respect to the all-other-in-Universe experiences' omniinterangular orientations,

altogether both permit and accommodate any two other points X and Y in Universe being interconnected not only with one another, but also with the two points A and B that define the unaltered sixth edge AB of the constant-volume and constant-AB-edge-length, omni- Universe-interconnecting tetrahedron ABXY; all of which permits the constant sixth edge AB length to serve as the anywhere and anywhen in Universe to be established transceiver's wavelength-defining and frequency-selecting and tuning interconnecting any given two points in Universe with any two other points in Universe; ergo, with all other points in Universe, granted only sufficient elapsed time for rotational realization of the

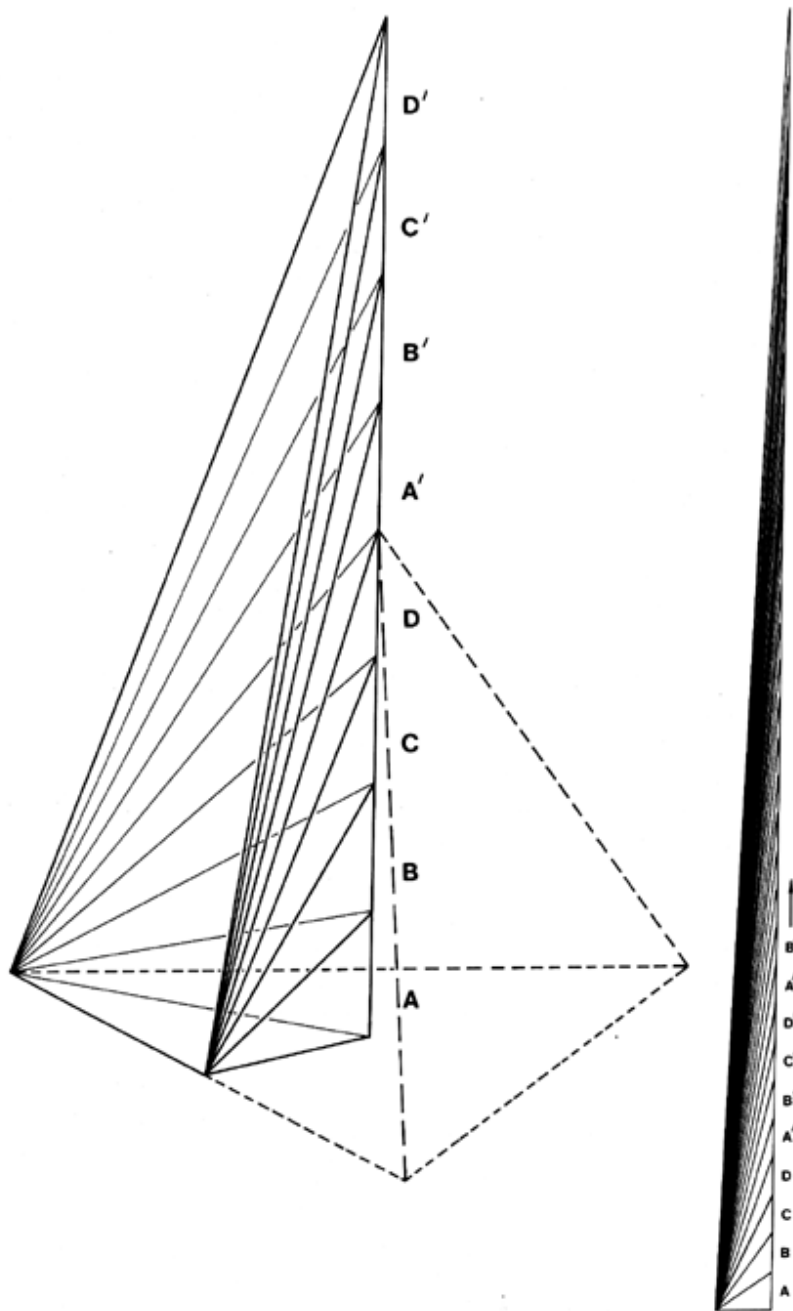


Fig. 986.726 Constant-unit-volume Progressions of Asymmetric Tetrahedra: In this progression of ever- more-asymmetric tetrahedra, only the sixth edge remains constant. Tetrahedral wavelength and tuning permits any two point in Universe.

frequency of repetition of the wavelength vector's velocity factor to reach any given loci in Universe with a given volumetric-unit quantum of energy. (This is the significance of Fig. [923.10](#).)

986.727 Fifth, I recall as recounted in Sec. [961.40](#) that the more elongated the unit- volume tetrahedron of only one-edge-length-constancy (the sixth edge), the less becomes the unit-volume tetrahedron's least-altitude aspect as related to its other interdimensional aspects, wherefore there is attained a condition wherein the controlling sixth edge's wavelength is greater than half the tetrahedron's least-altitude aspect—at which condition the tetrahedron spontaneously turns itself inside-out, ergo, turns itself out—not out of Universe, but out of tune-in-able range. Prior to this spontaneous tuning-out range we have a vast range of now-partially-tuned-in-and-now-tuned-out, which altogether propagates finitely packaged, tuned-in energy information occurring in packages yet recurring in constant, contained wavelength intervals that introduce what has hitherto been considered to be the paradoxical aspect of electromagnetic phenomena, of which it has been misassumed that as of any one moment we can consider our electromagnetic phenomena as being continuous-wave phenomena or as discontinuous-particle phenomena—both simultaneous. We thus learn that no such paradox exists. (Compare Secs. [541.30](#), [961.46-48](#), [973.30](#), and [1072.32](#).)

986.728 Sixth, we recall that there are no solids or absolute continuums; ergo, there are no physically demonstrable faces or sides of *hedra*; ergo, we reidentify the system- conceptioning experiences heretofore spoken of as polyhedra, by the name *polyvertexia*, the simplest of which is the *tetravertex*, or "four-fix" system.

986.729 Seventh, we recall that the tetravertex is not only the simplest limit case—i.e., the topologically most economically definable polyvertex system case—but also the simplest spheric-system experience case. (See Secs. [1024.10-25](#), [1053.40-62](#), [1054.00](#), [1054.30](#), and Fig. [1054.40](#).)

986.730 **The Spheric Experience:** *We now scientifically redefine the spheric experience as an aggregate of vertex-direction-pointed-to (fixed) sub-tune-in-able microevent centers surrounding a system center at equal-radius distances from the system center. Four such surrounding, vertex-convergence-indicated, microevent fixes are redemonstrably proven to be the minimum number of such a microcenter- surrounding aggregate geometrically adequate to constitute systemic subdivision of Universe into macrocosm and microcosm by convergent envelopment, which inherently excludes the thus-constituted system's macrocosm and inherently includes the thus- constituted system's microcosm, in which spheric experiencing the greater the population of equi-radiused-from-system-center microevent fixes, the more spheric the experience, and the earliest and simplest beyond the tetrahedron being the hierarchy of concentric, symmetric, primitive polyhedra.*

986.740 **Microenergy Transformations of Octet Truss**

986.741 These last nine major recalls (Sec. [986.711](#)) are directly related to the matter-to-radiation transitional events that occur as we transit between the T and the E Quanta Modules. First, we note that bubbles are spherics, that bubble envelopes are liquid membranes, and that liquids are bivalent. Bivalent tetrahedral aggregates produce at minimum the octet truss. (See Sec. [986.835](#) et seq.) The octet truss's double-bonded vertexes also require two layers of closest-packed, unit-radius spheres, whose two layers of closest-packed spheres produce an octet truss whose interior intermembranes are planar while both the exterior and interior membranes are domical.

986.742 Sufficient interior pressure will stretch out the bivalent two-sphere layer into univalent one-sphere layering, which means transforming from the liquid into the gaseous state, which also means transforming from interattractive proximity to inadequate interattractive proximity—ergo, to self-diffusing, atoms-dispersing gaseous molecules. This is to say that the surface-to-volume relationship as we transform from T Quanta Module to E Quanta Module is a transformative, double-to-single-bond, liquid-to-gas transition. Nothing "bursts." . . . Bursting is a neat structural-to-destructural atomic rearrangement, not an undefinable random mess.

986.743 Small-moleculed, gaseous-state, atomic-element, monovalent integrities, wherein the atoms are within mass-interattractive critical-proximity range of one another, interconstitute a cloud that may entrap individual molecules too large for escape through the small-molecule interstices of the cloud. A cloud is a monovalent atomic crowd. Water is a bivalent crowd of atoms. Clouds of gasses, having no external membrane, tend to dissipate their molecule and atom populations expansively, except, for instance, within critical proximity of planet Earth, whose Van Allen belts and ionosphere are overwhelmingly capable of retaining the atmospheric aggregates—whose minienergy events such as electrons otherwise become so cosmically dispersed as to be encountered only as seemingly "random" rays and particles.

986.744 This cosmic dispersion of individual microenergy event components—alpha particles, beta particles, and so on—leads us to what is seemingly the most entropic disorderly state, which is, however, only the interpenetration of the outer ramparts of a plurality of differently tuned or vectored isotropic-vector-matrix VE systems.

986.750 **Universal Accommodation of Vector Equilibrium Field: Expanding Universe**

986.751 Recalling (a) that we gave the vector equilibrium its name because nature avoids the indeterminate (the condition of equilibrium) by always transforming or pulsating four-dimensionally in 12 different ways through the omnical VE state, as in one plane of which VE a pendulum swings *through* the vertical;

— and recalling (b) that each of the vertexes of the isotropic vector matrix could serve as the nuclear center of a VE;

— and recalling (c) also that the limits of swing, pulse, or transform through aberrations of all the VE nucleus-concentric hierarchy of polyhedra have shown themselves to be of modest aberrational magnitude (see the unzipping angle, etc.);

— and recalling (d) also that post-Hubble astronomical discoveries have found more than a million galaxies, all of which are omniuniformly interpositioned angularly and are omniuniformly interdistanced from one another, while all those distances are seemingly increasing uniformly;

— all of which recalls together relate to, explain, and engender the name Expanding Universe.

986.752 We realize that these last four recalls clearly identify the isotropic vector matrix as being the operative geometrical field, not only when atoms are closest packed with one another but also when they are scattered entropically into the cosmically greatest time-size galaxies consisting of all the thus-far-discovered-to-exist stars, which consist of the thus-far-discovered evidence of existent atoms within each star's cosmic region—with those atoms interarrayed in a multitude of all-alternately, equi-degrees-of-freedom-and- frequency-permitted, evolutionary patterning displays ranging from interstellar gasses and dusts to planets and stars, from asteroids to planetary turtles...to coral...to fungi... et al.... Wherefore the Expanding Universe of uniformly interpositioned galaxies informs us that we are witnessing the isotropic vector matrix and its local vector equilibria demonstrating integrity of accommodation at the uttermost time-size macrolimits thus far generalizable within this local 20-billion-year-episode sequence of eternally regenerative Universe, with each galaxy's unique multibillions of stars, and each of these stars' multibillions of atoms all intertransforming locally to demonstrate the adequacy of the isotropic vector matrix and its local vector equilibria to accommodate the totality of all local time aberrations possible within the galaxies' total system limits, which is to say within each of their vector equilibrium's intertransformability limits.

986.753 Each of the galaxies is centered within a major VE domain within the greater isotropic vector matrix geometrical field—which major VE's respective fields are subdividingly multiplied by isotropic matrix field VE centerings to the extent of the cumulative number of tendencies of the highest frequency components of the systems permitted by the total time-size enduring magnitude of the local systems' individual endurance time limits.

986.754 In the seemingly Expanding Universe the equidistant galaxies are apparently receding from each other at a uniform rate, as accounted for by the pre-time-size VE matrix which holds for the largest scale of the total time. This is what we mean by multiplication only by division within each VE domain and its total degrees of freedom in which the number of frequencies available can accommodate the full history of the cosmogony.

986.755 The higher the frequency, the lower the aberration. With multiplication only by division we can accommodate the randomness and the entropy within an entirely regenerative Universe. The high frequency is simply diminishing our point of view.

986.756 The Expanding Universe is a misnomer. What we have is a progressively diminishing point of view as ever more time permits ever greater frequency of subdivisoning of the totally tunable Universe.

986.757 What we observe sum-totally is not a uniformly Expanding Universe, but a uniformly-contracting-magnitude viewpoint of multiplication only by division of the finite but non-unitarily-conceptual, eternally regenerative Scenario Universe. (See Secs. [987.066](#) and [1052.62](#).)

986.758 Because the higher-frequency events have the shortest wavelengths in aberration limits, their field of articulation is more local than the low-frequency, longer- wavelengths aberration limit events—ergo, the galaxies usually have the most intense activities closer into and around the central VE regions: all their entropy tendency is accommodated by the total syntropy of the astrophysical greatest-as-yet-identified duration limit.

986.759 We may now direct our attention to the microcosmic, no-time-size, closest- packed unity (versus the Galactic Universe macro-interdistanced unity). This brings us to the prefrequency, timeless-sizeless VE's hierarchy and to the latter's contractability into the geometrical tetrahedron and to that quadrivalent tetrahedron's ability to turn itself inside-out in pure principle to become the novent tetrahedron—the "Black Hole"—the presently-non-tuned-in phenomena. And now we witness the full regenerative range of generalized accommodatability of the VE's isotropic matrix and its gamut of "special case" realizations occurring as local Universe episodes ranging from photons to molecules, from red giants to white dwarfs, to the black-hole, self-insideouting, and self-reversing phase of intertransformability of eternally regenerative Universe.

986.760 Next we reexplore and recall our discovery of the initial time-size frequency- multiplication by division only-which produces the frequency F , F^2 , F^3 layers of 12, 42, closest-packed spheres around a nuclear sphere.... And here we have evidencible proof of the persistent adequacy of the VE's local field to accommodate the elegantly simple structural regenerating of the prime chemical elements, with the successive shell populations demonstrating physically the exact proton-neutron population accounting of the first minimum-limit case of most symmetrical shell enclosings, which corresponds exactly with the ever-experimentally-redemonstrable structural model assemblies shown in Sec. [986.770](#).

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