Booklet of Large & Small Spheres in Patterns, and Large & Small Mass Particles

(For all Major Particle Groups in Physics)
Carl R. Littmann, 8th Edit., 1-31-2014

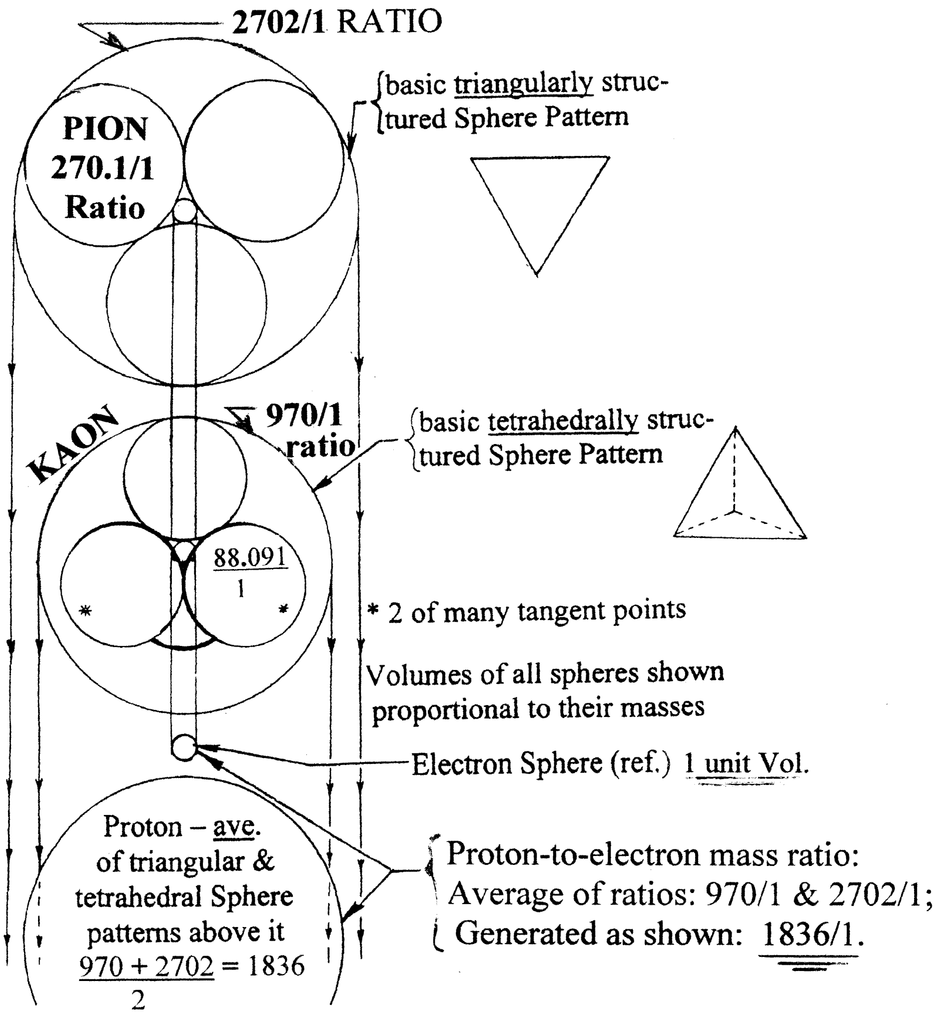
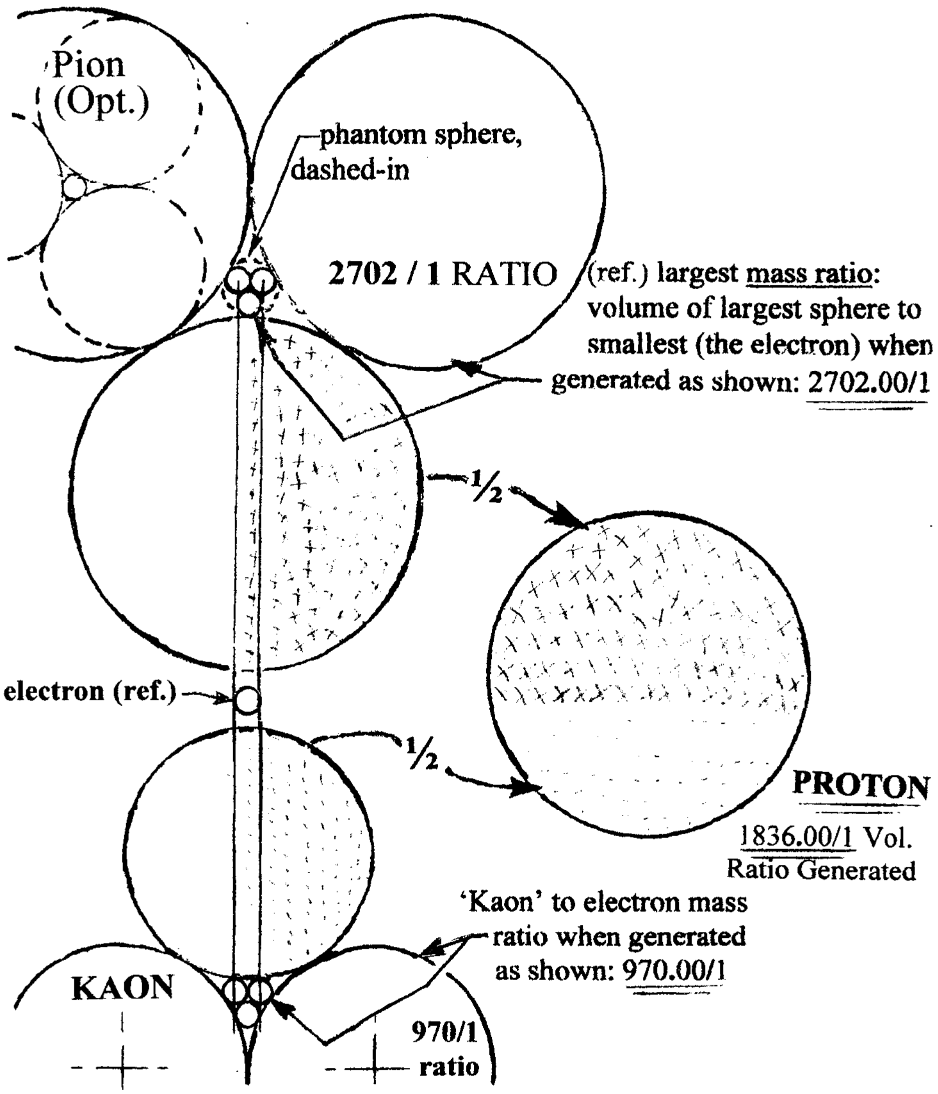


Fig. 1, the Proton-to-electron Ratio generated from two patterns above it. (Est., 1836.00/1)

Lastly, we average the volume of the largest sphere in the top sketch with the largest sphere in the middle sketch, and draw a large sphere in the bottom sketch that is equal to that volumetric average.

And the resulting *volumetric ratio* of that large bottom sphere to our standard 'electron sphere' (shown above it) corresponds almost exactly to the empirical 'Proton-to-electron' particle *mass ratio*: (1836.15/1)



$$\left[\frac{970 + 2702}{2} = 1836\right]$$

Fig. 1X, Alternate Method for Constructing all Large Spheres in Fig. 1 (same 1836/1 ratio results)

The sketches above show an alternate way of constructing each large sphere in the previously viewed page. (The 3 'dashed-in' Pions are not needed in above construction, but are shown anyway.)

Again the proton is constructed by averaging volumes. (The more roads to the same outcome, the better!)

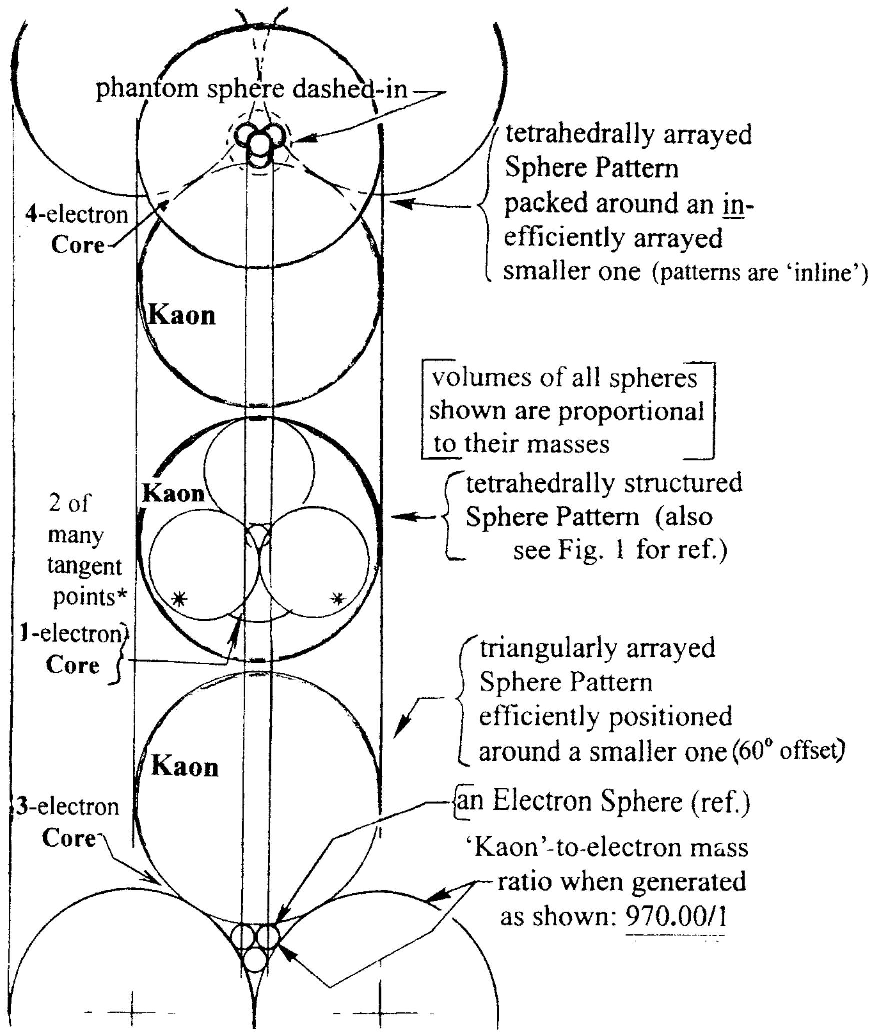


Fig. 2, Three Patterns all exhibiting the Kaon-to-electron 'volume' Ratio (970.00/1)

We note, in the sketches above, that the bottom sketch has a '3-electron core'; the middle sketch has a '1-electron core'; and the top sketch has a '4-electron core'. Yet, by using a different 'style arrangement' of spheres around them; each pattern still exhibits the same volumetric ratio of 'large-sphere to a small electron sphere'. (The more roads to the same outcome, the better!)

Please imagine top sketch as using especially transparent spheres so you can view its interior more easily than usual.

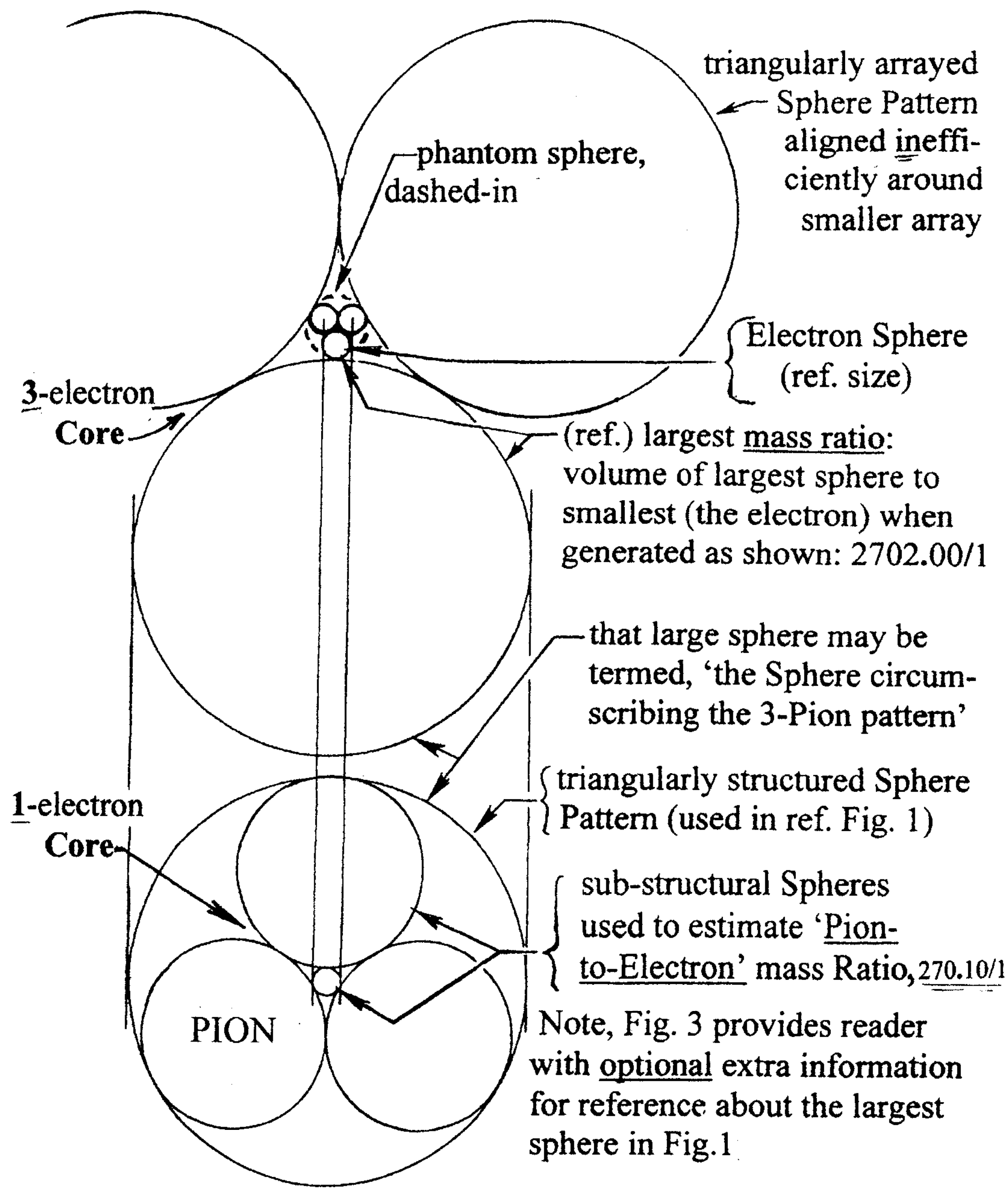


Fig. 3, Two different Ways to Make Largest Sphere in Fig. 1 and Fig. 1X

The above patterns show the equality of the largest spheres generated, whether generated around a '1-electron-core' (as shown in the bottom sketch), or around a '3-electron core' (as shown in the upper sketch).

We remember that this largest resulting sphere was used in Fig. 1 and Fig. 1X, to be averaged together with a slightly smaller 'Kaon' sphere (also in Fig. 1 and Fig. 1X), to create our 'Proton' sphere.

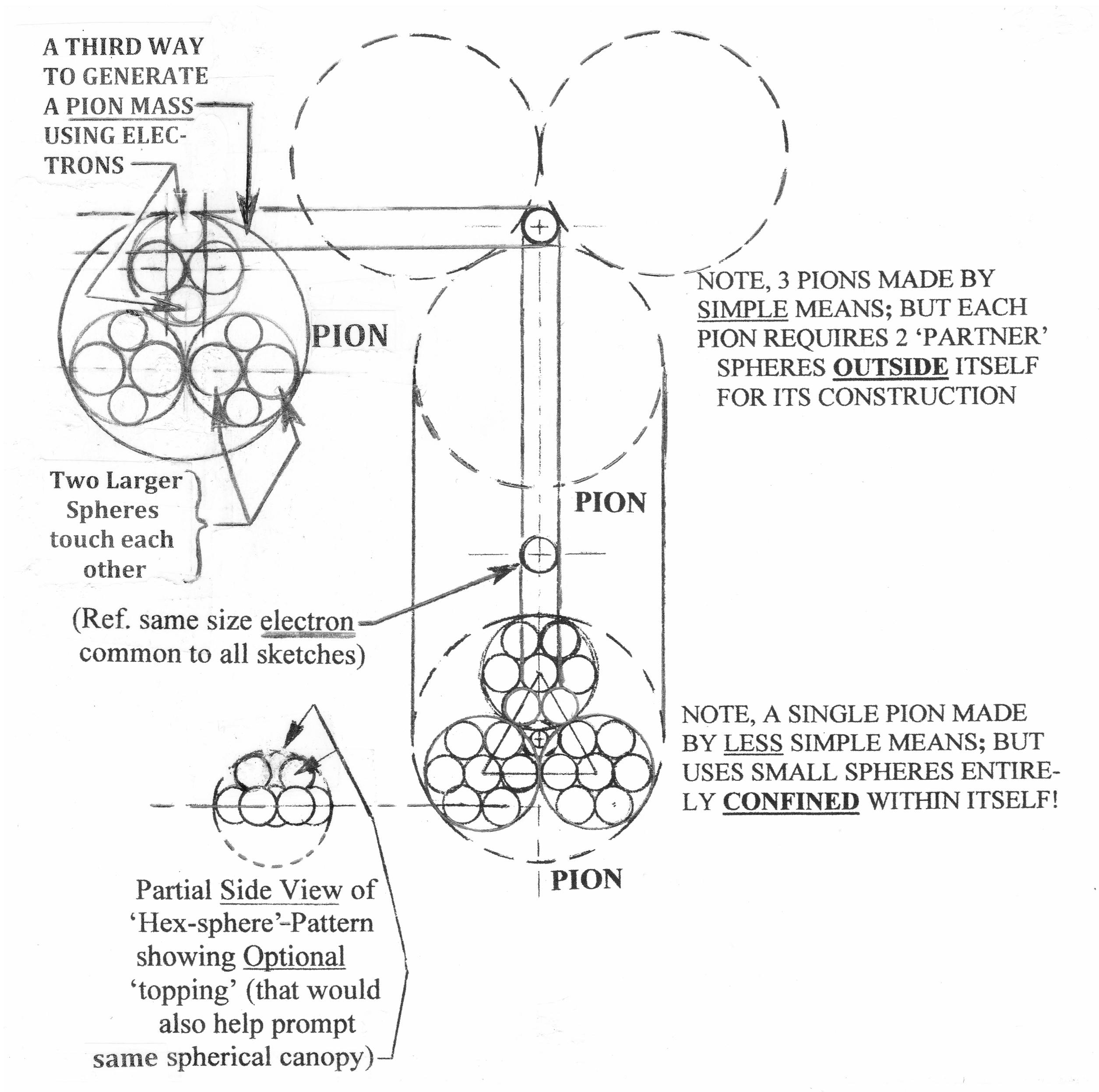
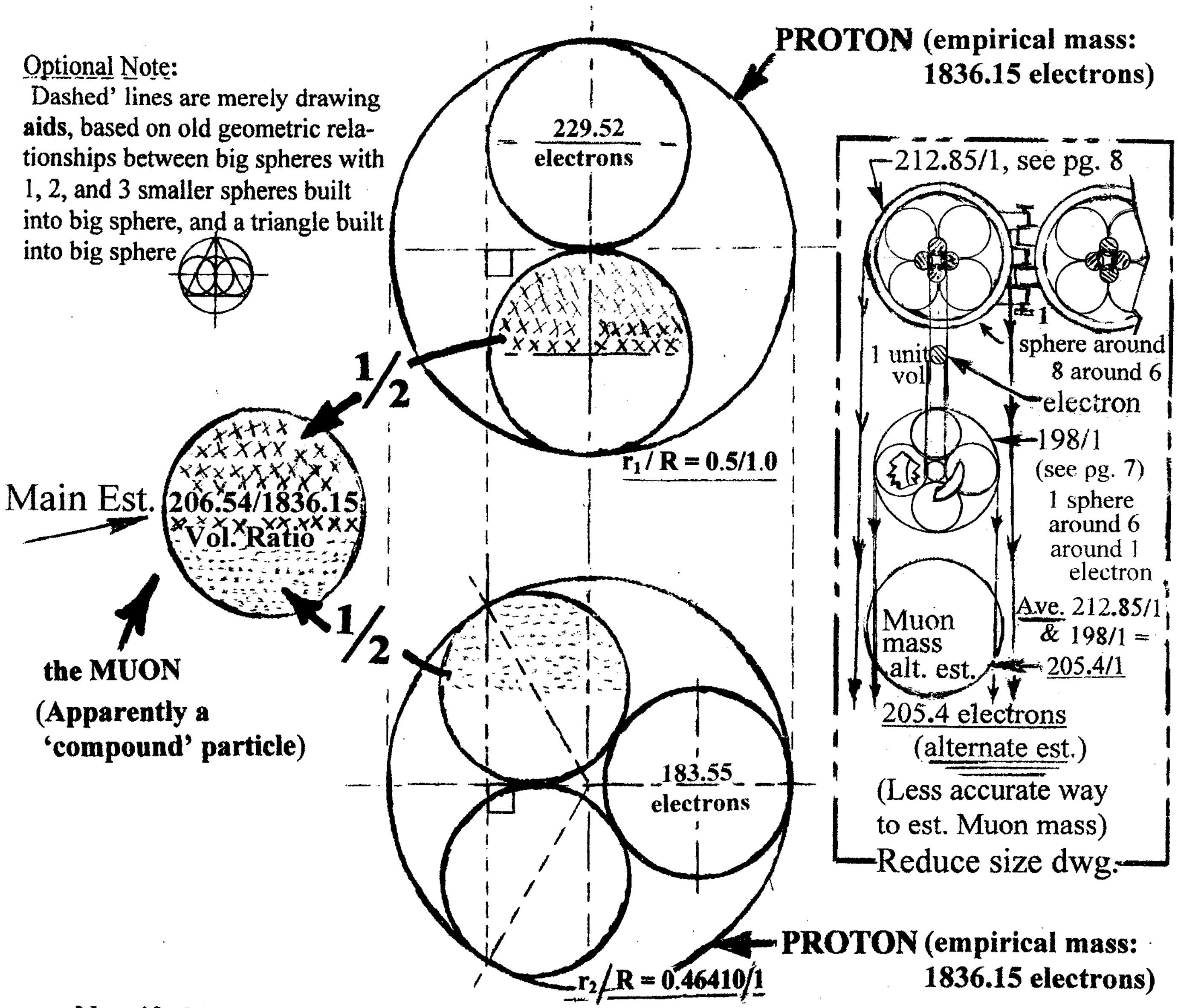


Fig. 3X, (3) Ways to Generate the Pion-to-electron Mass Ratio: (270.10/1)

The bottom sketch shows an alternate way to generate our Pion-to-electron 'volume' ratio, (270,10/1); and, therefore, also our 270.10/1 estimate for the average Pion-to-electron mass ratio. It 'comes out' identical to each of the three Pions generated in the upper sketch; but note that the Pion in the bottom sketch was generated by electrons solely inside of the Pion there. Similarly for the sketch at the upper left. Notice, from the 'partial side-view' sketch (shown to the left of the bottom sketch) that even a triangular pattern of '3-electrons', above the 7 main electrons, would encourage the exact same size surrounding sphere as the seven electrons did below it.

Also note in the upper left ('3rd Way') sketch -- that the 2 electron spheres shown in each substructure could be 'a Ring of 6 electrons', instead, and still fit perfectly. And each substructure also contains 2 spheres slightly bigger than the electron, (each sphere =3.375 electrons), instead of 1 centered electron. Although not shown, a good Est. *(3273.75 electrons) for the Omega Hyperon's mass,* Ω^-, can be constructed as "1 big sphere around 4 close-packed spheres and those around 1 core sphere of mass 3.375 electrons," the same as each 3.375 electron mass sphere described above.



Note if a Neutron (a particle with a 'pinch' more mass than proton) is substituted for either of protons shown, exactness of Muon 'mass' estimate is even closer

Fig. 4, the Muon, made from Ave. of (1 of 2) and (1 of 3) spheres inside Proton (Est., 206.54 electrons)

The Muon seems to be a 'compound' particle constructible by averaging *two* different size spheres together: *One* sphere from a pattern of 2 spheres packed inside a 'proton sphere'; and *the other* sphere from a pattern of 3 spheres packed inside a 'proton sphere'.

Above Dwg. gives: **206.54**m_e est. for Muon based on 1836.15 m_e for proton
vs. actual measured Muon is: **206.77**m_e for real Muon based on 1836.15 m_e for proton

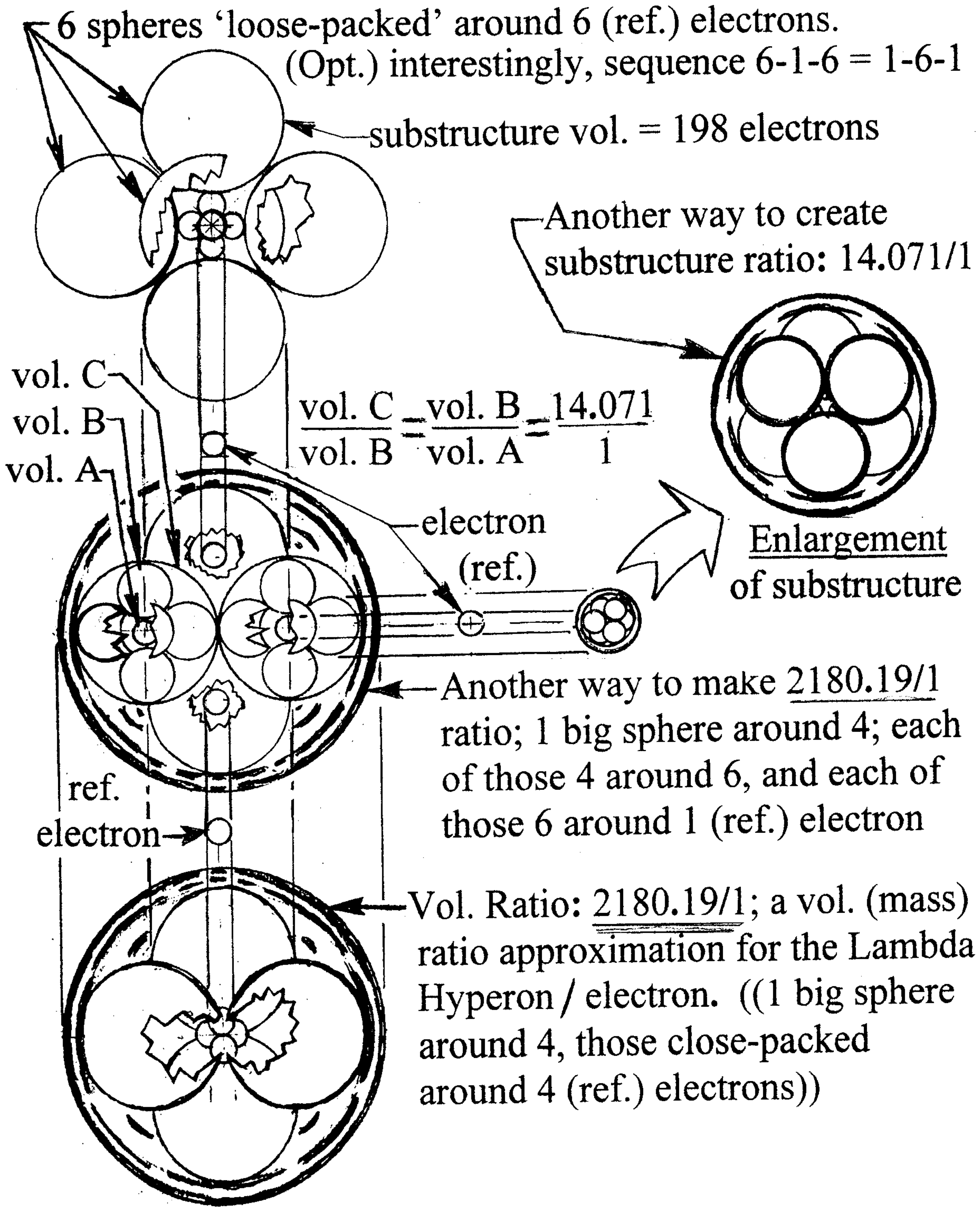


Fig. 5; the Lambda Hyperon with empirical mass of 2183.34 electrons. Ways to approximate it and its sub-structures.

This Hyperon has a longer 'half-life' than most Hyperons. All Hyperons shown more massive than Neutrons..

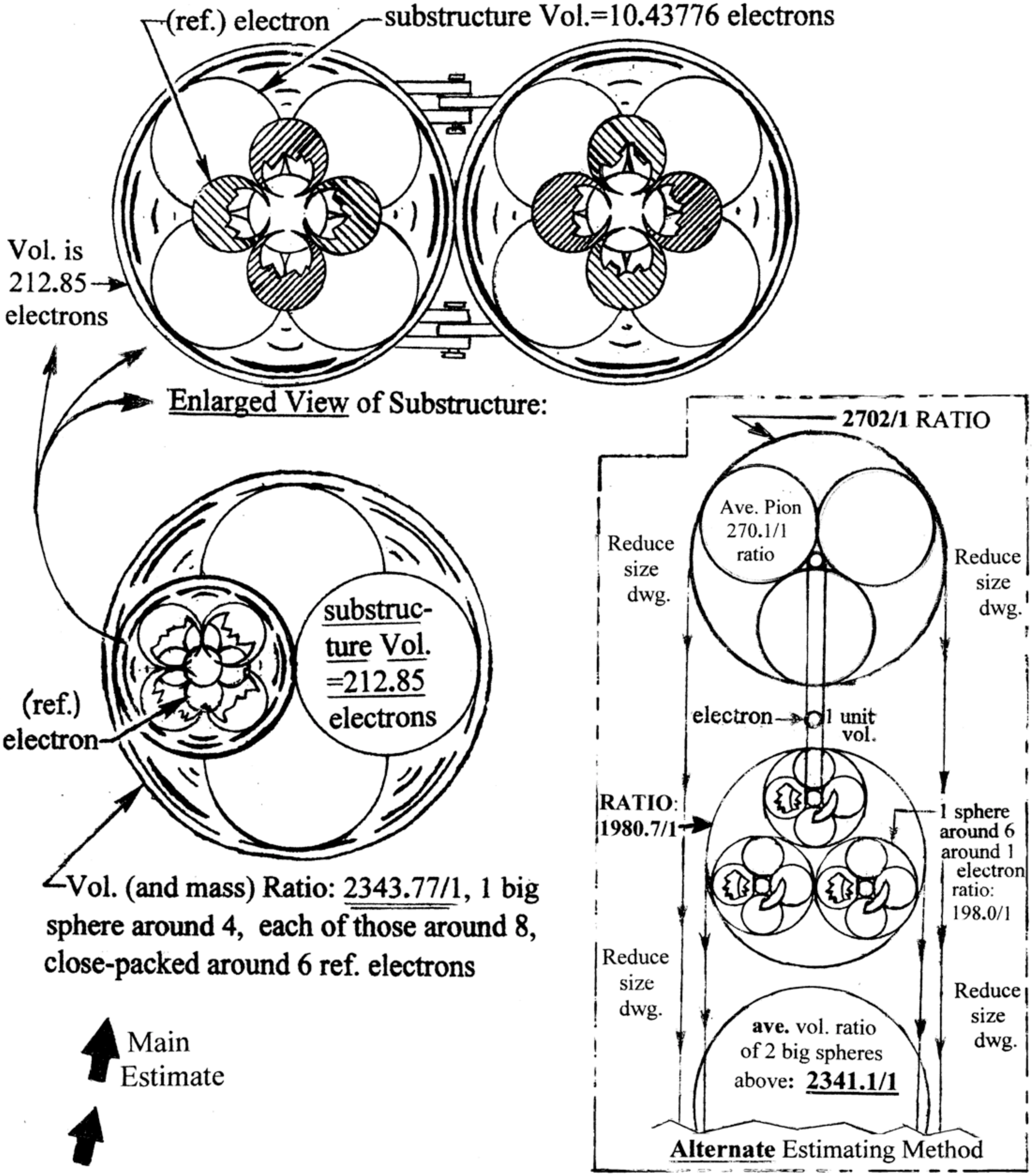


Fig. 6; Heaviest and longest-life Sigma Hyperon – empirically equal to 2343.35 electron masses.

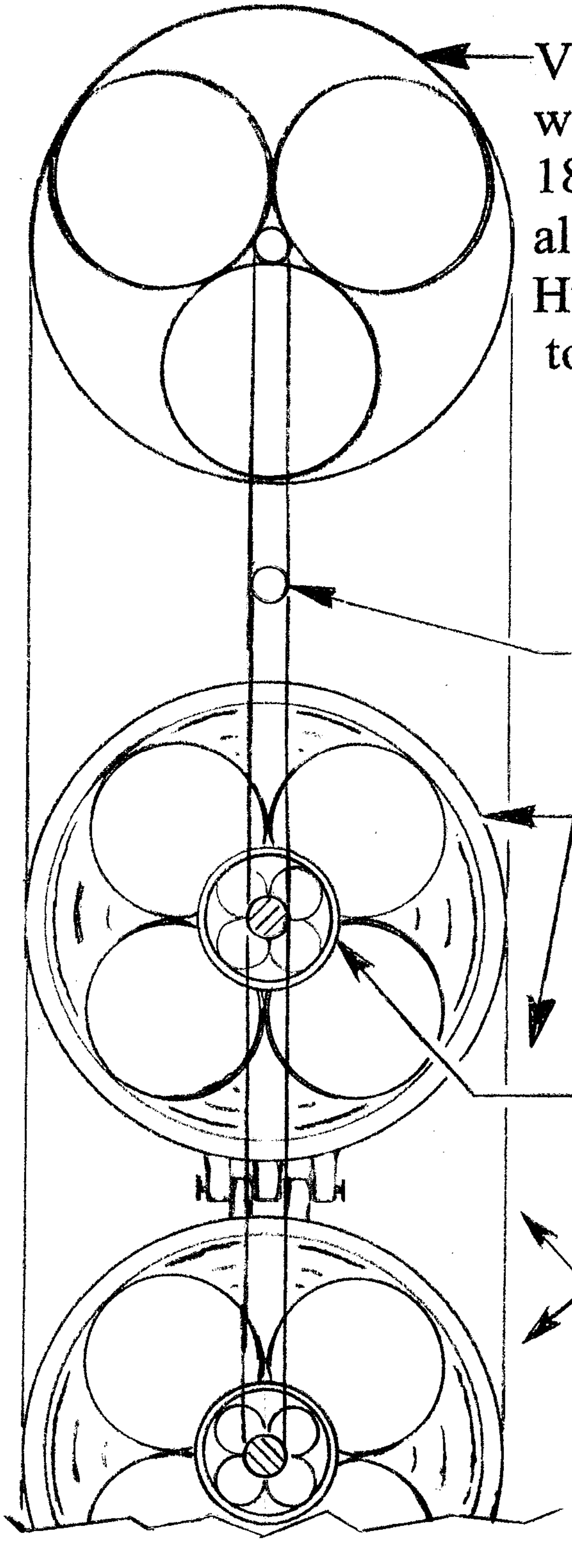


Fig. 7; One more of many existing ways to construct Vol. Ratio (i.e., mass ratio): 2702/1. Also associated with proton construction and a 'Sigma Hyperon Resonance'.

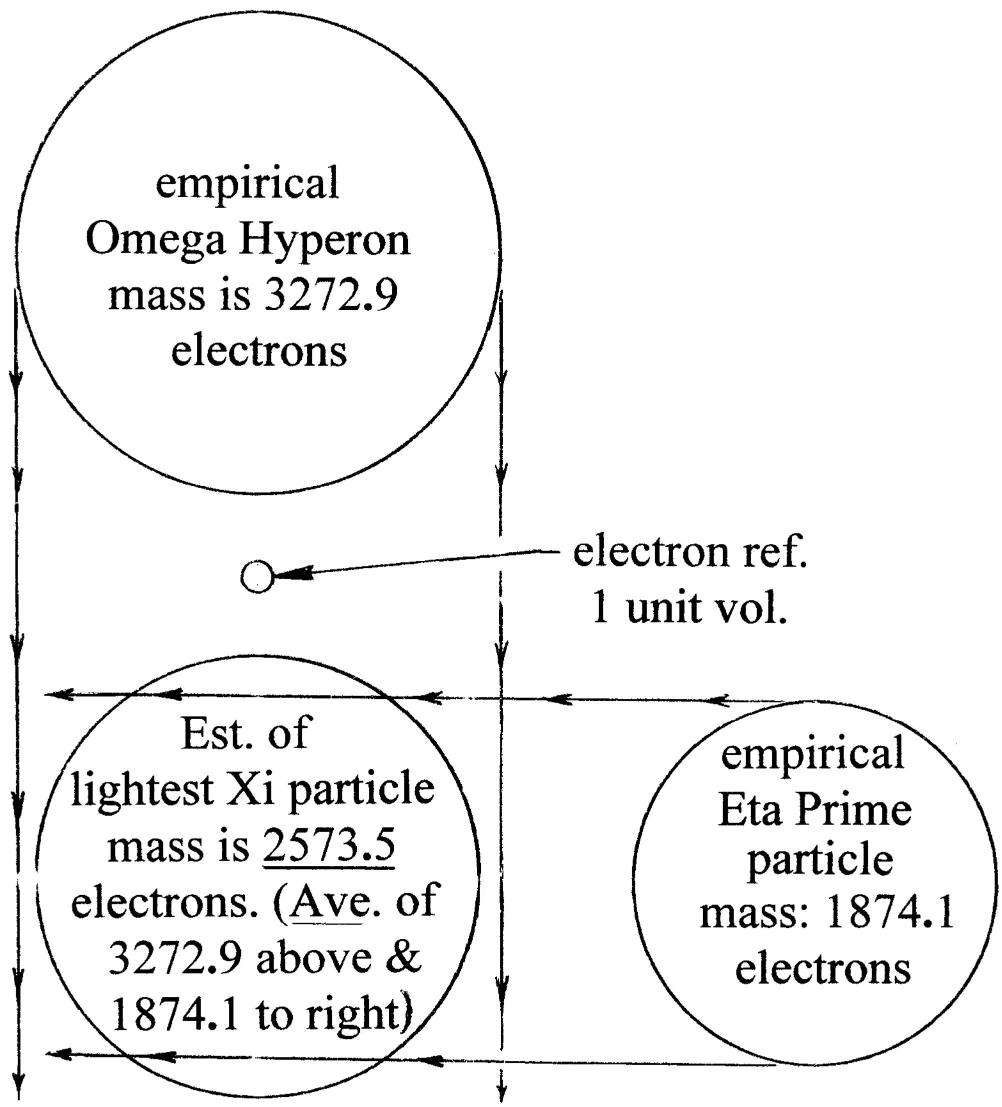
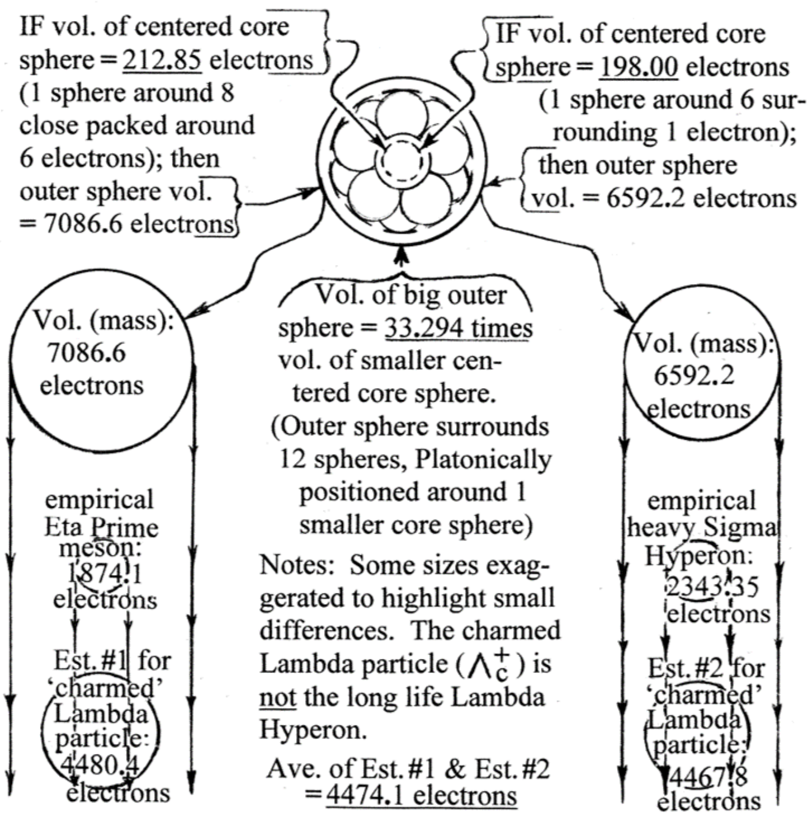


Fig. 8; one of several ways of estimating Lightest **Xi** Hyperon's empirical mass of 2573.1 electrons.

..Note, est. based on averaging empirical masses of two other particles whose masses are later estimated in this booklet.

Near the upper-center of the dwg., one large sphere surrounds a pattern of 12 platonically positioned spheres, and those 12 surround a medium-size core sphere, shown dashed, because it is hidden. If that core sphere has a Vol . of 212.85 electrons (as described at its left and on pg. 8), a 7086.6 electron vol. outer sphere results, as shown. That 7086.6 vol. is very near the empirical mass of the Xi double- charm baryon, Ξ_{cc}^{++}, 7086.1 electrons. (For another way to make and est. it, and for more details, see pg. 20A.)

If, instead of a 212.85 electron core, the core sphere vol. is only 198.00 electrons (as described at its right and on pg. 7); then a smaller outer sphere would result, 6592.2 electrons, as shown.

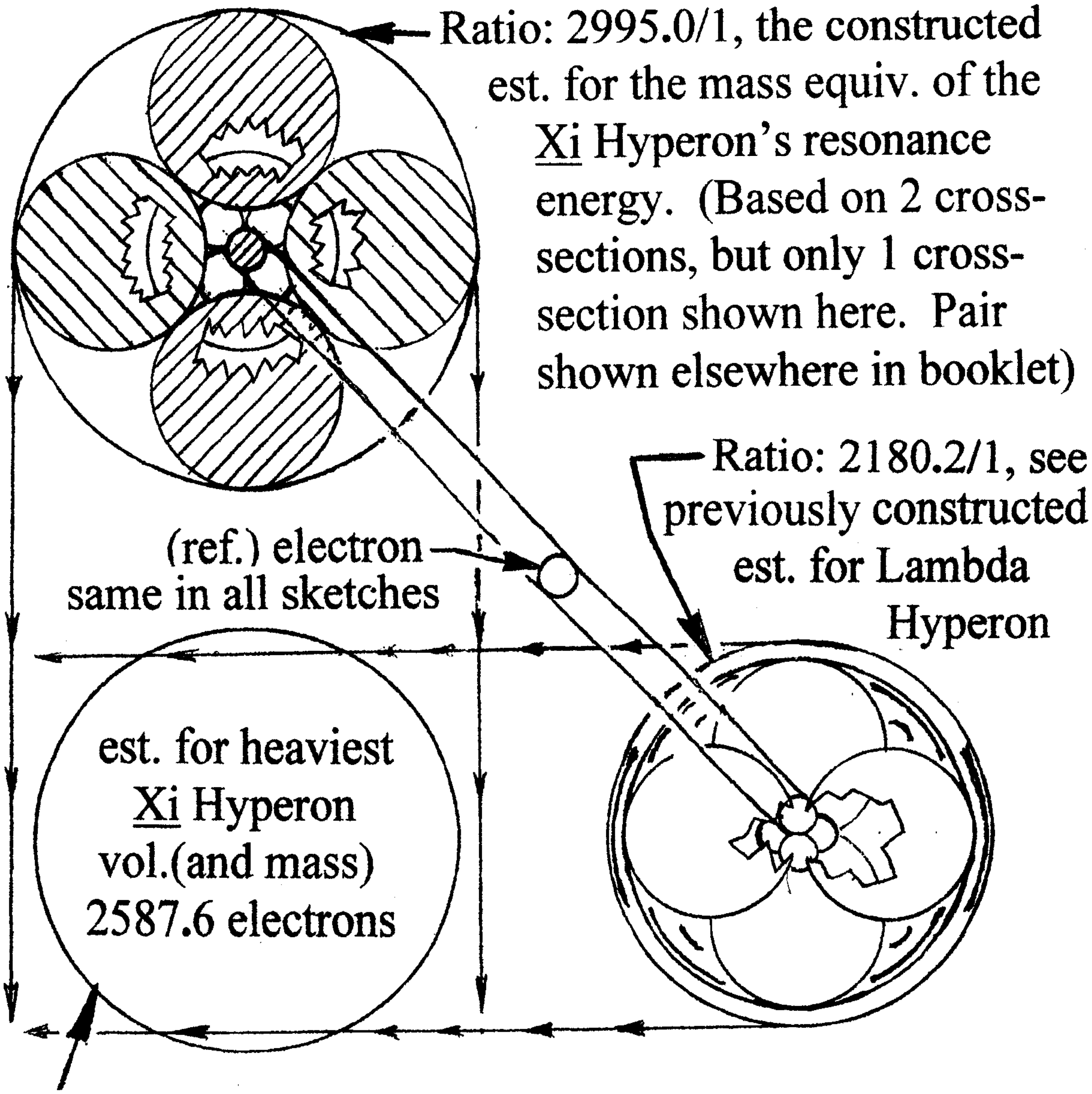


Est.#1 at lower left is the ave. Vol. of the 2 spheres above it, and Est.#2 at the lower right is the ave. of the 2 spheres directly of above it. So, the ave. of Estimates 1 & 2 = 4474.1 electrons, our est. for the Charm-Lambda Baryon (Hyperon), Λ^+_c.

But another baryon, the Bottom-Lambda, Λ^0_b, can be estimated by averaging the empirical mass of the Charm B meson, (B^+_c), 12,281,8 electrons and the Vol. of 1 big sphere surrounding 3 ave. Kaons, (see pg. 19), giving 9703.6 electrons. That Ave.= 10,992.7 electrons, our est. for the Bottom-Lambda, Λ^0_b.

Fig. 5X, our above est. for the masses of the Charm-Lambda Baryon (Hyperon), Λ^+_c, 4474.1 electrons; the Bottom-Lambda, Λ^0_b, 10,992.7 electrons; and (near top of page) the Xi double charm baryon, Ξ_{cc}^{++}, 7086.6 electrons. Those estimates vs. empirical masses: Λ^+_c = 4474.5, Λ^0_b = 10,998.4 roughly, and Ξ_{cc}^{++} = 7086.1 electrons, respectively.

(1 big sphere around 6 close-packed around 8 around 1 core electron)



Main Est.= **2587.6/1**; ave. of sphere vol. above it and to right of it.

((An alternate est. is 1big sphere around 6, each equal to 1 of 3 spheres (183.53 electrons each) inside a proton, see pg. 6; giving 2582.5 electrons))

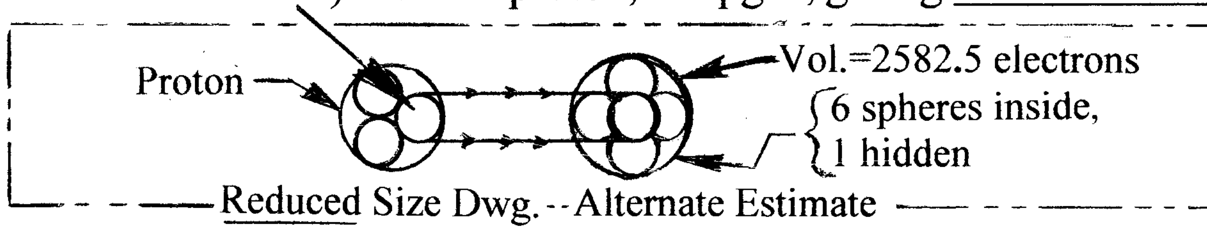
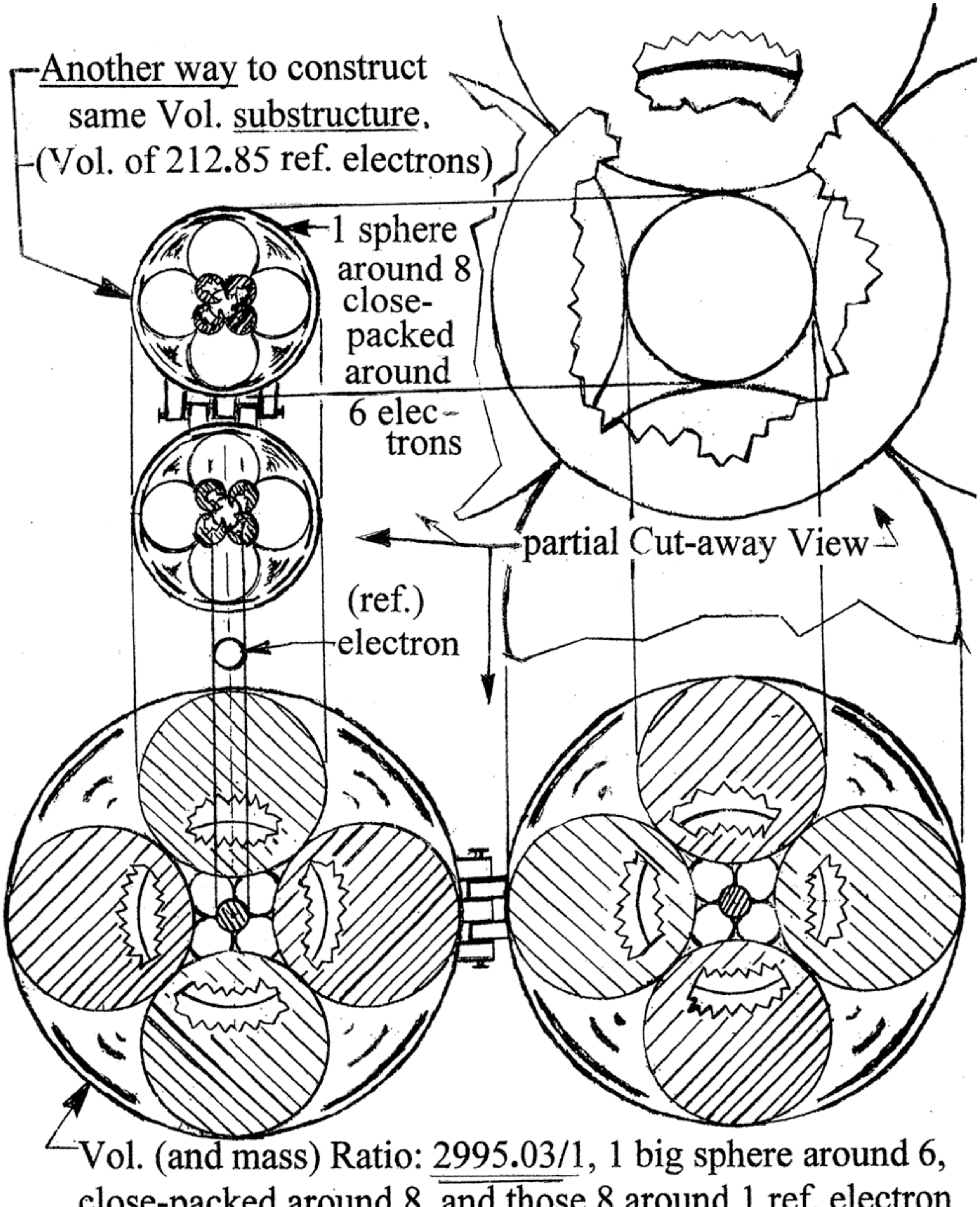


Fig. 9; Heaviest **Xi** Hyperon (**2585.74** electron masses)



Note: Outer sphere Vol. **un**changed if its sequence was 1 around 8 around 6 around 1, instead of '1-6-8-1'

Fig. 10; Resonance Energies of **Xi** Hyperon particles, with mass equivalence of 2997.7 and 3003.9 electron masses

Note: Skip reading the below until after reading the pages with sketches, preferably. **Also first read pg.20** of this booklet, before reading the below -- which continues some of the discussion on page 20.

. At least 3 Nobel Laurettes, all experts on quarks, etc., bemoaned not understanding why the various particles in physics have the various masses they do. So, I hope this booklet helps to largely resolve that otherwise on-going mystery.

. This pg.14 also contains descriptions, even without sketches, to describe how to build and estimate the particle masses of many more particles. That allows this booklet to be shorter than otherwise, since sketches occupy large spaces. Still, this booklet avoids descriptions of some less prominent particles and other misc. discourse – to avoid undue length. And we continue to often estimate particle masses well, by simply averaging together the masses of two other known particle masses.

. The early-discovered, longest half-life particle in the Omega Hyperon (baryon) family, (Ω^-), is already addressed on pg. 20C; but below we discuss two other Omega baryons in the Omega family as well:

. The mass of the Charm Omega baryon', ($\mathbf{\Omega^0_c}$), 5278.86 electrons, roughly**;** can be estimated as the ave. of the mass of the Tauon, (**τ**), 3477.19 electrons, and the mass of the fairly recently discovered 'Xi Double Charm Baryon', (Ξcc++), 7086.1 electrons. That ave. = 5281.9 electrons, our est. for ($\mathbf{\Omega^0_c}$).

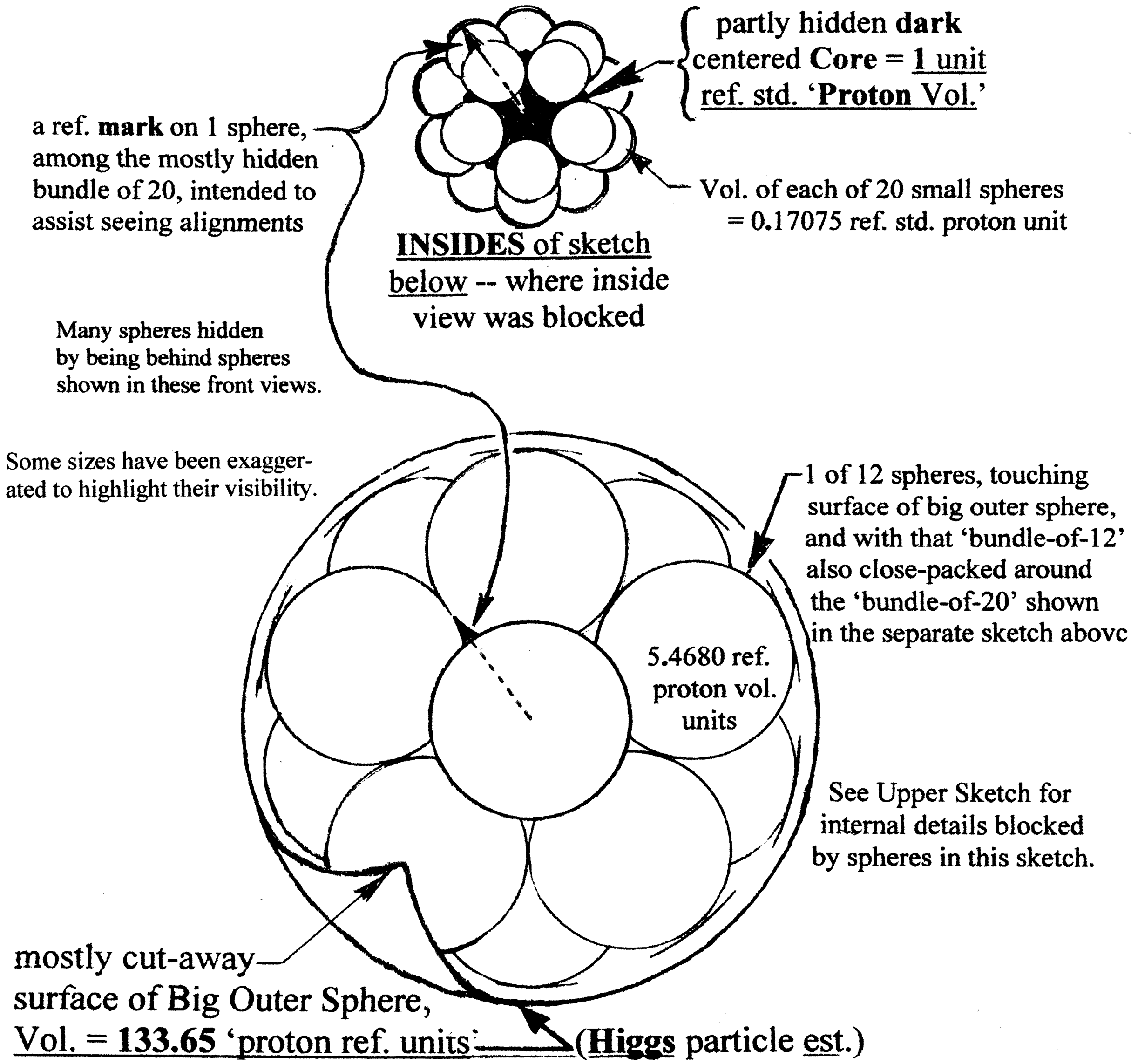
. The mass of the Bottom Omega baryon', ($\mathbf{\Omega^-_b}$), 11,848.14 electrons, roughly**;** can be estimated as the ave. of the mass of the Tauon, (**τ**), 3477.19 electrons, and the mass (vol.) existing when one big outer sphere surrounds four protons, outer sphere = 20.218.5 electrons. That ave. = 11,847.8 electrons, our est. for ($\mathbf{\Omega^-_b}$).

. Regarding the empirical mass of the 'light' Xi baryon, $\mathbf{\Xi^0}$, 2573.1 electrons; it is already very well estimated by the sketches on pg. 10, est. = 2573.5 electrons. ((It could have also been very roughly estimated (instead of very well estimated) by **averaging** the following**:** The mass of the 'heavy' Sigma baryon, $\mathbf{\Sigma^-}$, 2343.35 electrons and a *large outer sphere* mass (vol.) surrounding 6 platonically positioned spheres, with each of those 6 containing 6 platonically positioned spheres surrounding 1 core electrons, I.e., the *large outer sphere* = 2786.1 electron. That **averaging**. = 2564,73 electrons.)) That is a relatively very **poor** est., landing about 8.37 electrons less than the empirical Xi, $\mathbf{\Xi^0}$, mass, And thus, that poor method likely has only a very slight influence on the final $\mathbf{\Xi^0}$ mass outcome, but still, perhaps, a very slight effect. And that sort of very slight perturbation is typical of the sort that sometimes causes a very slight deviation of mass outcome from the mass otherwise estimated. And 'circular feedback' and 'second tier' mass averaging, similarly, a very slight deviation.))

. On Pg. 17, note 2, we construct and est. the mass of the light Sigma baryon mass, Σ^+, a 2nd way, and get 2330.1 electrons. That Est. is not quite as accurate as the 1st Σ^+ est., made nearer the top of pg. 17, but perhaps that 2nd est. still increases the Σ^+ empirical mass outcome a pinch above the mass of our 1st Est.

. In the upper large sketch on pg.12 of the booklet, we estimated a particle mass by averaging our calculated value for an ultra-prominent Resonance (equivalent mass) and our mass est. for a Lambda baryon particle, Λ^0. When averaging such Resonance and particle mass values together, we think using the empirical mass of a particle is a better practice than using 'our estimated particle mass'. Even though the effect, in that pg.12 case, would have been a slightly less accurate est. But when we use the equivalent mass of an ultra-prominent 'Resonance', I think the use of our calculated (estimated) 'Resonance' is more appropriate.

. Regarding 'circular feedback', suppose the following is averaged**:** The pattern,1 sphere around 6 close-packed around 8 electrons, see pg.17, 1175. electrons, and the empirical light Xi baryon, $\mathbf{\Xi^0}$, 2573.1 electrons. That ave. = 1874.05 electrons, a great est. for the Eta Prime meson, η′, 1874.1 electrons. **But** on pg. 10 we obtained that ($\mathbf{\Xi^0}$), 2573.1 electrons value by averaging the Eta Prime, (η′), mass and the mass of the Omega Hyperon (baryon), (Ω^-). So, we seem to be using (η′), and (Ξ^0) in a ('chicken lays egg, egg hatches chicken' -- which came first?) -- 'circular' manner. Thus, it is especially nice to have built and estimated the Eta Prime (η′), mass **independently** of the above, see pg. 16! But still, importantly, 'circular feedback' results in a more stable particle than otherwise, and often, I think, provides a very slight influence in a particle's empirical mass outcome.

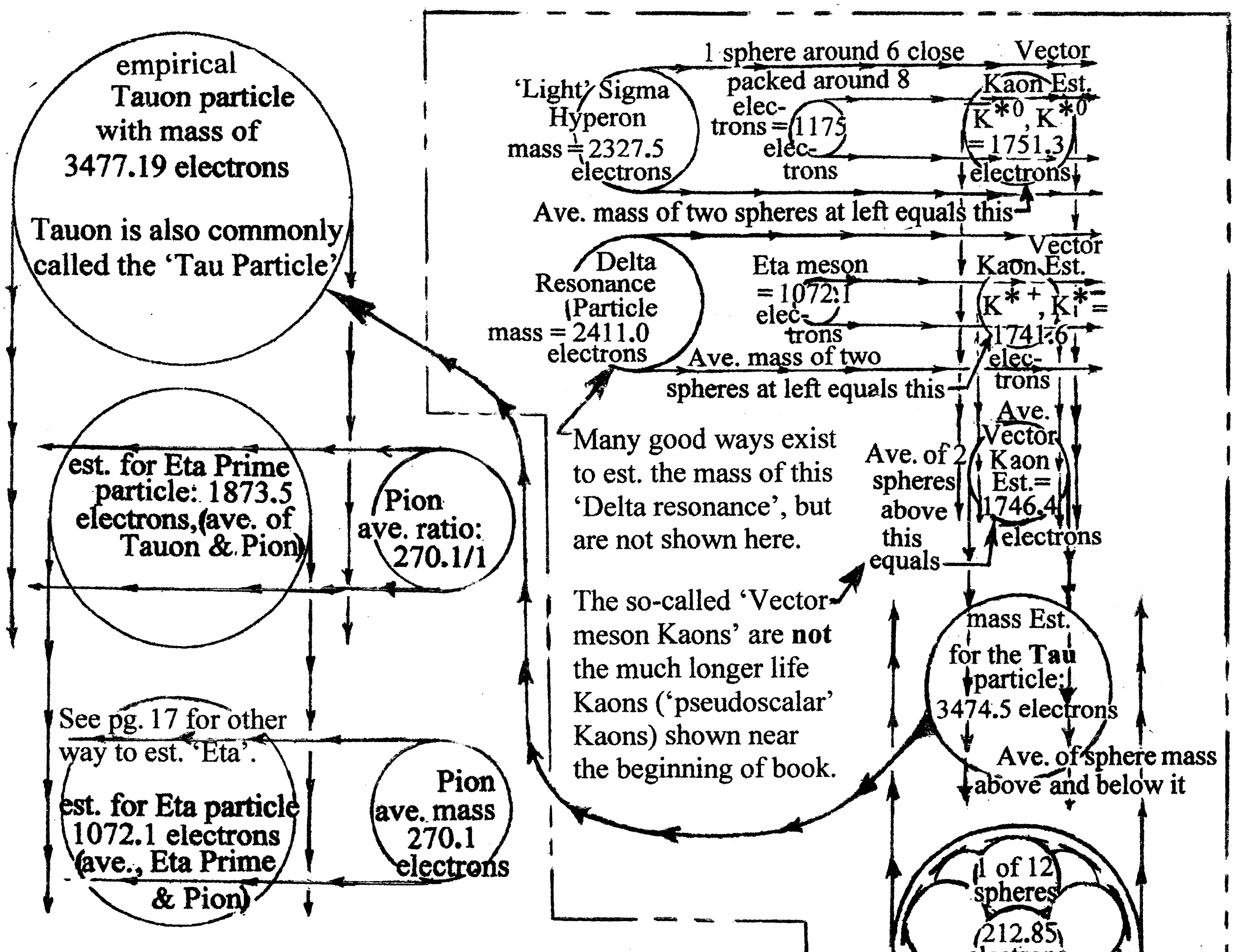


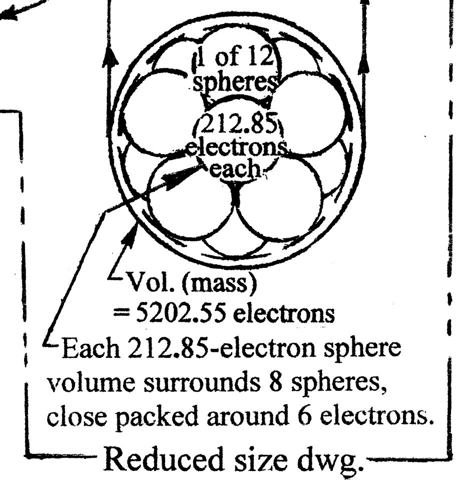
Note: Interchanging the '20-spheres' (Dodecahedron) position and the '12-spheres' (Icosahedron) position would **not** change the Vol. of the outer sphere.

Fig. 12; the above Platonically constructed sphere pattern gives a Volume Ratio, (Outer Sphere to dark core sphere), equal to **133.65/ 1**.

That is remarkably near the recent empirical-based estimates for the Mass Ratio of the Higgs Boson to Proton of about **133.20/1** to **133.50/1**, as determined in 2017 by independent groups of super-collider experts.

Opt. Note: When this booklet estimates particles having high mass, estimates are more speculative than otherwise; and more than one pattern estimate often exists. But in a sense, it may be said: "The final target of Euclid's 8 books, and the pattern that Plato thought *God* used to make the heavens -- also helped us here to match the so-called *God* particle mass, the Higgs mass, a major target of the current mainstream's 'Standard Model of Physics'!





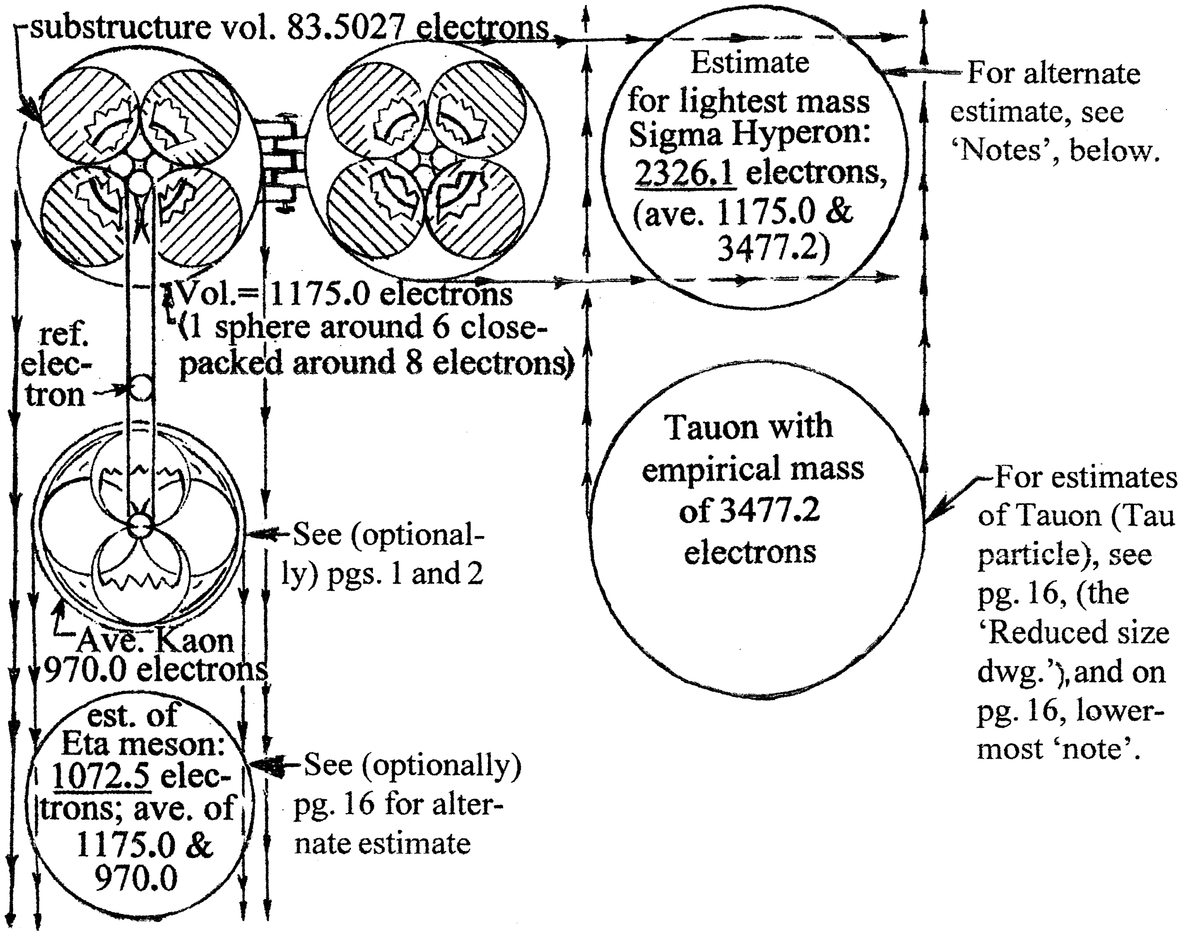
Notes:

The light Sigma Hyperon estimable as ave. of 2786.1 electrons (1 sphere around 6, each around 6 around electron, see pg.11) and 1874.1 electrons (the Eta Prime particle mass). Ave. = 2330.1 electrons. (The 'Eta Prime' is estimable as ave. of the 2786.1 electron structure, see above sentence, and the average Kaon, 970.00 electrons. That Eta Prime est. gives 1878.0 electrons.)

Often, a particle mass is estimable in several ways, and that particle mass is averaged with a different one to create another, and so on. Often, it is the 'feedback' of the 'downstream' created mass, which nearly equals the original estimate, that results in a slight compromise for the final mass of the particle. And many good estimates and feedbacks add more stability to the final particle mass than it would otherwise have.

Important Note: A more fundamental & accurate way to make the Tauon is shown on pg. 20D. It likely affects the Tauon's stability and mass more than the sketch above.

Fig. 13; the empirical masses of particles above: the Eta Prime, (η'), 1874.1 electrons; the Eta, (η), 1072.1 electrons; and the Tauon, (τ), 3477.19 electrons; vs. our estimates for them above. Some other particle estimates also shown.
Erratum: the first 'note' under left Dwg. should contain ref. '**see pg.17, note 2**'; not 'see pg.11'

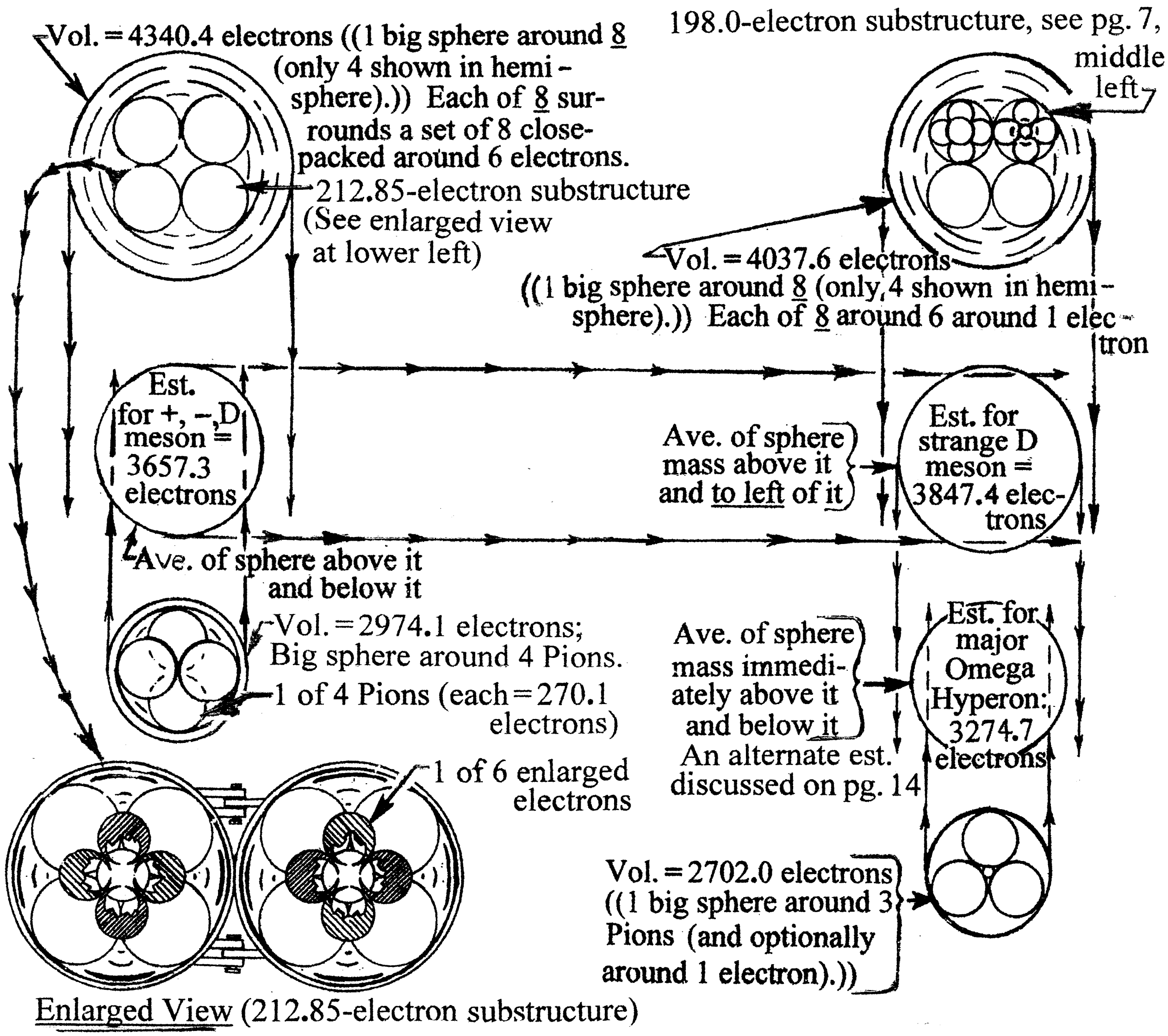


Notes:

1...A more fundamental & accurate way to make the Tauon is shown on pg. 20D, vs. the pg. 16 referenced above. The Pg. 20D version likely affects the Tauon's stability & mass more.

2...Another way, but less accurate, to make and est. the mass of the light Sigma Hyperon (Baryon), Σ^+, is to average the masses of the following: (The empirical Eta Prime Meson, η′, 1874.1 electrons and the mass of a basic Big sphere around a platonic pattern of 6 smaller spheres, and each of those around a similar pattern of 6 and each of those arrays around a core electron--the outer Big sphere result = 2786.1 electrons.) The ave. of those two constructs = 2330.1 electrons for the Σ^+, but an est. not as accurate as the est. made by above sketch.

Fig. 14; the empirical mass of the light Sigma Baryon (Hyperon), Σ^+, 2327.5 electrons, vs. our dwg. est. above, 2326.1 electrons. And the empirical mass of the Eta Meson, η, 1072.1 electrons, vs. our above dwg. est. 1072.5 electrons.



Notes: For a more accurate est. of mass for Strange D Meson, D_s^+, than the D_s^+ est. above, see pg. 20D. The D_s^+ constructed on pg. 20D, likely greater affects the D_s^+ attributes.

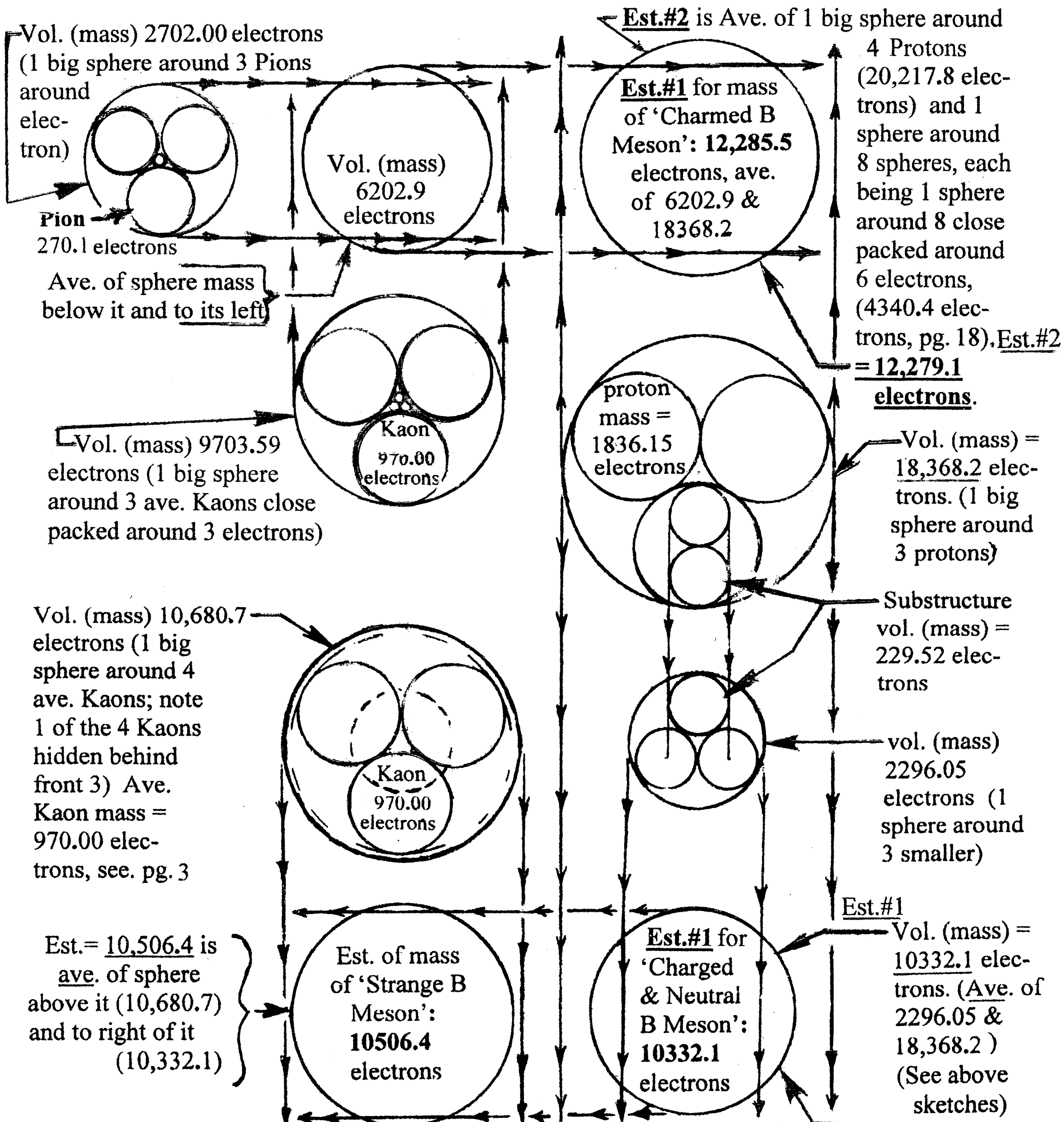
Similarly, for the Omega Hyperon (baryon), Ω^-, see pg. 20C, for a better Ω^- construction.

The mass of the Neutral D Meson, D^0, 3649.37 electrons, is better estimated by averaging the mass of the Xi double charm baryon, Ξcc^{++}, 7,086.1 electrons (see pg. 20A) and the 212.85 electron mass of the outer big sphere, shown in the sketch at the lower left, (which surrounds 8 smaller spheres which are close-packed around 6 electrons). That ave. = our est. for the D^0, 3649.48 electrons, our best est.

A less accurate Est. for D^0 mass is to ave. the construct at upper right, 4037.6, and actual Ω^-, 3272.9 electrons. That est. = 3655.25 electrons, is almost 6 electrons too high, close to $D^\pm$ too, but notable and prompted by a symmetry of the 2 upper sketches. A 3rd way to est. $D^\pm$ is on pg.20D.

Our construction estimates for the Charm Omega baryon', (Ω^0_c), and the Bottom Omega baryon, (Ω^-_b), are described on pg. 14. (And much other misc. information, too.)

Fig. 15; Empirical mass of the Charged D Meson, D^+, D^{--}, 3658.71 electrons; Neutral D Meson, D^0, 3649.37 electrons; Strange D Meson, D_s^+, 3852.19 electrons; and Omega Hyperon (baryon), Ω^-, 3272.9 electrons; vs, our estimates for them above and on other referenced pages.



Est.#2 is Ave. of 2 spheres: The first is 1 big sphere around 20 spheres Platonically positioned around a core sphere -- the core sphere, ref. pg. 7, being 1 sphere around 4 close packed around 4 electrons. (The first big sphere = 20,467.5 electrons). The second sphere surrounds 6 spheres Platonically positioned around 1 centered electron. (Second sphere = 198.00 electrons). So **Est.#2 = 10,332.7** electrons

(A little speculation arises because of the very large & very small sphere averaged together for Est.#2; and for Est.#1, also, because no known particle mass exists near the 2296.05-electron construction.)

Fig. 16; the 'B Meson family' with empirical masses as follows: 'Charged' is 10,331.1 electrons; 'Neutral' is 10,331.7 electrons; 'Strange' is 10,501.57 electrons; and 'Charmed' about 12,283.8 electrons, vs. our estimates above.

Optional Discussion**:**

The reader has likely surmised our approach by glancing at the drawings. Generally, we started each sketch by making one or more identical small volume spheres, each representing one reference volume, i.e., one electron 'mass' unit. Next, we made one or more larger spheres around that. And often, even one still larger sphere around all that. Then we compared the volume ratio of the large sphere to small sphere, and we discovered that that ratio almost equaled the mass ratio of some major particle to the electron, in physics. (Sometimes we averaged together two major volumetric ratios to create a third ratio for our comparisons.) Generally we found great close matches. So not likely just coincidental.

When we assume, in a neat pattern, that large and small volume spheres are proportional to large and small masses of real particles; we are making a 'uniform density assumption'. And that is similar to a rather successful assumption that Bohr used in his 'liquid drop model of a nucleus'. Interestingly, there are no compact (standard) particles in the range of "greater than 1 electron mass but less than 200." That is likely because even if such mass tried to spin near the velocity of light, it still could not achieve as much angular momentum as something called, "a Planck's Bar Constant" amount, which relates to "Heisenberg's Uncertainty Principle." But the 'free' electron, outside a nucleus, is not a compact particle. Instead, like a spread-out puffball or doughnut, it thus achieves sufficient angular momentum.

Our approach generally achieves very good matches, provided we are looking for the mass ratios of **major** prominent particles to match with volume ratios in patterns having **major** basic symmetries! ((We do not seek here to match volume ratios in minor patterns (having merely minor symmetries) with mass ratios of minor, non-prominent particles; and we would not expect that to match well. That is because less prominent particles generally have relatively short 'half-lives', and are less stable, and their actual mass may be determined by too many relatively minor factors to estimate well the effect of each factor.)) By contrast, the particles with mass ratios that nearly match the ratios in our most symmetrical, major patterns – generally have substantially longer half-lives. And that provides a 'double check' that our correspondence is very meaningful. Generally in physics, high-mass particles are less stable than smaller mass particles.

The term 'particle Resonance energy', or its 'equivalent mass', roughly means this: Consider particle scattering experiments, and if one of the particles is, say, the heaviest Sigma Hyperon and the other is, say, any other lighter particle. Empirically, when one particle is traveling toward the other at high velocity, it is found that when their total energy (or mass equivalent) is near a special value, scattering occurs especially often. And when their total energy is somewhat above or below that value, less scattering occurs. So that special pro-scattering total energy value (that that energized Sigma Hyperon contributed to) -- is termed a 'Sigma Hyperon Resonance Energy'. Thus, in the above case, we compare a special total mass value, M, of the target plus projectile particle ((having an equivalent total resonance energy, $E = (M)c^2$)) -- to the 'rest mass of the electron', (m_e). And that is a major equivalent mass ratio, $(M) / (m_e)$, in this case. So we then find a major geometric pattern ratio that nearly matches it.

Readers are reminded that I believe the spheres in my sketched patterns are proportional to actual sphere sizes existing in a 'universal aether'. And that the amount of ethereal energy in the 'ethereal spheres' is also proportional to those spheres' volumes. I believe that the stability of the masses of real high-density particles is greatly enhanced when those particles' $E = mc^2$ energies equal the ethereal energies in ethereal spheres that fit nicely into an ethereal pattern matching one in my neat sketches. Those major short-life particles are often made when 'cosmic rays' from outer space hit the nuclei of atoms in our upper atmosphere. And also made in labs. And they affect life on earth and evolution.

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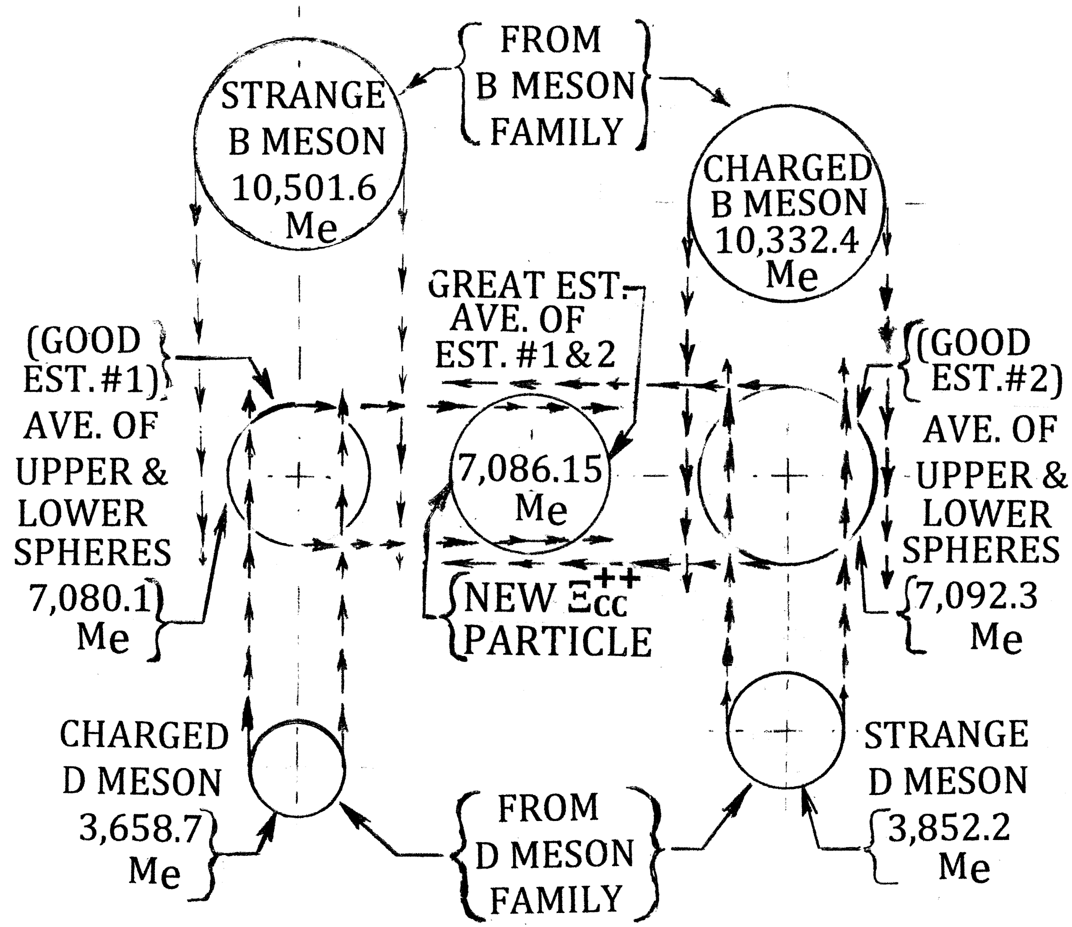


NOTES: (Me) DENOTES THE MASS OF 1 ELECTRON.
(Me) = 0.511 MILLION ELEC. VOLTS (MeV) OF ENERGY.

The above Drawing shows how the "Averaging of two already known Particle masses" – tends to predict a good mass candidate for 'Nature' to match -- by creating a new particle with a mass nearly equal to that 'average'. Especially if averaging each of **2 pairs** of already known particles gives nearly the same mass (for a candidate), not just 1 pair 'making the nomination'.

The newly discovered particle, the '**Xi Double Charm Baryon**', (Ξcc^{++}), with the mass of **7,086.1** electrons, is virtually matched, as shown above, by using such 'averaging method' – i.e., to propose a good, and thus probable, mass value for a new particle to have.

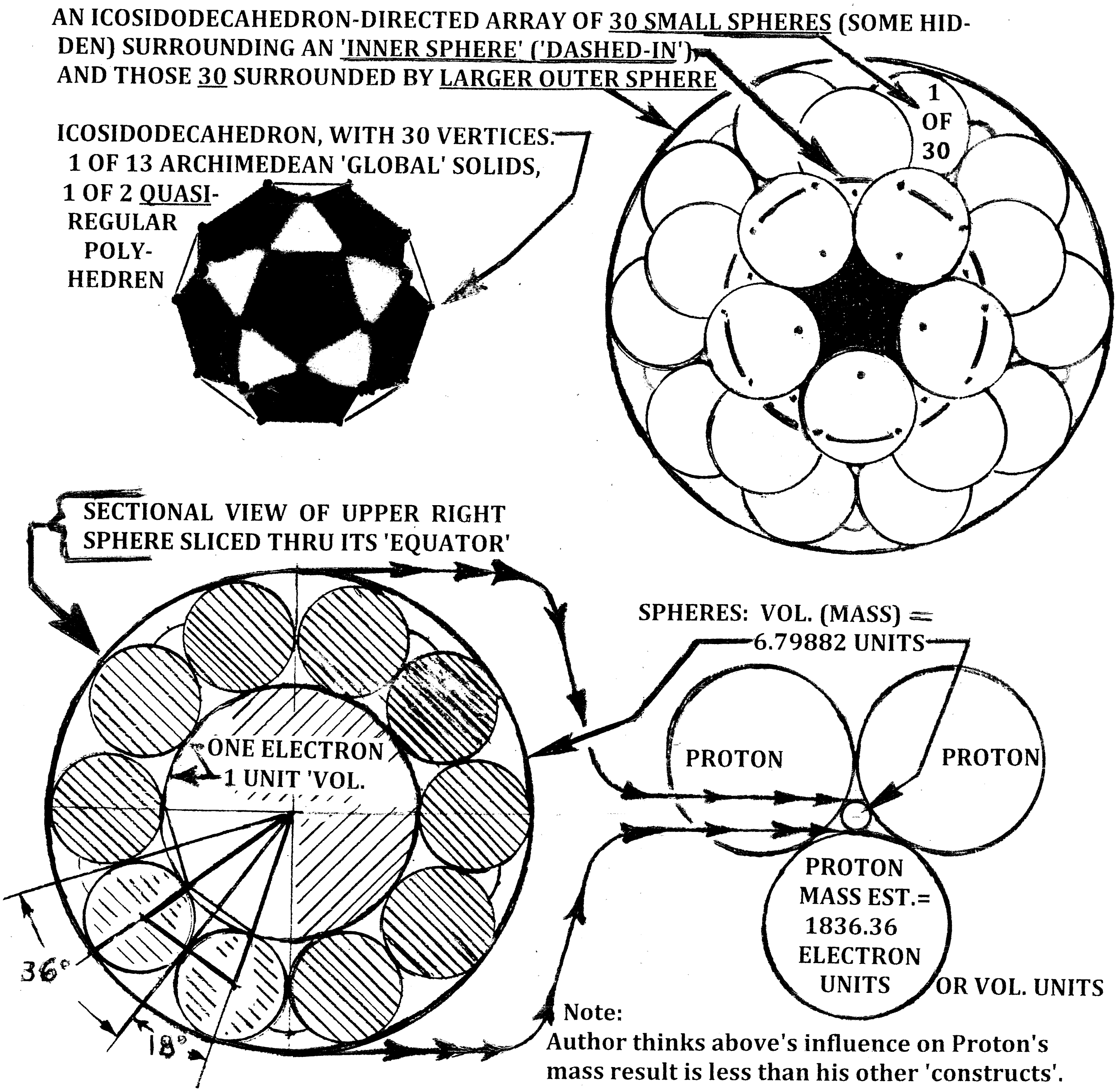
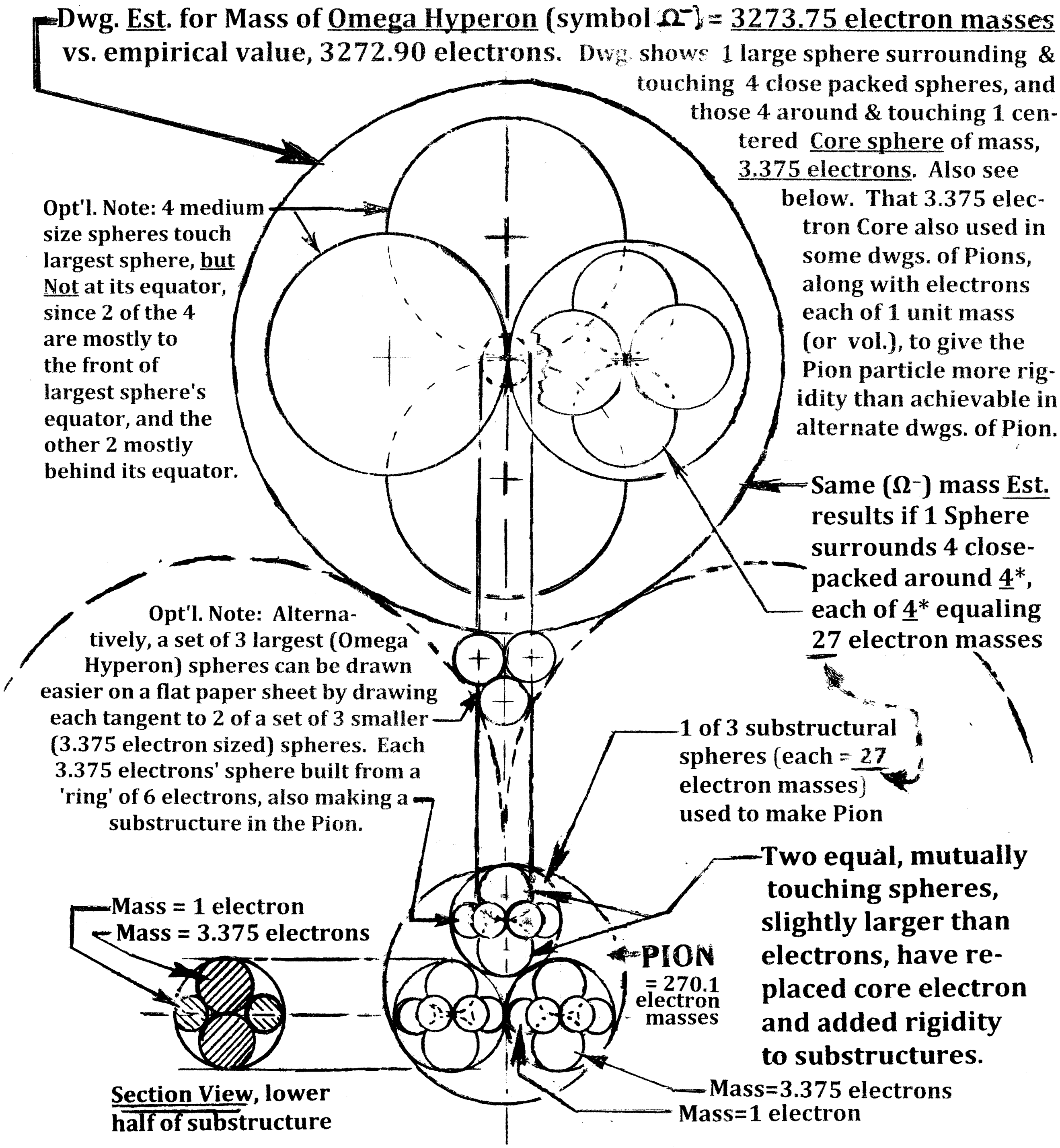


Fig. 1Y; Another Way to Est. Proton's Mass, close to 1836.15 electrons

The sketches above give an estimate for Proton's mass of 1836.36 electrons, near proton's actual mass, 1836.15. In the super-expanded 'Sectioned View', lower left, 1 core electron sphere (Vol.= 1 Unit) is shown surrounded by 10 small 'sliced' spheres (among 30 small spheres in an 'icosidodecahedron' pattern). These 30 are surrounded by an Outer sphere (*Vol.= 6.79882 units*). At lower right, that same *6.79882 unit Vol. sphere* generates 3 big spheres in a simple triangular pattern around it, each of 'Vol.'= 1836.36 unit electrons, our Proton Mass Est.

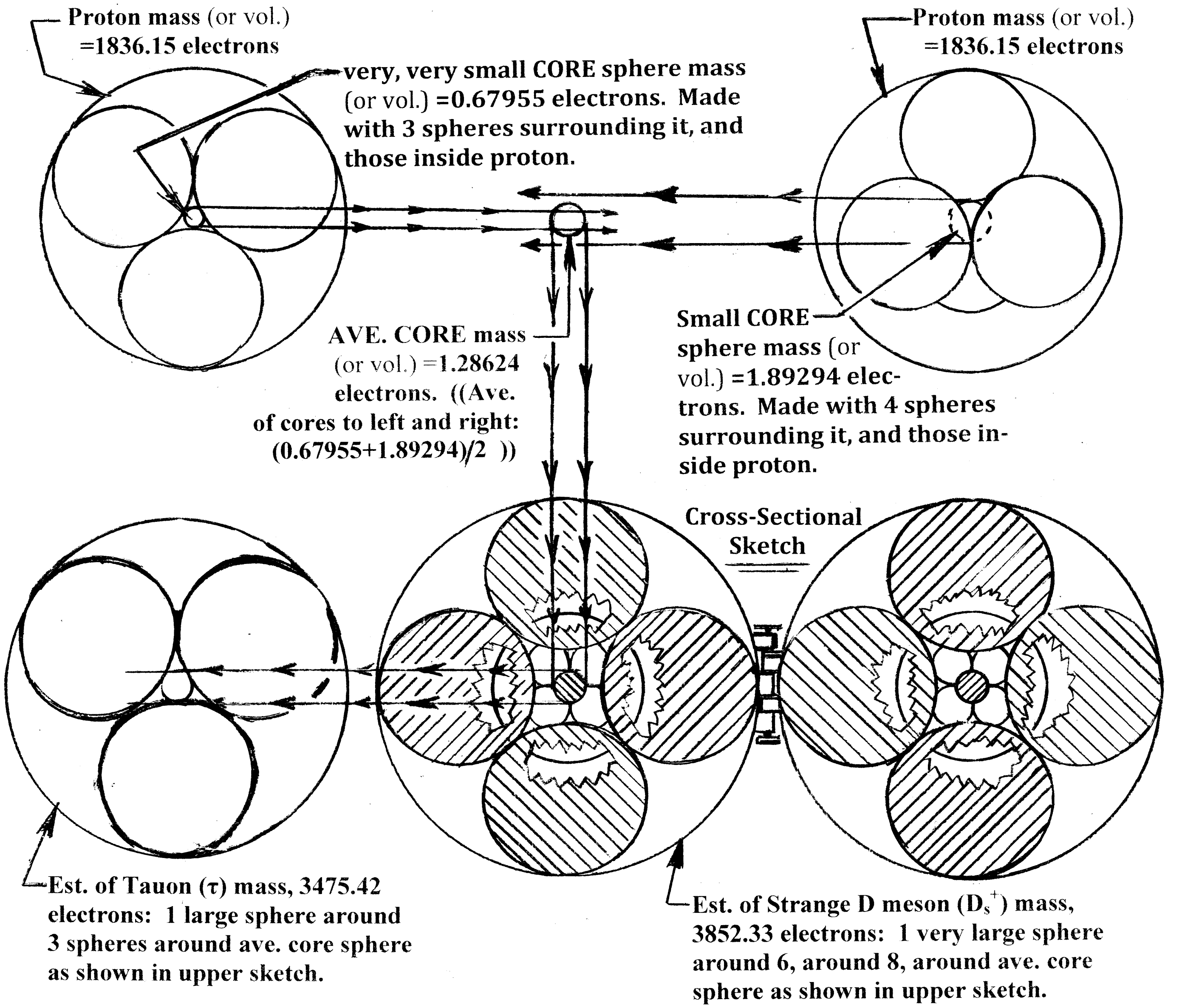


Dwg. Est. for Mass of Omega 'Hyperon', (Ω^-): 3273.75 electrons

Above Dwg. gives, for the Mass of the major 'Omega Hyperon' (aka Omega Baryon): 3273.75 electron masses, vs. an empirical value: 3272.90 electrons. **The above sketches use a 3.375 electron mass sphere in est., which is also generated in some Pion dwg. constructions, which also provide greater rigidity.**

And, yet a third way to construct the same Estimate for the mass of the Omega baryon (Ω^-) is shown to the middle right of the above Drawing.

x



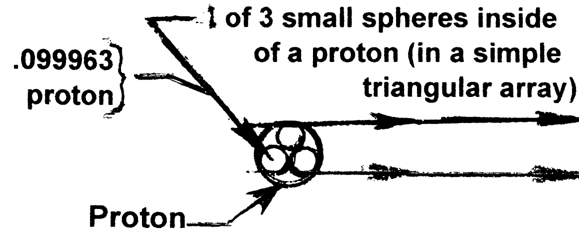
Drawing: Ways to Estimate Masses of Tauon (τ) and Strange D Meson (D_s^+)

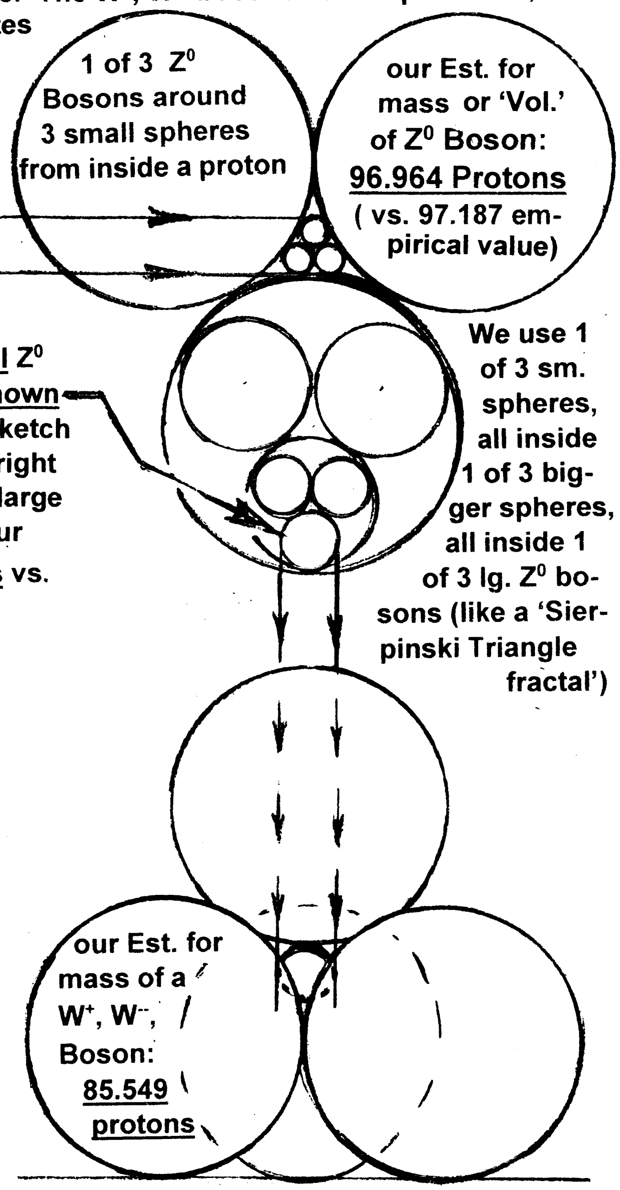
Our dwg's Estimate for the Mass of the Tauon (τ) is 3475.42 electrons (vs. empirical value 3477.19), and for the Strange D Meson (D_s^+) our dwg's Est. is 3852.33 electrons (vs. empirical value 3852.19).

Averaging those empirical masses of (τ) and (D_s^+) together, in previous sentence, gives 3664.69 electrons, a mass est. somewhat near the empirical Charged D Meson ($D^\pm$) mass, 3658.71 electrons. But too high, yet still likely affecting the mass outcome of ($D^\pm$) and increasing its half-life. ((A closer method to est. ($D^\pm$) mass is shown on Pg.18, but that est. is a little low.))

To make dwg. estimates, we started with the Proton and built, inwardly, small cores (instead of the usual 'starting with a one electron core and building outward'). We used our 1st proton around 3 spheres around a core to make the 1st core; and we used a 2nd proton around 4 spheres around another core to make 2nd core. We averaged cores together to make an 'Ave. core' vol. And around that Ave. core, we built the two different sphere patterns, as shown in near bottom of sketch, to make our mass estimates for (τ) and (D_s^+).

Note: All spheres shown below touch their adjacent neighbors, and all spheres belonging to the same 'set' are equal in size. The W^+, W^- bosons have equal mass, but opposite charge. All relative mass estimates assume mass proportional to volume.





Based on the empirical Z^0 mass, 97.187 protons, the small sphere shown has mass = 0.97115 protons. And in the sketch directly below that small sphere, (bottom right of page), we build a tetrahedral array of 4 large spheres around that small sphere, each our W^+, W^-, boson mass est. = 85.549 protons vs. empirical value 85.667 protons.

a 2nd Way to Est. W^+, W^-, mass described below, without sketches:

Ref. 1 LG. sphere around a 'platonic array' of 12 spheres close-packed around a platonic array of 20 spheres around a 'core sphere'. That core around a platonic array of 6 spheres close-packed around a platonic array of 8 electron masses. (Core sphere result = 1175.0 electron masses.)

The Ref. 1 LG. sphere, our 2nd Way to Est. W^+, W^- boson mass, comes out = 157.039 electrons, or 85.526 protons vs. empirical value 85.667

2nd Way to Est. W^+, W^-, Boson Masses as Described above

1st Way, (main way), to Est. W^+, W^-, boson masses giving 85.549 protons vs. an empirical value 85.667 protons

Dwg; Ways to Construct and Est. Masses of Z^0 & W^+, W^-, Bosons

Using upper sketches and a proton's substructure, we Est. the Z^0 boson mass = 96.964 protons, vs. 97.187 empirical value. At lower right sketch and just above it, we use an empirical Z^0 boson's substructure to Est. mass of W^+, W^-, bosons = 85.549 protons, vs. empirical 85.667 value. At lower left, we described, without sketches, a 2nd Way to Est. W^+, W^-, boson masses, giving 85.526 protons. That 2nd Way uses all platonic 'Duals' – except the '4 around 4',- that dual being itself. A 3rd Way, less accurate, too high; but likely with a slight effect – is to surround a proton, platonically, with 4 spheres giving for each, an Est. of 88.091 protons.