Particle Mass Ratios nearly equaling Geometric Ratios -- Additional examples

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Abstract
There are many important Particle Mass Ratios in Physics, such as the 'Proton to electron' mass ratio, about 1836.15 to 1. And there are many major Volumetric ratios in 'Solid Geometry', some of which we may have seen in high school. And, remarkably, some of the major particle Mass ratios nearly equal some of those major geometric Volumetric ratios! This article gives many additional examples of these matches, which couldn't be included in my earlier article, but the earlier should be read first, preferably. Ref. http://viXra.org/abs/1901.0299
(But even both articles don't give all the important examples -- to avoid unwieldy length.)

Introduction
The Abstract, above, outlined the goal of this article. That goal is to find out why the different Particles in physics have the different masses they do! And that was the goal of many Nobel Laureates. But that goal illuded them. But this article largely **succeeds**. In many cases, we have importantly discovered that a major particle mass ratio, existing in Nature, nearly equals a basic volume ratio in a symmetrical sphere pattern. In many cases, we have also found that the average of two different major volumetric ratios nearly equals a major particle mass ratio. Or simply averaging the masses of two different particles together -- nearly equals the mass of a third particle! Quite remarkable, and unlikely to be just 'chance'.

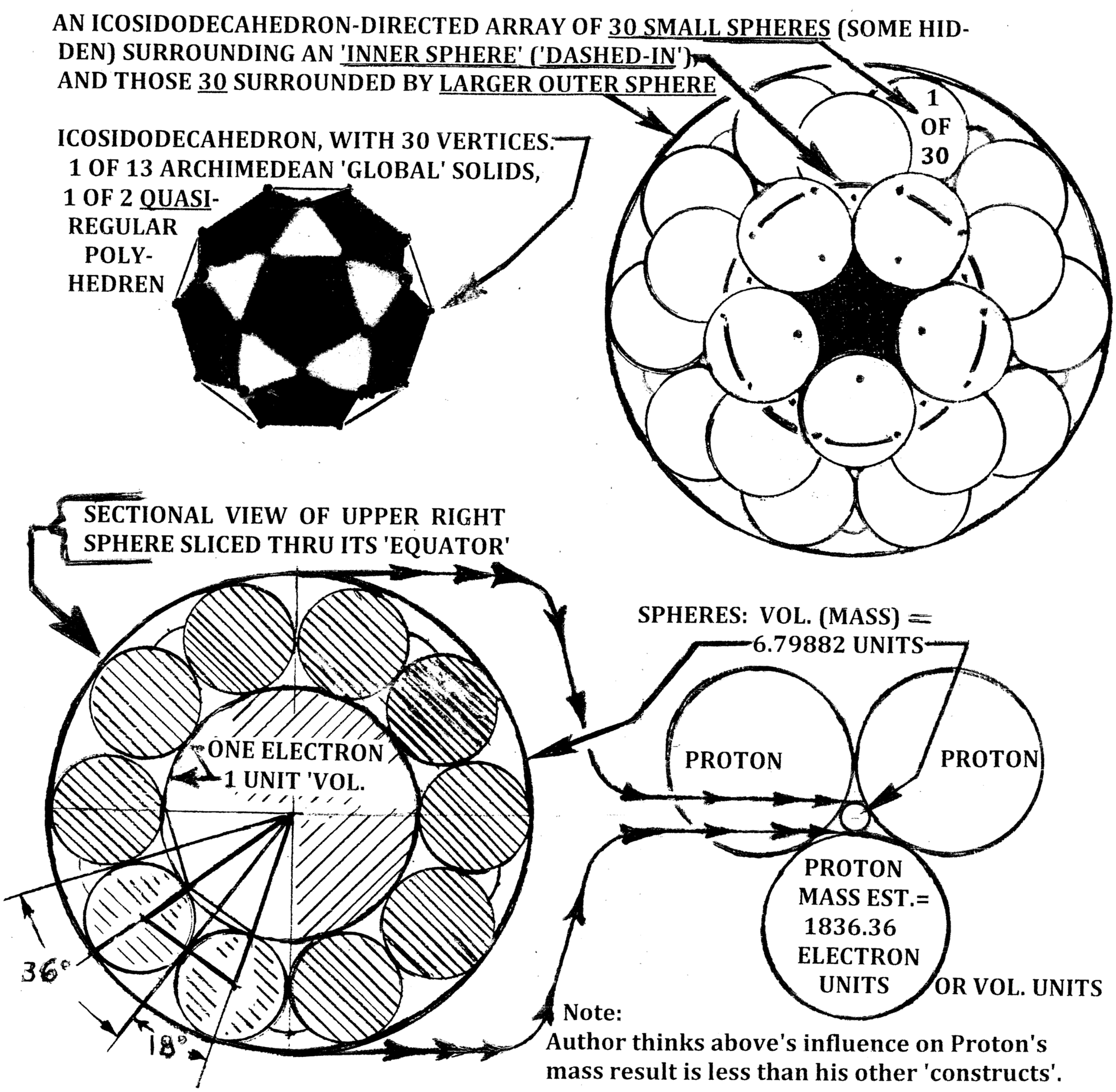
So, 'Nature' sometimes accomplished the same thing, or almost the same, in two different ways. For example, two different atoms in 'Chemistry' can strongly 'bond' together, either with a 'covalent' bond **or** an 'ionic' bond. And in this article, we find two different ways that Nature often uses to create a mass for a major particle' to have, relative to the electron. I.e., by creating a particle with mass ratio that will nearly equal a major geometric ratio **or** with such mass as will nearly equal the average of two such geometric ratios.

And, importantly, the more different patterns that are found that give nearly the same geometric ratio -- the greater the chance of there being a particle in Nature with a mass ratio (relative to the electron) almost matching that geometric ratio. And the more prominent and longer half-life, such particle will generally have.

Related helpful information can also be found by 'clicking' or otherwise using my (website) links below:
http://www.causeeffect.org/articles/book.html
http://www.causeeffect.org/video/RatioTalk11-11-16.mp4 (for this link, allow 30 sec. to load)

Now, readers should **SCROLL DOWN BELOW**, and view the many drawings, examples, and comments -- thus completing the goals of this Article:

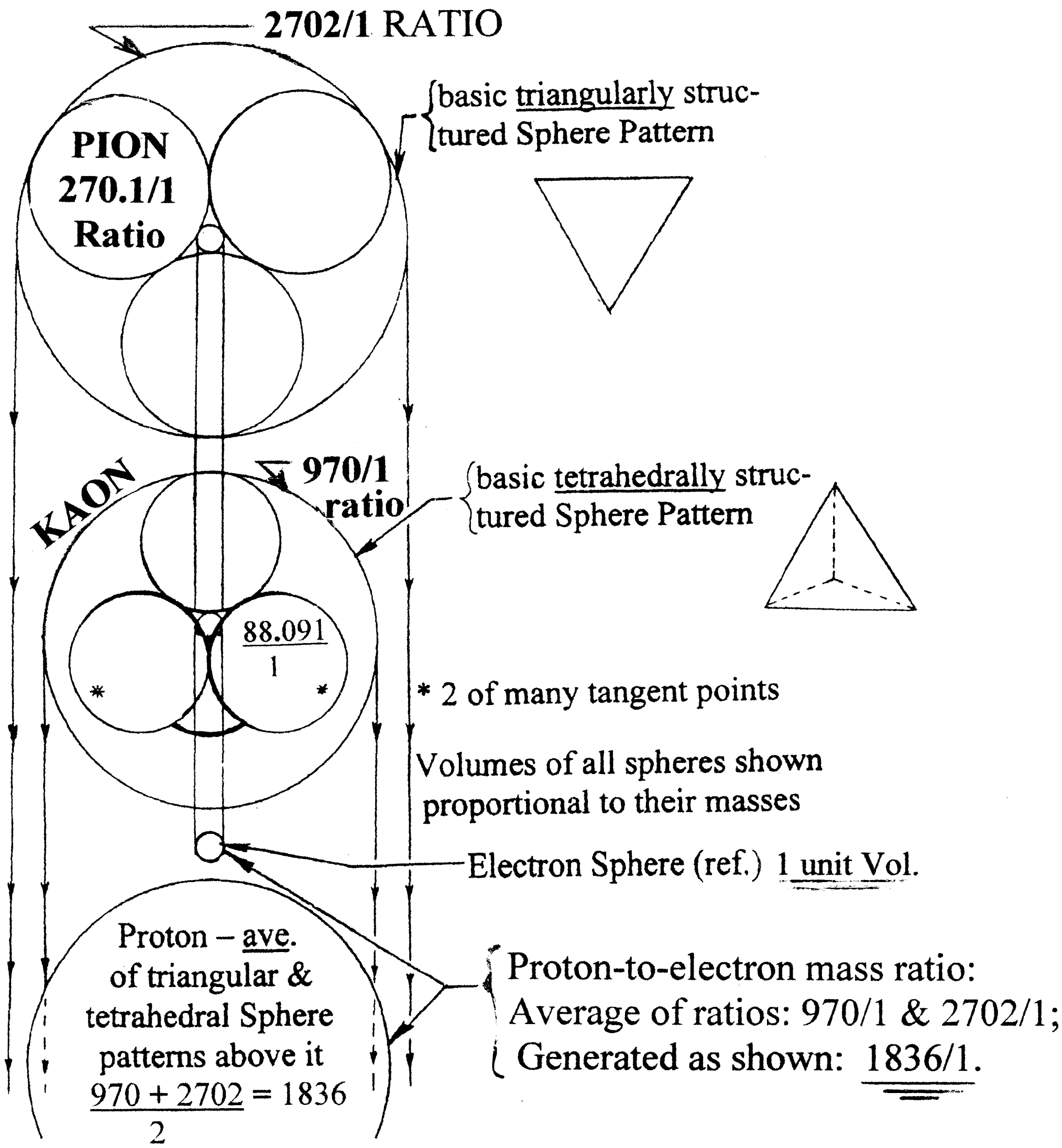
Example 1:
The main mass ratio estimate, obtained from the dwgs below, is 1836.36/1, and that est.is a pinch high. Perhaps it interacts with the main ratio estimate in the earlier paper, using other sketches, 1836.00/1 -- so the combined result is even closer to the actual Proton to electron mass ratio, 1836.15/1.



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*). And using that same *6.79882 unit Vol. sphere* and as shown at lower right, we generate 3 big spheres around it, in a simple triangular pattern. And each resulting sphere volume =1836.36 unit electrons. Thus, our Proton Mass Est.= 1836.36 electrons.
(Interestingly, the main sphere pattern above was also found in an old Japanese shrine.[1])

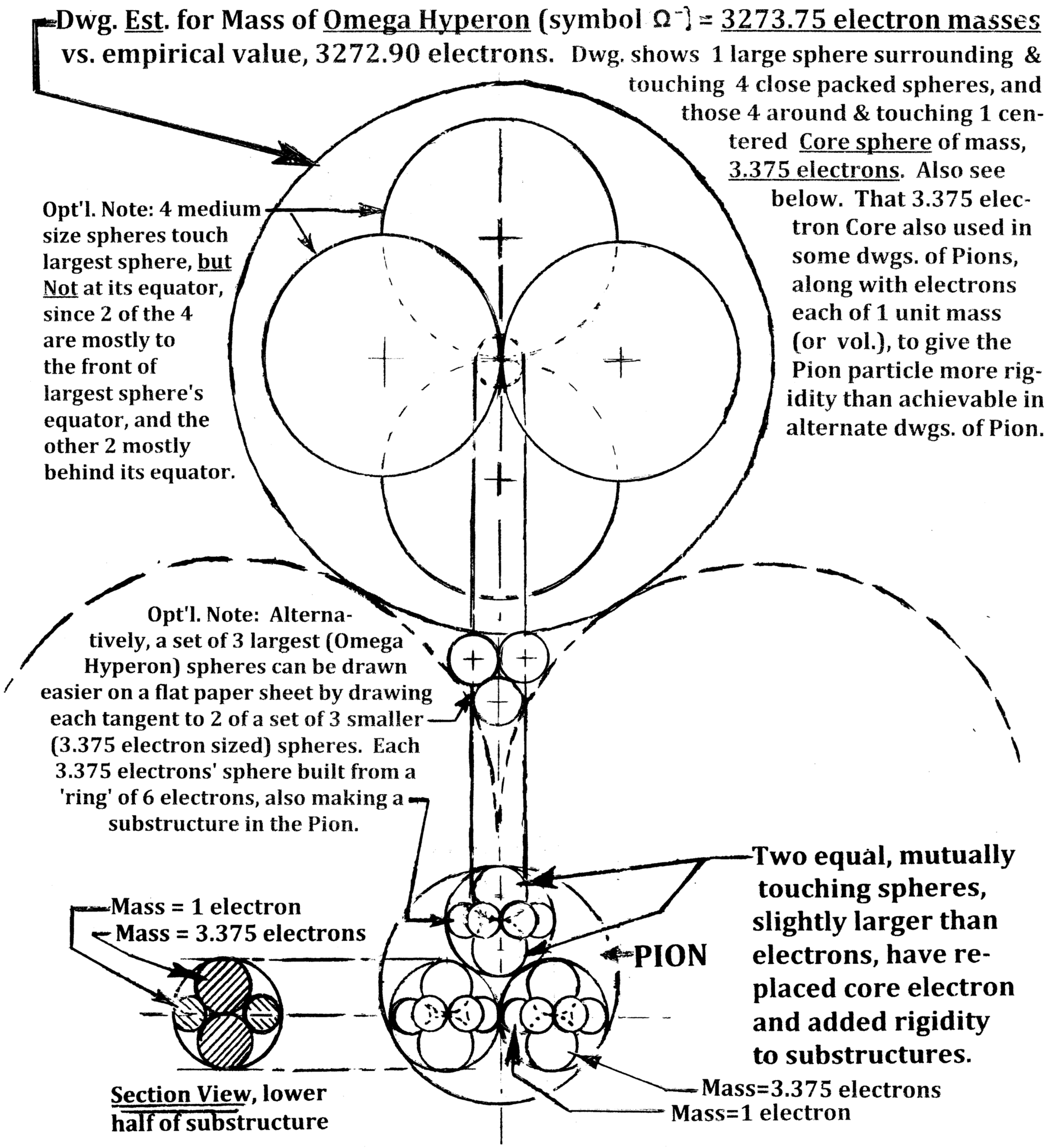
Example 2, See discourse near bottom of below Dwg.
Note a small electron sphere =1 unit of mass (or vol.) at centers of upper two sketches.



An earlier good Way to Est. mass of Proton, and also the ave. mass of the Pion & Kaon Particles

The above Dwg. (also shown in an earlier article) shows one of two ways to construct an estimate of the Proton's mass, 1836.00 electrons, close to 1836.15, its empirical mass. Note, Dwg. also shows how to construct a great estimate for the ave. PION particle mass, 270.10 electrons, and the ave. KAON particle mass, 970.00 electrons.
Those particle mass estimates were also needed to construct spheres volumes, which we averaged together, to estimate the Proton's mass, relative to the electron's.

Example 3, The below Dwg. (near bottom) shows a third way to construct a great estimate of the mass of the ave. **Pion** particle, **270.10** electrons. (An earlier article showed only 2 ways.) Above that, we show two ways of estimating the mass of the Omega 'Hyperon', each resulting in a 3273.75 electron mass est.



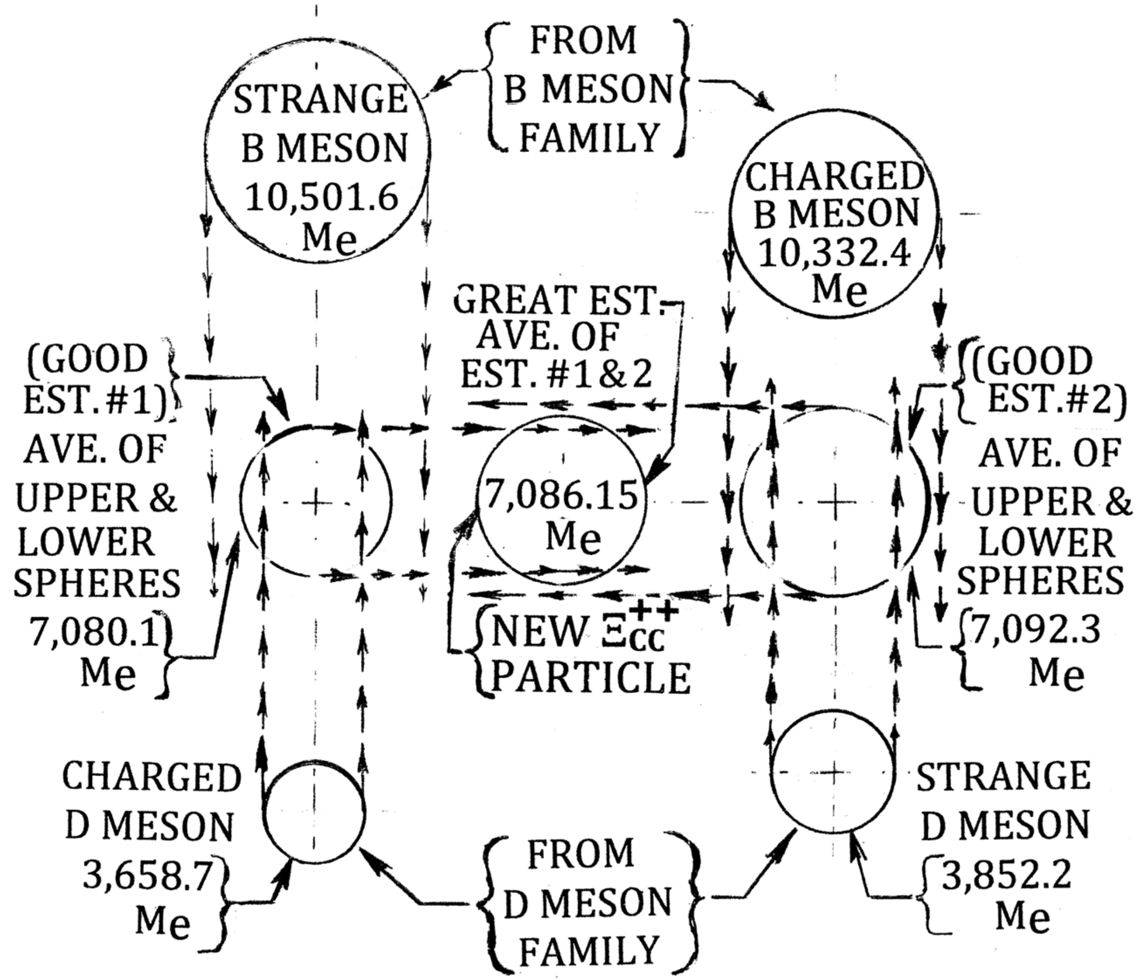
Dwg. Est. for Mass of Omega 'Hyperon', (Ω^-): 3273.75 electrons

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. ((Opt'l., had just 1 or a set of 3 electron-sized spheres been used, (instead of spheres sized 3.375 electrons each), then an ave. Kaon particle would have resulted, not the larger mass Omega Baryon.))

Example 4,

The Xi Double Charm Baryon, (Ξcc^{++}), a rather new Particle discovered using the 'super-collider', and the below great estimate of its mass, by averaging together two good estimates, each of which is simply an average of a pair of already known particles masses.

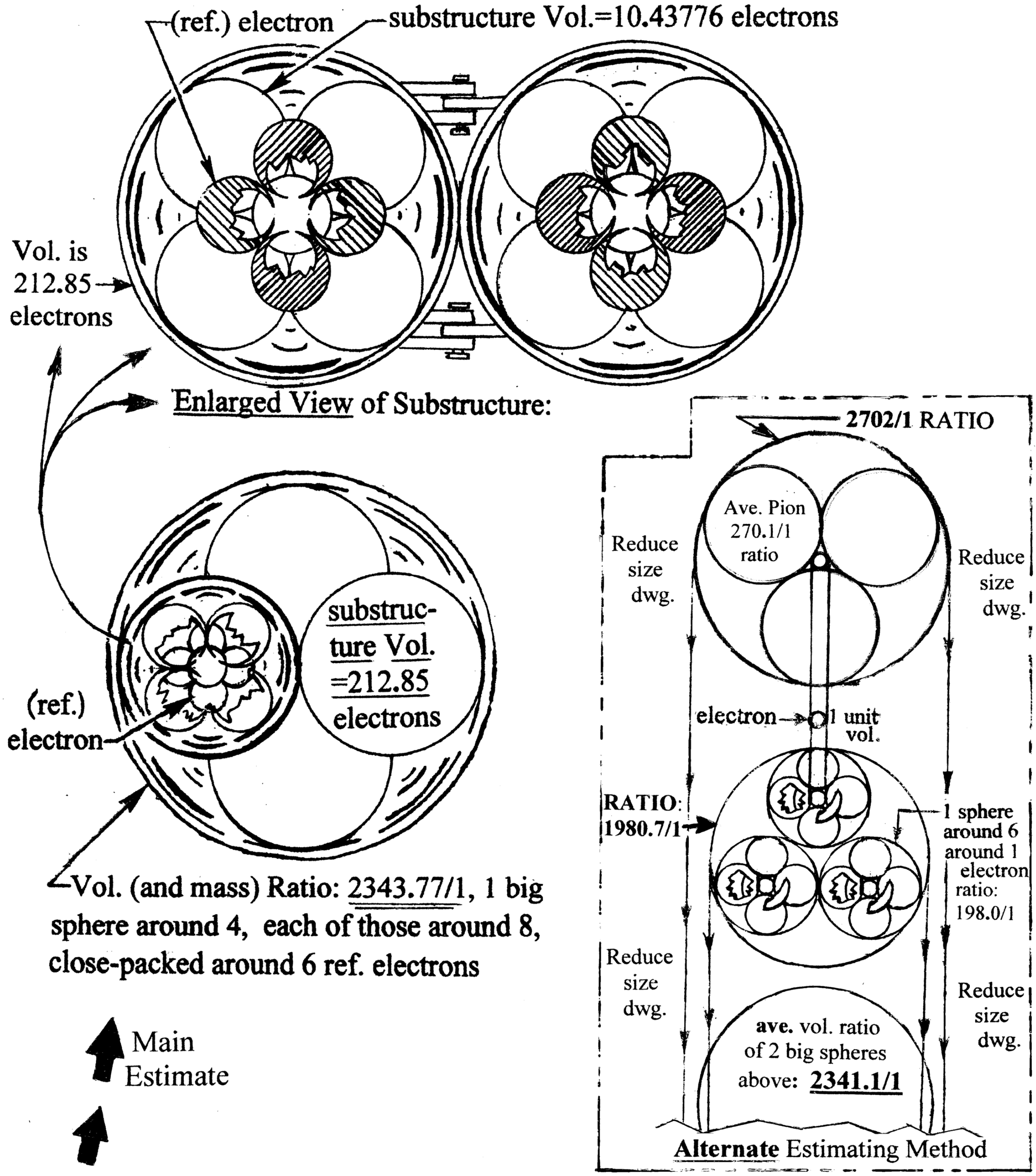


NOTES: (Me) DENOTES THE MASS OF 1 ELECTRON.
(Me) = 0.511 MILLION ELEC. VOLTS (MeV) OF ENERGY.

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 Nature's 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) to have, 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.

Example 5, the Sigma Hyperon, Σ^-, see below, especially the main sketch at left.



The heaviest, longest-life Sigma Hyperon, Σ^- (see left sketch, our best estimate)

That main sketch at left, is the best of two estimates shown, for the Sigma Hyperon's mass, Est.= **2343.77 electrons** vs. an empirical 2343.35 result.

Note the 1 big sphere around and touching a tetrahedral array of 4 spheres. And, as better shown in the close-up view above that main sketch, inside of each of the 4 spheres there is a 'cubic' array of 8 smaller spheres close-packed around an octahedral array of 6 electrons.

An alternate, (but less accurate) sketch estimate is shown at right, where two sphere constructions are shown averaged together. We may find that of additional interest - later.

Some other Miscellaneous Mass Ratio Estimates,
And descriptions of the Volume Ratios found in Sphere Patterns which nearly equal those Mass Ratios. And miscellaneous other comments about our approach:

We have presented above, examples of major Vol. Ratios, in basic sphere patterns, that equal, or nearly so, the Mass Ratios of major particles. And we have provided **large** drawings to aid our visualizing all that, 'at-a-glance'. Those examples, shown above, along with miscellaneous comments, exemplified how we reach our goal, one step at a time. Thus, in total, showing the likely great merit of this article's approach or theme. Therefore, in a sense, all the remainder, below, is Optional -- it just enhances the broader goal of providing a more complete reference.

But since many large drawings extend the scrolling required to unwieldly length, in most of what follows -- we will provide just a 'verbal' description of pattern's sphere volumes and mass ratios, and **avoid** the larger space required by drawings.

Optionally, it might be helpful if we remind reader of 3 general principles, or rules, that we continue to follow. And which were discussed in an earlier article:

a. We regard the relative volume of spheres we view -- as directly proportional to the masses of the particles they represent. Sort of like incompressible water, like the so-called Bohr 'Liquid Drop Model of a compact Nucleus', or like analogous concepts of Pythagoras and Democritus. I.e., if the size of the volume of a sphere is doubled, the mass that it represents is assumed also doubled.

b. We regard aspects of Heisenberg's 'Uncertainty Principle' as generally preventing the existence of a **compact** particle with a mass less than 200 electrons. ((However, a small ball of energy can exist in space with just the Energy of, say, 1 electron ((I.e., its so-called ($E=mc^2$) 'mass-equivalent Energy'.))

c. When we use the term, "Resonance equivalent mass" (or mass equivalence to an $E=mc^2$ amount of 'resonance Energy'), we mean the following: At such special total 'resonance' mass or resonance energy amount -- if two particles, one or both moving, have a 'close encounter' with one-another -- they scatter much more at that special (Resonance) value than if the total energy was typically somewhat lower or higher (than that special value).

Example 6, subj. the Lambda Hyperon, ($\mathbf{\Lambda^0}$). as shown in a previous article:
A Ratio results, (largest sphere vol. to smallest sphere vol.), when 1 large sphere surrounds & touches each of a group of 4 tetrahedrally arrayed spheres, and that group is 'close-packed' around a tetrahedrally arrayed group of 4 electrons, with each electron equaling 1 unit vol.
The Vol. Ratio resulting, (i.e., our Mass Ratio Estimate): **2180.19/ 1**.
The nearly matching major particle Mass Ratio (found in Nature) is the Lambda Hyperon particle mass, symbol ($\mathbf{\Lambda^0}$), to electron particle mass: **2183.34 / 1**.
Opt'l. note: Incidentally, each of the spheres; in the first mentioned group of 4 spheres, has a mass of 198.0 electrons. That same mass or ratio, 198.0/1, is found in a substructure shown in the sketch on the right side of example 5. (The Lambda 'Hyperon' is also known as the major Lambda 'Baryon'.)

Example 7, subj. the so-called lowest 'Sigma Resonance' (**Σ*+**),
Ratio of largest sphere vol. to smallest sphere vol. in example 2, see that previous Dwg. in this article:
The Vol. Ratio (i.e., Mass Ratio) resulting: **2702.0/ 1**,
Thus, the relative mass of that biggest sphere -- is our Estimated Mass: **2702.0 electrons.**

The nearly matching entity involves one of the most prominent and early discovered 'Resonance Masses' found in Nature, the so-called lowest 'Sigma Resonance' (**Σ*+**), with mass equivalence of **2706.06 electrons**. ((It is in the resonance 'family': "Σ*(1385)".))

Example 8, subj. the so-called lowest 'Xi Resonance' (Ξ^{*0}), shown in a previous article:
The Ratio of largest sphere vol. to smallest sphere vol., when 1 very large sphere surrounds & touches an octahedrally arrayed group of 6 internal medium-size spheres, and that group is close-packed around a cubically arrayed group of 8 small spheres, and that group surrounds & touches a 1-unit vol. electron.
The Vol. Ratio (i.e., Mass Ratio) resulting: **2995.03/ 1**,
The nearly matching entity involves one of the most prominent and early discovered 'Resonance Masses' found in Nature, the so-called lowest 'Xi Resonance' (Ξ^{*0}), with mass equivalence of **2997.65 electrons**.

Example 9, subj. the major and heaviest 'Xi Hyperon', (Ξ-), a.k.a. 'Xi Baryon'
The Ratio of the average of two estimated ratios in this article is as follows:
Note Example 6, (Λ^0), Est.= 2180.19/ 1, and note Example 8, (Ξ^{*0}), Est.= 2995.03/ 1.
The averaging of those estimates equals an estimated ratio, 2587.6/1.
So our **Est**. for a good 'candidate' for a particle mass to have is **2587.6** electrons.
And we find in nature, a particle, the 'Xi Hyperon', (Ξ-), with mass =**2586.5** electrons. Thus, our estimate was a very good one.

Example 10, subj. Simply a symmetrical sphere pattern, but not itself representing a volume ratio nearly equal to any known particle mass ratio or prominent 'resonance'. But its generated volume ratio (2786/1), when averaged with other prominent particle mass ratios, gives average ratios nearly equal to still other prominent particle mass ratios -- in nature.
For the case of example 10, we imagine 1 very large sphere surrounding and touching an octahedrally arrayed group of 6 medium size spheres. And each of those spheres surrounds (internally, within itself) a similarly arrayed group of 6 small spheres. And each of those latter groups surround & touch a centered very small sphere -- which we'll regard as a 1 unit vol. (or mass) electron.
That creates, (biggest to smallest sphere), a volume ratio of **2786/1**. Or a **2786** electron mass to use in our averaging to help nearly match the mass of other prominent particles.

Discussion of other Estimates nearly matching the mass of other particles, and aided by the above example 10 result:

To keep this article from being unwieldly long, we will address, below, only 'qualitatively' -- how we use geometric patterns to estimate some other particle masses. And we will see how our sphere mass result in example 10, (2786 electron masses), helps us make our good estimates.

Averaging that 2786 electrons' result with the ave. Kaon particle mass -- comes rather close to the 'Eta Prime meson' mass, (**η′**), although our estimate is a little 'high'.

Averaging that est. for the Eta Prime meson (η′), with our mass est. for the Omega Hyperon (Ω−), ref. example 3, -- comes rather close to the mass of the lightest major Xi Hyperon, (Ξ^0)

Averaging our Est. for the mass of the Eta Prime meson, (η′), with the mass of the ave. Pion gives an estimate for the mass of the Eta meson, (**η**).

There are other even more accurate ways to estimate the mass of the particles addressed immediately above. For example, another method involves first generating the Tauon, (**τ**), a.k.a. the Tau particle. But that might have been a little less simple and lengthened this article.

A reminder -- there are many other important particles, most less prominent, and most are <u>not</u> addressed in this article, nor even in my other more basic ref. online article. Most of these are addressed at my website, and hopefully, by using the link provided previously in this article's Introduction. My website or other ref. article likely addresses most of the issues that may still be on the mind of the reader of this above (supplemental) article, and thus will not be repeated here.

My major work, (matching abstract geometric ratios with particle mass ratios) -- is likely <u>not</u> 100% complete. And there are at least some rather good geometric sphere patterns which I have not studied, even though having less symmetry than those related to Platonic solids - which I have addressed. For example, I have not well studied geometric sphere patterns related to almost 30 'Archimedes Solids' and others. So, there are still likely some possible sphere patterns which might cast further light on the subject of my articles.

Closing Remarks:

As remarked in this article's Introduction, many rather recent Nobel Laureates, even familiar with 'quark theory', etc., have attempted to discern a 'rationale' as to why the various particles in Nature have the particular mass values they do.

Below, I quote some examples of remarks by some Nobel Laureates, and in some cases I give my opinion:

In an interview shortly before his death in early 1988, **Feynman** was quoted as saying, "**Why is it that the mass of the muon compared with the electron is exactly 206 or whatever it is, why are the masses of the various particles such as quarks what they are?** All these numbers, and others analogous to that -- which amount to some two dozen -- have **no** explanations in these string theories -- absolutely none! ...... **There's not an idea at the present time, in any of the theoretical structures that I have heard of, which will give a clue as to why those masses are what they are.**"[2]

And **Steven Weinberg**, who was awarded the Nobel Prize for his outstanding contributions to the standard model (of Particle Physics), said in his fairly recent book, *Dreams of a Final Theory*: "**The standard model involves many features that are <u>not</u> dictated by fundamental principles**" (*as he would only wish for*) "**but instead simply have to be taken from experiment. These apparently arbitrary features include a menu of particles, a number of constants such as <u>ratios of masses</u>**, and even symmetries themselves. **We can easily imagine that any or all of these features of the standard model might have been different.**"[3]

And **John Wheeler** wrote in his book, Geons, Black Holes & Quantum Foam (A Life in Science) on page 119, "I was so enchanted with the electron, with its beautiful, exact Dirac theory and its ultimate simplicity, that I couldn't help wondering: **Is everything made out of electrons? Isn't there some way to tie together the electron** and its antiparticle, the positron—perhaps with the help of the photon—**to build all other particles**?....... On my own, I kept trying this and that as I worked away at my desk, **but I never came up with a plausible way to build the world from positive and negative electrons.**"
(He also wrote elsewhere, "What else is there out of which to build a particle except **geometry itself**?")

I have written the above online Journal article, and many others like it, because I think they provide substantial solutions to the problem raised by the Nobel Laureates, quoted above. I regard the above article, and related ones, as largely establishing, in fact, that '**geometry itself**", largely reveals the solution. I.e., Again, see article's drawings, which, 'at a glance', exemplify **that**. And thus Wheeler, although not accomplishing this goal during his time, was, in a sense, correct: There are simple 'geometric methods' which show "**how everything can be constructed rather well from the electron**" and we have illustrated this in major cases in the above and related articles. And in some cases, by using structures that, although not 'electrons' themselves, are structures which were built from the electron. [4]

REFERENCES

[1] Rothman, T., Hidetoshi, F.; Sacred Mathematics-Japanese Temple Geometry, Chap. 6, Prob. 14, pp. 203-204, Princeton University Press, 2008.

[2] Davies, P. C. W., Brown, J., editors; Superstrings: A theory of Everything?; "Richard Feynman", p.195, Cambridge University Press, 1988.

[3] Weinberg, S.; Dreams of a Final Theory, Chap. VIII, p.192, Vintage Books, 1994

[4] As of this viXra article's date, its author has a website at http://www.causeeffect.org/