Pattern Volume Ratios vs. Less Prominent Particle Mass Ratios

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My previous articles addressed, mainly, very prominent particles, and showed that their major mass ratios nearly matched geometric ratios in patterns. The present article attempts to match mass ratios of not so prominent particles with, generally, less-simple pattern ratios. The matches seem sometimes not quite as close and impressive as previously, but still seem quite impressive enough to merit discussion and a paper. And a few particles in author's previous articles, whose prominences were not as understandable as others, surprisingly also receive better support, below. (Note. no 2014 Albuquerque meeting – but e-paper at 'CNPS')

1. Introduction -- the General Approach

In author's previously papers, he matched sphere volume ratios in patterns with the mass ratios of prominent particles. Now he extends that approach to include not so prominent particles, within limits. This paper and the previously ones use two methods of approach [1-2]. Examples of each method are presented in the next two paragraphs, and the second method is used more often in this paper.

Method 1: One example is when 1 big sphere symmetrically surrounds 4 equal medium-size spheres (tetrahedrally directed) and those surround 1 small centered reference electron sphere. A volume ratio (biggest to smallest sphere) of **970.00/1** then results. That almost exactly matches the average major kaon particle mass to the electron's mass, 970.00/1. Another example is when 1 big sphere surrounds 3 equal medium-size spheres, which surround that same electron sphere. In that case, the volume ratio of each medium-size sphere to the electron is 270.10/1, nearly matching the average pion particle to electron mass ratio. And the volume of the large outer sphere, relative to the electron's, is **2702.00/1**. That nearly matches something describable as *the mass equivalent of the energy of the lowest major resonance state of the major sigma hyperon relative to the electron's mass*, 2706.0/1, approximately [3-4]. So those are several remarkable examples of using the **first method**, the most basic, pure ratios in solid geometry, for matching sphere volume ratios with particle mass ratios.

Method 2: In this method, we average together the masses of two particle, or close estimates of them, like the **970.00/1** and **2702.00/1** in the previous paragraph. That gives us **1836.00/1**. That 1836.00/1 is famous because it nearly matches the mass ratio of the ultra-stable proton to electron, 1836.15/1. And thus that second method, simple averaging, often results in a third estimated mass, nearly matching a real particle that is even more stable than the two particles chosen to be averaged together!

But the second method, especially, has its limitations. Averaging of just any two existing particle masses together often does not 'hit' near any known third particle. And the precise rules as to when averaging will and will not work – are not known. It is well known that as the masses of particles are noted to increase more and more, their stability (mean lifetime) generally drops! But there are no known particles in the range: 'more massive than the electron and less massive than the muon'.

2. Commentary and Drawings Showing Ratios

We now show drawings used to generate many not so prominent particle masses, relative to the electron mass. We will also discuss each in more detail and discuss other ratios related to them, even though we might not always provide sketches.

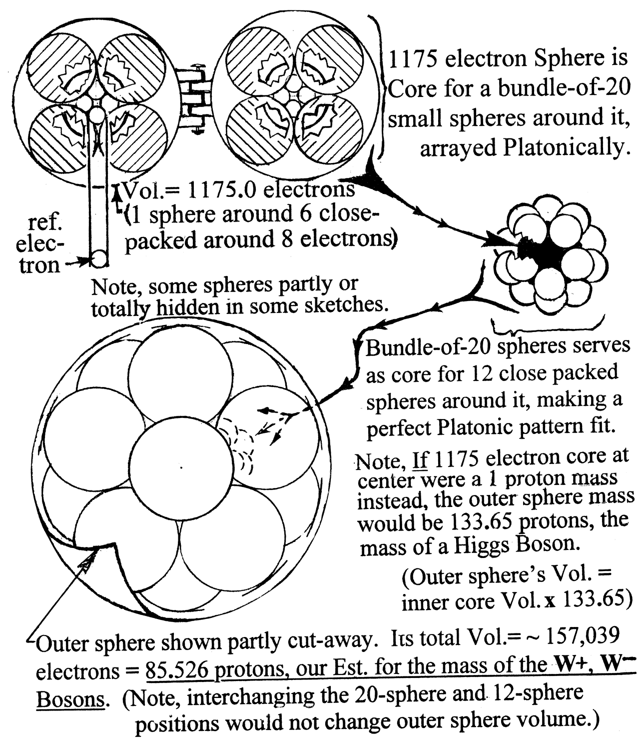
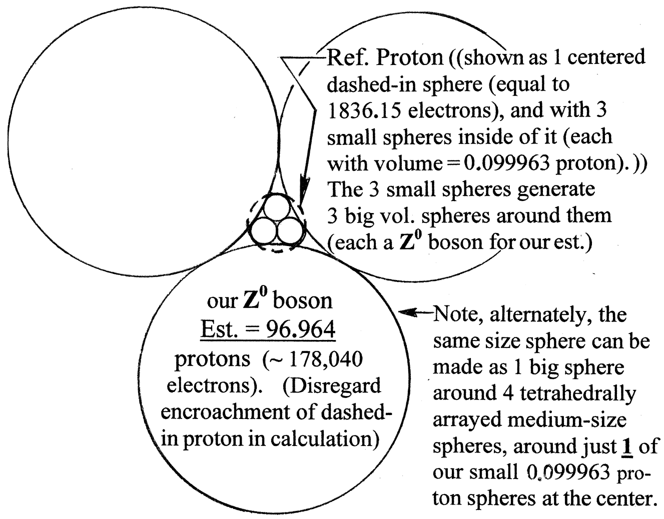


Fig. 1; Our 85.526 proton mass Est. for W^+, W^- Bosons (~ 157,039 electrons) vs. a 85.673 proton mass empirical equivalent.

Most current publications express the mass of particles in units of: 'energy divided by c squared', (MeV/c^2), like Wikipedia does [5-7]. Since a rest electron mass = ~ 0.511 MeV/c^2, we can divide a particle's mass in MeV/c² units by 0.511 MeV/c² to express a particle's mass in 'number of electrons' equivalent.

In Fig. 1 and 2, we try to address particles with mean lifetimes of about 10^{-25} sec. That is much shorter than is generally treatable by our method without considerable speculation.



Our Z^0 boson mass estimate misses the empirical value by only a small fraction of a proton, but that is still many electrons! When estimating very large mass particles, author believes his simple 'patterns method' is likely the major contributor to the empirical mass outcome, but not the only contributor.

Fig 2; our Estimate for Z^0 boson mass: 96.964 protons (~ 178,040 electrons) vs. empirical value: 97.187 protons (~ 178,450 electrons) equivalent.

Unless there is a very major resonance also associated with the particle, we usually limit our treatment to particles with 10^{-20} sec. mean lifetime or longer. We expect our treatment to handle well, as it generally does, particles with mean life as long as about 10^{-13} sec., even though author classifies those as 'not so prominent'. But even a 10^{-13} sec. mean lifetime makes such particle far more prominent than the vast majority of particles in 'the particle zoo'.

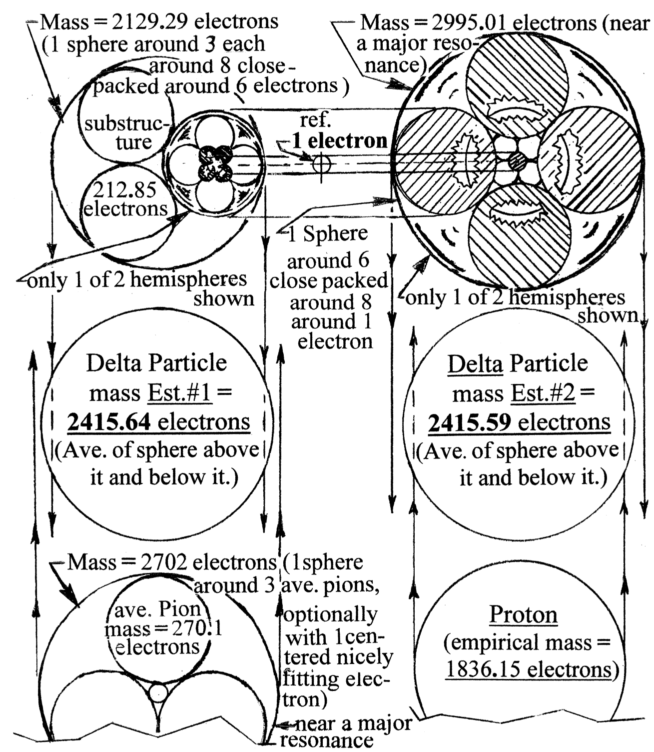
Since the W and Z bosons are considered very important by the 'mainstream' (Standard Model of Particle Physics), we try to address them here, despite their extremely short mean lifetime and thus lack of prominence. And although our estimate of their very great mass misses by only a small fraction of a proton's mass, that is still many electrons. Not surprising to us, there are other factors that also influence their ultimate mass outcomes besides that envisioned in our coarse estimate based on fewer factors. Our method's reliability tends to decrease when trying to estimate particle masses greater than 10,000 electrons.

Our estimate of the Higgs boson mass is a more basic estimate than some, because we assume it has a core equivalent to just one proton mass. (See notes in Fig. 1) So it is hoped that experimentalists can some day give us an even more accurate empirical determination of its mass, so we can better compare our 'Platonically'-based estimate with the empirical reality.

There exist some very short mean lifetime Vector mesons named 'rho mesons' with empirical masses of about 1517.5 electrons. That mass can be very speculatively estimated as the average of the 1175.0 electron structure shown in Fig. 1 and the Eta prime meson, 1874.1 electrons. Or that 1175.0 electron structure averaged with a proton, 1836.15 electrons. Or, better yet, the 1175.0 averaged with the average of 1874.1 and 1836.15.

One of several ways to estimate that Eta prime mass (1874.1 electrons) is to average an average kaon (970.00 electrons) with a big sphere around 6 smaller ones, each surrounding 6 spheres around an electron. (Big sphere = 2786.1 electrons). That gives an estimate of 1878.0, a little on the high side. But a constructed mass is often averaged with others to create other particles, which, in turn, are averaged with others to almost duplicate the original. But not quite duplicate it, so the 'feedback' actually further refines and stabilizes the original constructed estimate!

Fig. 3 illustrates or describes three good ways to estimate the mass of the Delta particle resonance mass. This resonance, and also the lowest 'sigma hyperon resonance mass' and the lowest 'xi hyperon resonance mass', are such major resonances that a mean lifetime has actually been assigned to their masses.



Note, Not shown above is Est.#3 = 2405.1 electrons for Delta Particle: Ave. of (1 Proton) & (1sphere around 4 Pions), = Ave. of (1836.15) & (2974.07) electron masses.

Fig. 3; the Delta Resonance Particles, (++), (+), (0), (-), each with empirical mass = 2411 electrons (~ 1232 Mev/c²)

And they were all discovered and investigated early, in the 1950's -- the Delta in 1952 by E. Fermi. The lowest basic sigma hyperon resonance and xi hyperon resonance masses are used to average with other particle masses in Fig. 3 to obtain our estimates for the Delta particle resonance mass. Later in this article, we will average the Delta (~ 2411 electrons) with other particle masses to successfully estimate other particle masses!

We now move on to Fig. 4, and address the 'D meson family' of particles and the major Omega Hyperon. Author's estimates below are more helpful than his still useful previous ones, because the below seems more basic and independent of 'chicken and egg' feedback arguments. Yet good feedback, like in electronic circuits, can add stability and refinement, and here also might even be enough to 'morph' particles into existence.

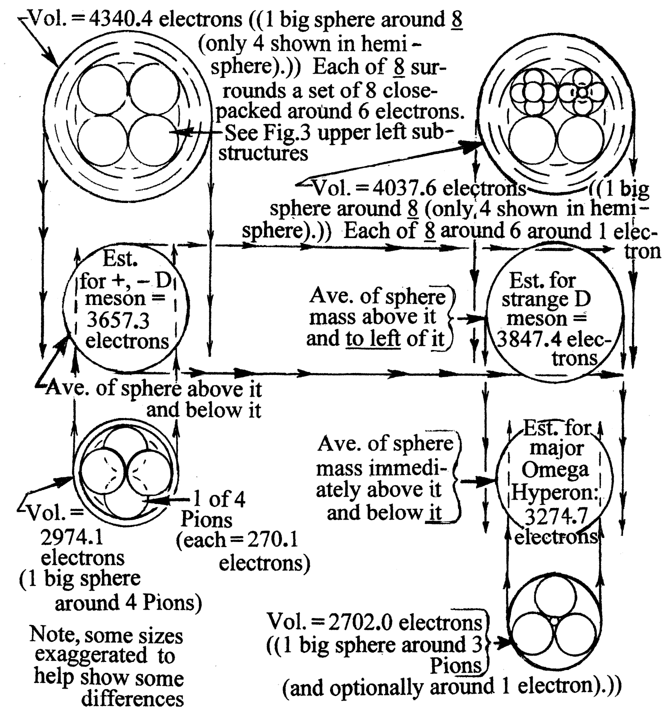


Fig. 4; Empirical mass of the charged D meson (3658.7 electrons), the strange D meson (3852.2 electron), and the major Omega Hyperon (3272.9 electrons).

Our estimate for each is shown above. (Optionally, the major Omega Hyperon could then be averaged with 4037.6 electron pattern at top right to estimate a mass for the neutral D meson.)

Now we move on to Fig. 5.

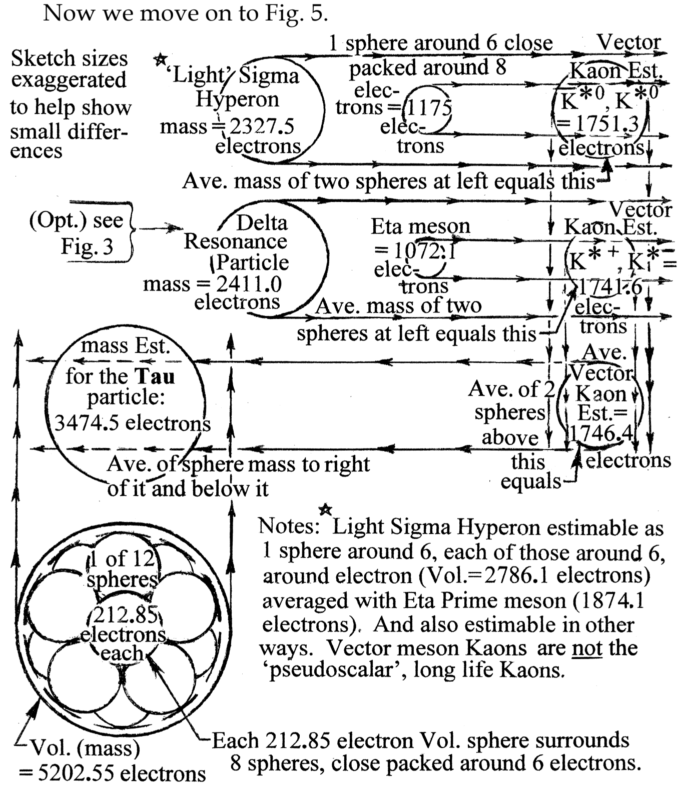


Fig. 5; Empirical masses: Kaon (Vector mesons) K^{*0}, $\overline{K}^{*0}$ = 1753.3 electrons; K^{*+}, K^{*-} = 1744.9 electrons; and Tau particle = 3477.2 electrons, vs. our estimates above.

Fig. 5 addresses the Tau particle and the Vector meson kaons, (not to be confused with the major, more prominent, and earlier discovered 'pseudoscalar' kaons). The pseudoscalar kaons are more basic and their average mass is estimated in a more basic, simple way.

The two sets of Vector meson kaons have a mean lifetime of about 10^{-19} sec., and do not differ much from each other in massiveness. And neither does our estimates for them. We thus average our estimated masses for them together, and in turn, average that with the mass shown in at the lower left in Fig. 5. That gives us a good estimate for the Tau particle – a simpler and thus more appealing estimate than the author's previous speculations.

We now address Fig. 6 and the various particles shown in it. The estimate for the mass of J/Psi is excellent since there are just not many ways to estimate masses of somewhat prominent particles ranging from 5500 to 6500 electrons and with mean life of about 10^{-20} sec. or longer. Our estimate for the charmed B meson, with a mass of over 10,000 electrons, is also excellent. Our estimate for it is now simpler and more helpful than the author's still helpful previous estimate. The mean lifetime of the charmed B meson is about 4.5×10^{-13} sec., and for the bottom Lambda about 1.4×10^{-12} sec., thus actually throwing the latter into our 'prominent particle' classification, and the former very near that classification, too. More on the 'B meson family' later.

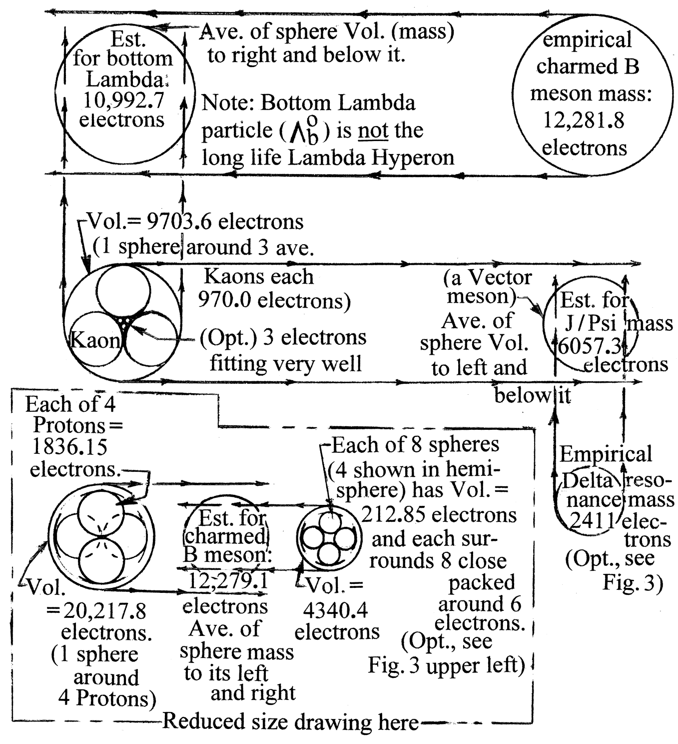


Fig. 6; Empirical masses: Bottom Lambda particle (10,998.4 electrons), Vector meson J/Psi (6060.5 electrons), and Charmed B meson (12,281.8 electrons), vs. our estimates for them above.

We next address particles shown in Fig. 7. The pattern shown in the upper middle of Fig. 7 has one centered core sphere and one outer sphere, and the final volume of the outer sphere is determined by the volume chosen for the core sphere. Each of our two choices for the core sphere results in a different outer sphere mass, which when averaged with different particles, gives us two good estimates for the charmed Lambda particle's mass.

In fact, we average both those good estimates together to give us a still better estimate.

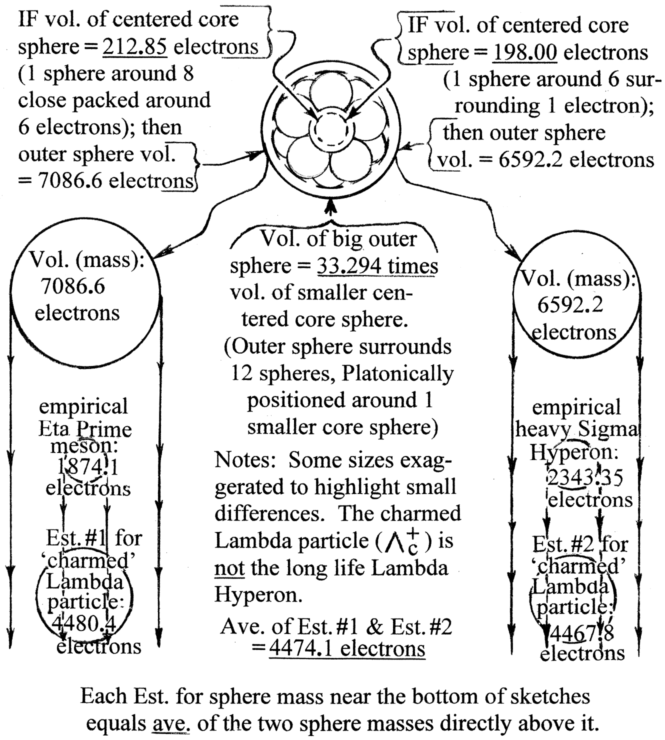


Fig. 7; Empirical mass of charmed Lambda particle (Λ_c^+) = 4474.5 electrons, vs. our estimates above.

There are not many ways to estimate particle mass candidates in the range, 4000 to 5000 electrons with a mean lifetime as long as 2.0x10^{-13} sec., so the above is a good, strong, impressive result.

By averaging the sphere mass outcome shown near the middle left in Fig. 7, (7086.6 electrons) with the empirical mass of the major Omega hyperon (3272.8 electrons), we obtain an estimated particle mass 'candidate' of 5179.4 electrons. That is very near the empirical masses of the charmed Xi particles, about 5178 electrons.

If the Fig. 7 structure (7086.6 electrons) is averaged with the empirical mass of the Tau particle (3477.2 electrons), we obtain an estimated particle mass of 5281.9 electrons. Or if the charmed Lambda in Fig. 7 (4474.5 electrons) is averaged with the J/Psi in Fig. 6 (6060.5 electrons), we get 5267.5 electrons. Each estimate alone, and best -- the average of both, hit near the empirical mass of the charmed Omega baryon, roughly 5274.4 electrons. The charmed Omega has mean lifetime of about 7x10^{-14} sec., and the charmed Xi has a mean lifetime somewhat longer than 10^{-22} sec.

Somewhat similarly when we average the 1175.0 electron structure shown in Fig. 1 with the Eta prime meson mass of 1874.1 electrons. That gives us an estimate of 1524.6 as the mass of a particle candidate. That is pretty near the empirical mass of a Vector meson known as the Omega meson, 1531.6 electrons. That is not to be confused with the major 'Omega Hyperon', which has a much longer mean lifetime.

Now, more about the 'B meson family', besides the charmed B meson generated in Fig. 6. Given the empirical charged and neutral B meson mass (about 10,331.4 electrons), we can average that 10,331.4 with the mass resulting from 1 big sphere surrounding 4 average kaons (big sphere = 10,680.7 electrons). That averaging gives us an estimated mass particle of 10,506.1 electrons, near the empirical strange B meson mass of 10,501.6 electrons. That is an excellent estimate because very large masses, in the range 10,000 to 11,000 electrons, are very hard to hit precisely. But it seems hard to estimate well -- the mass of the empirical charged or neutral B meson (about 10,331.4 electrons).

One of several speculative ways is to consider 1 very large sphere surrounding 20 Platonically positioned around a core sphere. That core mass (nearly that of the major Lambda hyperon) consists of 1 sphere around 4, each equaling 198 electrons. (The 198-electron substructure consists of 1 sphere around 6 around 1 electron.) We then average the very large sphere (20,467.5 electrons) with another 198-electron sphere giving a great estimate of 10,332.7 electrons! But averaging such very big sphere with a small one raises some speculation.

There is also some speculation in our estimating a Vector meson named the Phi meson. It has a very short mean lifetime of about 10^{-22} sec. and mass of about 1995 electrons. We can rather closely estimate it as the mass of 1 sphere surrounding 20 Platonically positioned around a 212.85-electron core. (Core is 1 sphere around 8 close packed around 6 electrons.) That results in our estimated mass equaling 1998.2 electrons. But precisely how can other possible sphere estimates, somewhat near our 1998.2 value, interact with our estimate, and refine it to bring it even closer to the empirical 1995-electron reality and establish better 'uniqueness'? The author does not know those details.

Somewhat like in Bohr's 'liquid drop model of the nucleus', we assume our masses proportional to our relative volumes.

3. Conclusion

The author believes that this extensive paper has generally estimated even not so prominent particle masses -- rather well. And, together with his previous papers that estimated prominent particle masses, the subject has been adequately introduced to the reader. Thus, he does not expect to write any more extensive papers on the subject. Certainly, his existing papers raise many other interesting questions, but he feels that interested readers can pursue those further as effectively as the author.

The author believes the present paper achieves a large number of exciting particle estimates, including good mass estimates for many that would be especially hard to attribute to just 'chance'. The author's use of not so prominent particles also enabled him, here, to make better helpful estimates to supplement his few previous fairly helpful estimates, among his many otherwise excellent prior estimates for prominent particles. All that implies that there is likely merit to the extension of our previously used methodology -- to now include not so prominent of particles, within limits. It is also a good sign to often see our repeated use of the same major structures to interact with other major structures, which also have been used so well, repeatedly, to help estimates so many different particle masses.

References

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[4] http://en.wikipedia.org/wiki/Hyperon

[5] http://en.wikipedia.org/wiki/List_of_baryons

[6] http://en.wikipedia.org/wiki/List_of_mesons

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