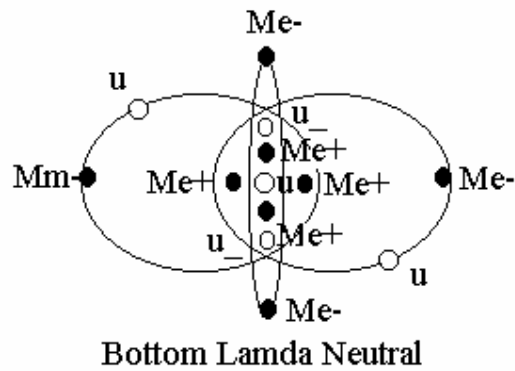
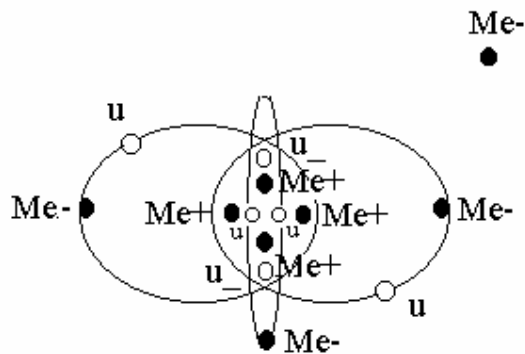


Ooc       $s^- = u \text{ Mm}^-$   
 $s^+ = u_- \text{ Mm}^{++} \text{ Mm}^-$   
 $c = u \text{ d}^+ \text{ s}^-$   
 $d^+ = u_- \text{ Me}^{++} \text{ Me}^-$   
 $s^- = u \text{ Mm}^-$



Lob       $u$   
 $d^+ = u_- \text{ Me}^{++} \text{ Me}^-$   
 $b^- = c \text{ Me}^-$   
 $u$   
 $d^+ = u_- \text{ Me}^{++} \text{ Me}^-$   
 $s^- = u \text{ Mm}^-$

A negative bottom quark is a charmed quark with an extra electron attached to it.  
 All the swirling vortices balance out, so the bottom lambda has a neutral charge.



**Deuteron**

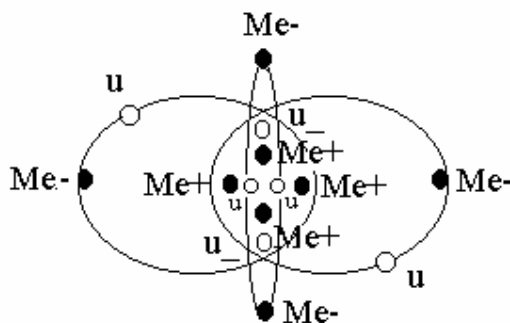
3 u

d+ = u\_ Me++ Me-

(u d+ u) (d- d+ u) d+ = u\_ Me++ Me-

d- = u Me-

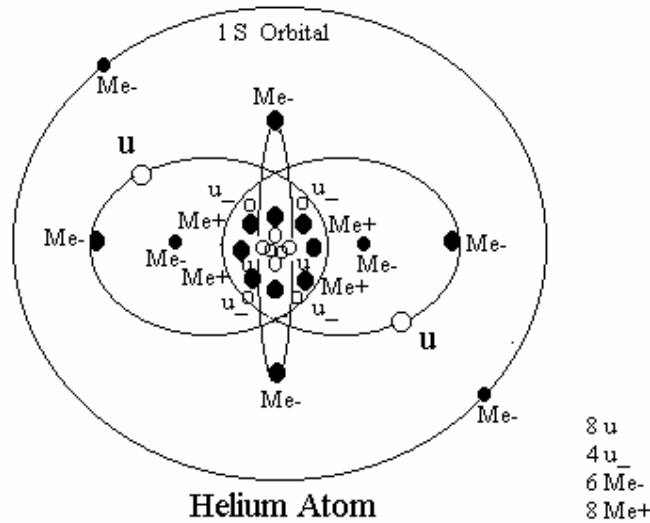
The deuteron is a combination of a proton and a neutron into a single particle. There are four internal positrons and three internal electrons, resulting in a net positive charge. One of the internal electrons rides in the girdle orbit. A fourth electron is in the 1 s orbit. By comparing with the charmed particles, we find that a deuteron is similar to the charmed particles, but has added an extra (u) in the lens vesicle.



**Hydrogen Molecule**

2 (u d+ u) --> 2 (u d+ d-)

A hydrogen molecule is a two-proton system. The two protons form a double neutron configuration. The charges all balance, and the two outer electrons drop into the girdle orbit. So the only difference between a hydrogen molecule and a deuteron is the position of the last electron. A deuteron is a partially ionized hydrogen molecule.



This is a rough sketch (not to scale) of a helium atom. The lens vesicle is starting to show harmonic nodal patterns similar to spherical harmonics. Six electrons are arranged in the outer vesicles and girdle orbit, and eight positrons are arranged in the inner vesicle. An additional pair of electrons (with opposing spin orientations) fills in the 1-s orbital shell, completing the first period of the periodic table of elements. The electrons stay on opposite sides because their charges repel. The positrons also distribute themselves at equal intervals in the lens vesicle with the up quarks as buffers between them. The positrons drain energy out, and the electrons funnel energy back in. The whole system is very stable and chemically inert because all the charges are balanced and all the positions of the first period are filled. The positions shown in the drawing are not necessarily accurate, but just show the general regions in which particles are usually to be found.

The above series of drawings show that the fundamental particles echo with quarks and leptons a structure roughly similar to the structure of atoms. However, there is no clear crossover point. The particle components just keep building into larger and larger ensembles. A heavy atomic nucleus can be thought of as a complex ensemble of quarks and leptons functioning as a single large particle or as a cluster of smaller nuclei, or as the harmonic vibration pattern of a single Bu ensemble.

We may suppose that the Bu particle is the up quark. If we calculate the mass of an ensemble of two up quarks and an anti-up quark, we get the following result:

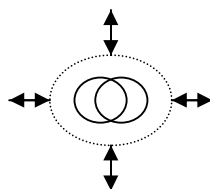
- \*  $Bu^2 = H c a / G = (1 / 4 P e o)(e^2 / G) = 3.4579 \times 10^{-9} \text{ kg}^2.$
- \*  $(Bu)(Bu)(Bu_-) = (1.86 \times 10^{-9} \text{ kg})(1.86 \times 10^{-9} \text{ kg})(1.86 \times 10^{-9} \text{ kg}^{-1}) = 6.43 \times 10^{-27} \text{ kg}$

This is close to the mass of a neutron ( $M_n$ ), but too heavy. It is actually much closer to 4 neutrons.

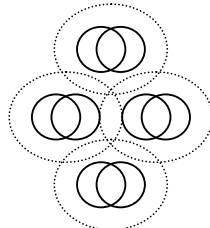
- $M_n = 1.674954 \times 10^{-27}$  kg.
- $4 M_n = 6.6998 \times 10^{-27}$  kg.
- $4 M_p = 6.695 \times 10^{-27}$  kg.
- $\text{He-4} = 6.64672 \times 10^{-27}$  kg.
- Bu ensemble =  $6.43 \times 10^{-27}$  kg.

Neutron masses are additive because they can function as independent particles, and their individual masses can be measured. This suggests that the ultimate cosmic nucleon ensemble is not the proton/neutron, but helium. Helium is the lightest inert mono-atomic noble gas and properly should be the ground state of matter. We will have to see why it is not the largest component of matter in the universe. Its nucleus normally consists of 2 protons and 2 neutrons. It is so perfectly balanced that it is chemically inert. There is still a slight difference of around  $2.7 \times 10^{-28}$  kg between a set of four neutrons and a Bu ensemble. The atomic weight of helium is  $6.64672 \times 10^{-27}$  kg, which is slightly less than the weight of four neutrons taken separately. This means that the actual ground state for the physical universe is not hydrogen, but helium. This is also why nuclear fusion is a good source of energy. Putting four nucleons together (there are several ways to do this) so as to form a helium atom leaves some mass/energy (around  $5.3 \times 10^{-29}$  kg) left over in the form of photons and kinetic energy. We also see from the Bu ensemble weight of  $6.43 \times 10^{-27}$  kg that there is another energy gap. The Bu ensemble is lighter than helium by around  $2.1672 \times 10^{-28}$  kg, and helium is a tad lighter than the sum of four neutrons by around  $5.308 \times 10^{-29}$  kg. A helium nucleus has two neutrons and two protons. The difference between protons and neutrons is that a proton has one of its two electrons outside the proton event horizon, while the neutron has both electrons inside its event horizon and thus invisible to an outside observer. The two protons in the helium nucleus also have two antineutrinos that have moved far off, carrying with them a lot of momentum. Hydrogen molecules are proton pairs. The negative electric charge on the external electron of a proton allows it to bond with a second proton. The positive proton charges repel, but the electrons attract the protons, so they form a pair of dance partners. The electrons have opposite spin and stay on opposite sides, but hold the protons close. A three-proton nucleus, however, is unstable. The extra proton mass keeps the electrons too far apart, so the binding energy is too weak to overcome the proton repulsion. Mono-atomic hydrogen is an excited form of hydrogen gas in which diatomic hydrogen molecules split apart

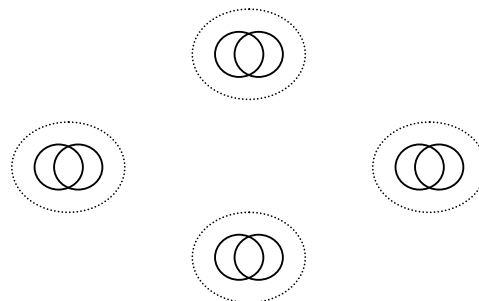
because they are vibrating too violently for the electrons to hold them together. Two hydrogen atoms relax together, bonding by overlapping their electron orbits into a single larger orbit. This is a nice analogy to how two Bu's overlap their event horizons. Hydrogen molecules do not like to bond into helium for the same reason that triple-proton nuclei do not form. Of course, if hydrogen gas naturally fused into helium, the universe would quickly be filled with inert helium and nothing much would happen. Hydrogen, on the other hand, is chemically very active. The fact that inert helium is lighter than an equivalent amount of hydrogen is like the remarkable fact that ice is lighter than an equivalent amount of water. These two tricks of nature allow for the possibility of living organisms to evolve. The ability of Bu ensembles to be stable while single Bu's are unstable is a further elaboration of this pattern. The instability of neutrons versus protons is also related to this remarkable situation.



Bu ensemble in its ground state  
 ( $6.43 \times 10^{-27}$  kg plus kinetic energy vibration)



Helium atom (Bu ensemble vibration viewed as a nuclear cluster)  
 ( $6.64672 \times 10^{-27}$  kg)



Four atoms of mono-atomic hydrogen gas  
 $(4)(1.673785 \times 10^{-27} \text{ kg} = 6.69514 \times 10^{-27} \text{ kg})$   
 (Four neutrons =  $6.6998 \times 10^{-27}$  kg)  
 (Increased kinetic energy generates a mono-nucleonic plasma)

The Bu quark triplet produces a single nucleon. To get the equivalent of four nucleons, the Bu requires some extra energy that takes the form of a quantum vibration. The super high frequency quantum vibration creates the illusion that the Bu ensemble is actually not one nucleon, but four nucleons.

The greater the vibration energy the larger the apparent space occupied by the ensemble. The quantum vibration of the He-4 nucleus behaves like the gluons that hold the nucleons together. If each cycle of the vibration is fast enough, the ensemble appears to translate into various positions with no time lapse measurable by physics even though the actual relative component velocity might be less than  $c$ . For example, the energy difference between the Bu ensemble and the He atom is about  $2.1672 \times 10^{-28}$  kg or  $121.548 \text{ MeV}/c^2$ . Converting that mass totally to kinetic energy gives  $1.95 \times 10^{-11}$  J. Looking at that as the kinetic energy of the Bu ensemble gives us the following:

- $1.95 \times 10^{-11} \text{ J} = 6.43 \times 10^{-28} \text{ kg } v^2$ .
- $v = 1.74 \times 10^8 \text{ m/s}$ .

Our Bu ensemble is moving at a little over half the speed of light. If the ensemble cycles through a space the size of a helium nucleus, say a distance of about  $10^{-9}$  m at half of light speed, it does so in around  $10^{-17}$  s, or around 1/1000 of the mean life span of an omega particle. To an observer it could appear to be a cluster of separate particles. If the ensemble has more energy, it spreads out in space. If it spreads out far enough, it appears to be a set of four separate nucleons (protons or neutrons). The mass-energy difference depends on the configuration. The most common probability in the current low-energy evolution of our universe is a pair of hydrogen molecules. This gives a difference of  $2.6514 \times 10^{-28}$  kg, and raises the speed to  $1.942256 \times 10^8$  m/s. Rather than a tiny sphere that looks like a helium nucleus (or alpha particle), we see two hydrogen molecules zipping about in the form of a gas. If the gas is further excited it becomes proton plasma. However, the real spread of a hydrogen gas ensemble comes from the electrons and the antineutrinos that the neutrons emit as they decay. They carry considerable momentum away from the nucleon and balance the energy density in terms of the Heisenberg relation.

The ultimate particle is the Unity Boson (Bu). It has the rest energy of a flea, or a mass of just over  $10^{-9}$  kg. From our viewpoint in our spaced-out universe the Unity Boson is unstable and very hot – at a temperature somewhere over  $10^{33}$  K. From its own viewpoint it eternally vibrates at all possible frequencies. That

vibration is its “heat”, but it is not really hot, because there is nothing to compare it with from its own viewpoint. The Unity Boson is pure awareness. It exists in the immediate moment of NOW. Physicists define this as an interval of around  $10^{-43}$  seconds. This is Planck time:  $(H G / c^5)^{1/2}$ . If the pure awareness chooses to put attention on any of its vibration states that coexist in this NOW, it immediately explodes. The vibration creates an illusion of contrasting duality. This is the Big Bang. The Bu particle expands. Actually it inflates at a speed faster than light in its initial stage. Gravity, the memory of the Unified State of the Unity Boson, almost immediately (at around  $10^{-34}$  seconds after the Bang) becomes a persistent background effect for the whole cosmos. As a force gravity affects all physical components that the observer resists. Otherwise it is simply the tendency of all vibrations to return to equilibrium and restore the viewpoint of the Unity Boson.

As the Bu bubble inflates, an observer in a vibration state inside the expanding bubble experiences multiplicity. The Bu’s super fast vibrations echoing back and forth in space/time create the illusion of many particles coexisting in the bubble instead of just one. The whole thing is a quantum phase conjugation bubble. The particles are quarks and anti-quarks – Bu’s and anti-Bu’s – boiling in the vacuum. As the bubble expands, it cools. At around  $10^{15}$  K ( $10^{-12}$  seconds) electroweak unification breaks down. This simply means that the bubble has expanded to the point where energy and matter start to seem distinct. But radiation energy dominates. The quarks become bubbles of resistance and the “radiating” EM photons hold the space between them. But there is still very little space. At slightly under  $10^{13}$  K (around  $10^{-8}$  to  $10^{-6}$  seconds) the quark-hadron transition occurs and the quarks and anti-quarks mutually annihilate into EM energy leaving only the Bu’s that happen to overlap forming Bu ensembles. The vibrating quarks condense into hadrons, each consisting of a pair of Bu quarks and an anti-Bu anti-quark overlap. The hadrons are still tightly packed and are fundamentally neutrons interfaced with pions and some other mesons. The universe looks like a large and very dense neutron star. Heavier particles occur, but decay as the expansion continues. Clusters of four neutrons form proto-helium. Larger clusters form other transient proto-elements. Some of these clusters transiently form real helium, but the energy is still too dense for it to stabilize. The hadrons in soup form behave a bit like the way water molecules interact in their liquid phase. At around  $10^{10}$  K or 1 second after the Big Bang nucleosynthesis has begun.

The neutron soup thins out into neutron plasma, and proto-helium (in the form of loosely associated nucleon clusters) becomes more common as the neutrons start

decaying into protons. From  $10^9$  K the cosmos enters the lepton era. At this energy density leptons and anti-leptons still survive in large numbers and dominate. At around  $10^5$  or  $10^4$  K ( $10^{12}$  seconds) almost all the electrons and positrons annihilate into photons leaving only the ones that can drop into orbits around nucleons. From this point we enter our current era in which there mostly remain just the surviving Bu ensembles (triple-quark protons and neutrons) floating in a soup of neutrinos and antineutrinos, photons and anti-photons. The density of radiation keeps dropping as the expansion continues. The photon wavelengths get longer and longer and the background temperature of the photon soup gradually drops to the 3 K it has today.

As the neutrons spread, they decay into protons generating hydrogen plasma. As the temperature cools to below 3000 K, the plasma condenses into molecular hydrogen gas, which is quite stable. The reason we did not end up with a helium universe is that when the universe passed through the stage where helium would form naturally by nucleosynthesis, it was not stable, but rapidly expanding. The result was that it quickly passed by this window and the neutrons almost all decayed instead into nearly pure proton plasma without fusing into helium. The proton plasma cooled and condensed into diatomic molecular hydrogen gas with a small distribution of deuterium and tritium combinations. At the lower density the positive charges on the protons would not allow them to cluster naturally into helium or heavier nuclei purely by the attractive charge on the orbital electrons. Thus we ended up with a hydrogen gas universe instead of a more “logical” true ground state helium gas universe. The secondary observer resistance of electric charge created a buffer zone.

The actual ultimate ground state physical condition consists of a pure Bu ensemble plus a bunch of other kinetic energy vibrations that give the appearance of various particles of matter interacting. As we saw, this is really the Bu ensemble vibrating at high speed. The Bu ensemble in turn is a single Bu vibrating at high speed.

The case now is that we have small amounts of helium, tritium, deuterium, and a dominance of hydrogen. Over time the hydrogen gas clouds collapse gravitationally due to macroscopic quantum fluctuations. They condense into stars, and cook helium in their cores (as well as heavier elements) by the standard fusion processes. This has gradually raised the amount of helium up to its current level of about 25%. He-4 is lighter and more stable and inert than any other combination of four nucleons such as 4 neutrons, 4 hydrogen atoms, two hydrogen molecules, two deuterium molecules, or tritium plus a proton.

The key reason that we end up with a mainly hydrogen universe rather than a mainly helium universe is that proton charges mutually repel, so a certain pressure is required to hold them together beneath that charge horizon so they can fuse into the helium quantum state of harmonic resonance. The easiest route (least pressure required) to obtain He-4 is fusion of deuterium. But deuterium does not show up in quantities until the falling density after the Bang has gone past the pressure required to fuse into He-4. At that stage the Bang is rapidly losing pressure as it expands. This is not conducive to helium fusion. Thus the production of helium in any quantity has to await the formation of gravitational collapses that occur when stars condense locally out of the thinner hydrogen gas. This local condensation temporarily reverses the general trend toward diffusion and cooling and provides the environment necessary to cook the heavier elements, including helium as the lightest of these. The lower energy state for the Bu ensemble per se ensures that helium is the most stable state once we have overcome the paradoxical electrostatic repulsion threshold. The expansion momentum of the Big Bang ensures that not much helium gets a chance to happen during its brief production density window. Ground state helium however eventually emerges spontaneously from the quantum fluctuations in the cosmic soup that we call stars and galaxies. The eventual spontaneous return to the unitary Bu particle occurs through the dynamics of black holes that eventually gobble up the matter with an ultimate gravitational collapse back into the primordial singularity of the Bu particle. This also occurs inevitably over the vast scale of cosmic time due to macroscopic quantum fluctuations just as Poincare predicted. A non-collapsing universe is not possible due to the lower quantum limit on time intervals. From any viewpoint below the Planck second the cosmos is unitary. For the universe to keep expanding requires observer focus to keep shrinking until it falls below the Planck limit. At that point the unitary condition also sets in as a boundary condition. At any time an observer can shift viewpoint back to the Unitary Boson state and restore the unified field state to experience. He can also adjust attention to any energy/vibration density level and observe what is occurring there. This is the remarkable phase wave property of observer attention that has not been fully utilized. The universe appears to continue expanding as the relativistic consequence of a situation in which the majority of observers in it continue to assume a transparent habit of focusing attention down toward point value while failing to assume responsibility for that initial impulse to focus. Every material object and organism does this simply by habit and does not seem to know any better. A few evolved species of intelligent beings have stepped out of this habit and gained the freedom to roam the universe at will. Perhaps mankind soon will awaken and rise to that level.