

# **A Conceptual Model of the Structure of Elementary Particles, Including a Description of a Dark Matter Particle**

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## **ABSTRACT**

In hyperversive theory, particles of matter are collapsed and coalesced quanta of space, created to conserve angular momentum at what is called the small energy quantum level. Here we develop a conceptual model for the structure of elementary particles based on the component vortices, which can be oriented so that either their north or south poles face the center. Six coalesced vortices produce a particle structure that can account for all particle charge variations, including fractional charges and anti-particles. Fractional charges are shown to be net charges, where charge is a consequence of spin orientations. Combining the appropriate particles to simulate the charge arrangements of a proton suggests that protons carry a hidden negative charge. This hidden charge is speculated to be what stops the electron from falling into the proton. The model produces a particle with a charge arrangement matching the neutrino, but this 'condensation' neutrino would have little to no kinetic energy, compared to the 'emission' neutrino, the high speed neutrino created by atomic decay and collisions. The condensation neutrino is the only particle in the model not shown to exist and thus is proposed as the dark matter particle.

*Subject headings:* condensation neutrinos; dark matter; emission neutrinos; fundamental particles; neutral quark structure of elementary particles

## **Introduction**

In [1] the idea was advanced that the universe is the surface volume of a four dimensional, hollow, spinning hypersphere, termed the hyperversive. The hyperversive is expanding radially

at twice the speed of light, and its circumferential expansion matches the Hubble constant. The hyperverses idea was expanded in [2], where the energetics of the surface vortices was shown to produce relativity, and together with the  $2c$  radial expansion, give us time. In [3] the hyperverses was shown to be following a geometric mean expansion, which accounts for, among other things, the deep connection between the small and the large of the universe. Evidence was given suggesting that the expansion of the universe is intimately connected to the creation of quantum levels, one of which, termed the 'small energy quantum', or SEQ, is the quantum of our experience. The expanding, and spinning, hyperverses must conserve angular momentum, and at the SEQ level, the quanta are forced to collapse and coalesce to conserve angular momentum and centripetal force [4], forming elementary particles. Thus, matter is condensed space, held in place by angular momentum. Because the universe is continually expanding, and its angular momentum is constantly increasing, new particles of matter must continually be created, and all particles must continually accrete energy; this ongoing accretion of the quanta of space is gravity [4].

Following the concept of the vortex nature of space, and that elementary particles are composed of collapsed and consolidated vortices, this paper presents a conceptual model for the structure of elementary particles. The model explains how fractional charges may occur and gives a simple explanation of matter and antimatter. We find that in combining the elementary particles to model a proton, that contrary to common thinking, the proton's charge of plus one is actually a net charge of plus one, and that hidden within the proton's structure is a full negative charge. It is proposed that this is the reason that the electron does not get pulled into the proton. Additionally the model suggests that low kinetic energy neutrinos are created in the same manner that other particles such as electrons and quarks are created. These 'condensation neutrinos' would bear the same rest mass and charge as the high kinetic energy neutrinos emitted by nuclear collisions and decay, but would have little to no kinetic energy. It is proposed that the condensation neutrinos is dark matter particle.

## 1. The Rationale for the Model

Hyperverses theory postulates that the universe is the surface volume of a hollow, spinning, four dimensional sphere, and that the surface is composed of energy. This energy is represented as vortices, or spinning four dimensional spheres. We will primarily consider two spin orientations, relative to the center of a particle.

In Figure 1, we see the use of the right hand rule applied to the earth, with the thumb of a right hand pointing north, and the curl of the fingers pointing in the direction of spin.

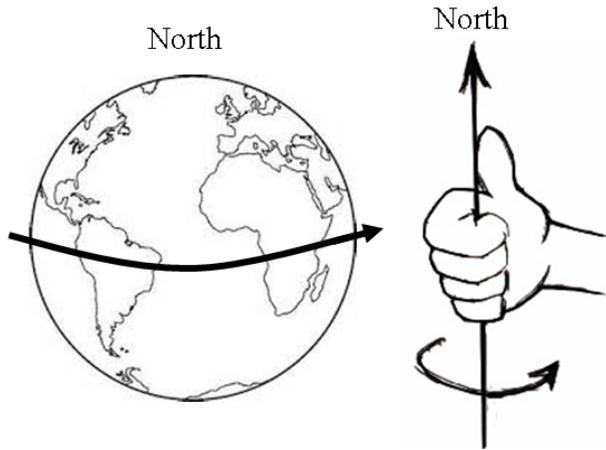


Figure 1. In our discussions, the thumb of the right hand will be defined as pointing 'north' as shown here, and the fingers point in the direction of spin.

In Figure 2, we see the two spin orientations that we will discuss. The black line represents the 'point' of reference, which is defined as the center of the matter particle. In Figure 2, left, we have north facing towards the center; in the right diagram, north faces away from the center. For easy scripting of the orientations, we will use the letters 'u' and 'n'. The open end of each alphabetic symbol points south, and the closed end points north.

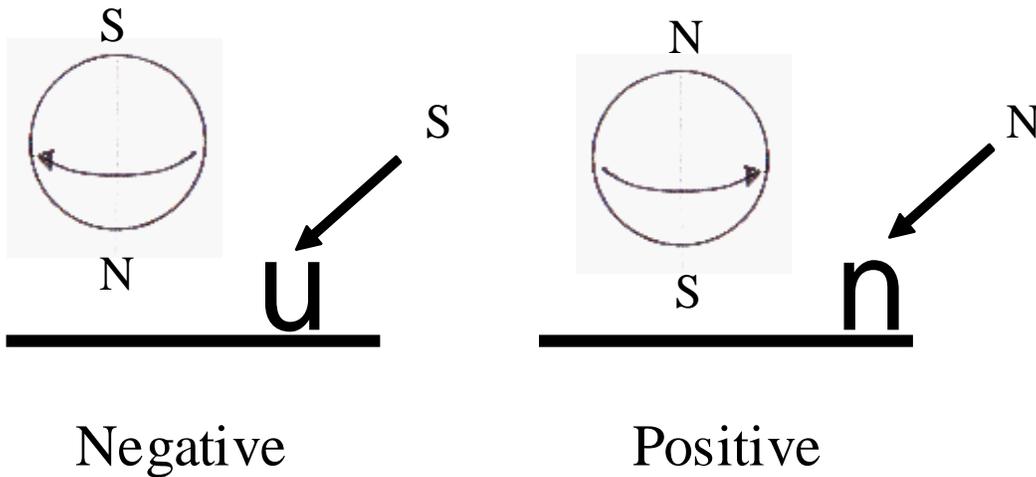


Figure 2. Using the right hand rule and orientation of spin to the black line beneath each example, the left side shows what we will define as a negative charge, and the right side is the positive charge orientation. For shorthand notation, the letter 'u' is defined as negative and the 'n' is positive.

## 2. Exposed Spin Orientations Determine Repulsion or Attraction

Given two particles, each bearing a vortex in identical orientation with respect to its particle's center, as in Figure 3, we see that the exposed spins offer opposite, or opposing, spins to one another and would repel upon contact.

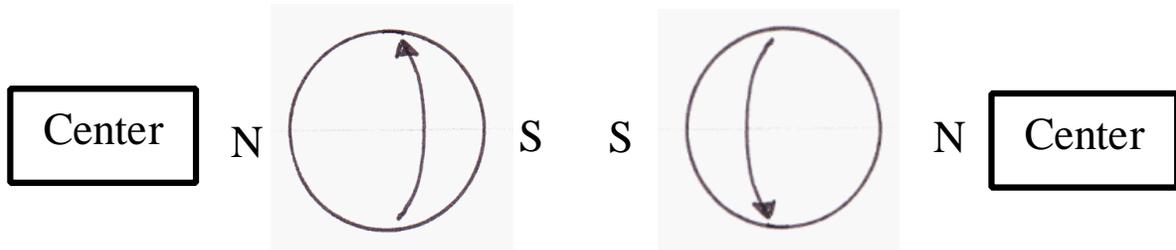


Figure 3. Repulsion will occur when the same poles are presented to each other. The spin directions are opposite, cannot mesh, and would repel. "Center" refers to the center of the particle.

If two particles were near one another, and one had a south pole exposed, and the other a north pole exposed, the spins of the two vortices would be complementary, allowing easy union, and would be considered as electrically attractive, as shown in Figure 4.

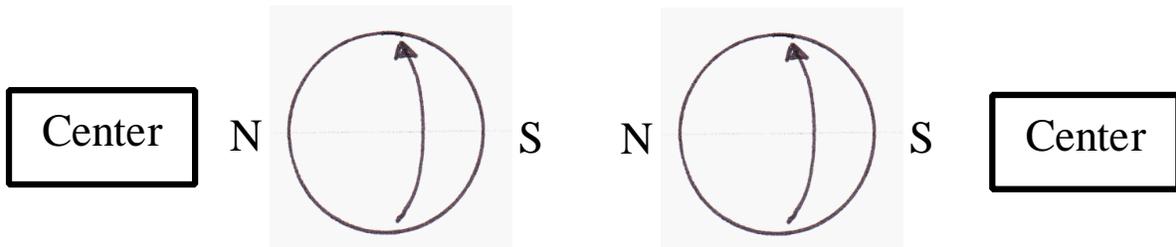


Figure 4. Attraction and binding can occur because opposite poles present complementary spin directions. The spinning atoms of space have meshing spin orientations. 'Center' refers to the center of the particle to which the vortex is part of.

## 3. Modeling Elementary Particles and Their Antiparticles Using Vortices

We can model the electrical charges of quarks and leptons using spinning atoms of space, building around the particle centers, using the n and u notation. We will use the convention that if the north pole of the atom of space faces away from the center of attraction then it will be represented as an 'n', and is considered to be 'positive'. If the south pole is oriented away from the center of attraction, then it will be represented with a 'u' and defined as 'negative'.

We will conjecture that a particle has six sides, each side bearing a vortex. There can be any combination of positive and negative vortex orientations among the six component vortices.

Doing this gives us seven combinations, running from six negatives (row 1) to six positives (row 7), as shown in Table 1. In column three, titled 'configuration', note we have underlined the pairs of opposing orientations to make it easier to see the cancelling pairings at a glance. In column four we have assigned a charge to each particle and given the name of particle that the vortex configuration is thought to represent. The pairings cancel out, leaving a net charge for the particle.

row	short-hand configuration	configuration	charge	possible particle
1	6u	<i>uuuuuu</i>	-1	electron
2	5u1n	<i>uuuu<u>un</u></i>	$-\frac{2}{3}$	anti-up quark
3	4u2n	<i>uuuu<u>nn</u></i>	$-\frac{1}{3}$	down quark
4	3u3n	<i><u>uunnn</u></i>	0	neutrino
5	2u4n	<i><u>unnnnn</u></i>	$+\frac{1}{3}$	anti-down quark
6	1u5n	<i><u>unnnnnn</u></i>	$+\frac{2}{3}$	up quark
7	6n	<i>nnnnnnn</i>	+1	positron

Table 1. Spin orientation configurations and their associated particles. The underlined portions of the configuration column represent cancelling pairs of spin or charge.

The electron, row one, consists of six vortices, all with their south, or negative, ends exposed. There is no internal cancelling, and the electric charge is minus one.

If one of the six sides of the particle had a vortex oriented so that one positive side was exposed, we would have a 5u1n configuration. Two of the six sides would be opposite to one another, cancelling each other, leaving us with a net charge of minus two-thirds. We define this as the anti-up quark.

The 4u2n configuration, row three, has a net charge of one-third, and this configuration represents the down quark. If one half of the six vortices were in a positive orientation, and one-half in the negative orientation, the spins would completely cancel, and we would have a neutral charge, matching a neutrino's charge. Four positive orientations and two negative leave us with a net positive charge of one-third, row five. The up quark, row six, has one negative orientation and five positive. Finally, row seven shows that the positron is a combination of six positive orientations. We see that all of the charge combinations of elementary particles can be modeled with this vortex configuration system

The system explains, very simply, particles and their antiparticles. The electron's antiparticle is the positron, row 7, which is the reverse configuration seen in the electron. The

same applies to the anti-up and up quarks, and the down and anti-down. The neutrino, row four, is its own antiparticle. All of the particles and their antiparticles are accounted for using this model.

As discussed in [4], matter is condensed space, and the vortices retain their vortex behavior upon their collapse and coalescence into particles. The electric nature of particles is determined by the configuration of the spin orientations of the component quanta. Fractional charges are net charges.

#### 4. Particle-Antiparticle Pairings and Annihilation

Combining a particle and its antiparticle allows binding of each quantum of one particle to a corresponding quantum on the other. For example, an electron and a positron have complementary spin pairings for all six of each particle's quanta, as shown in Figure 7. When an electron and a positron meet, they typically combine and annihilate one another. With this model, we can see that there is no opposing spin orientation to stop this attraction; the quanta can be pulled together without hindrance. The same complimentary pairings would occur for all particles and their antiparticles.

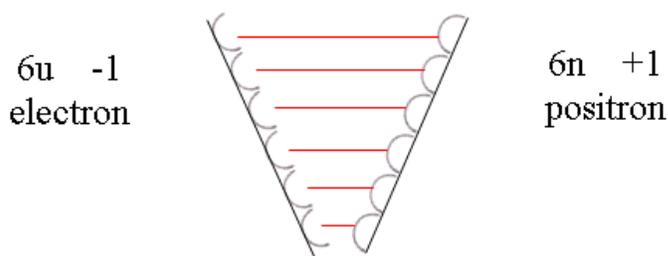


Figure 7. This diagram shows the component quanta laid out in a row for easy viewing. Each of the six quanta of the electron is matched by a complementary spin orientation of the positron. The two particles would pull together.

#### 5. Modeling Neutrons

A neutron consists of three quarks: down, down and up. The charges are  $-1/3$ ,  $-1/3$ ,  $+2/3$ . Adding the three charges gives a total charge of zero. Using our modeling system, the quark configurations are  $uuuunn$ ,  $uuuunn$ ,  $nnnnnu$ , or  $4u2n$ ,  $4u2n$  and  $1u5n$ . The total is  $9u9n$ . The triangle diagram of Figure 8 shows a possible one-to-one binding within a neutron. The sides represent quarks and the lines between the n's and u's show possible

pairings. In the neutron all component quanta are paired up, leaving no unbound electric charge. Also, no pairs of quarks within the neutron (or proton) are fully bound as occurs in particle-antiparticle pairings. In each pairing of quarks within the neutron, opposing quanta provide repulsion, and stop an annihilation event.

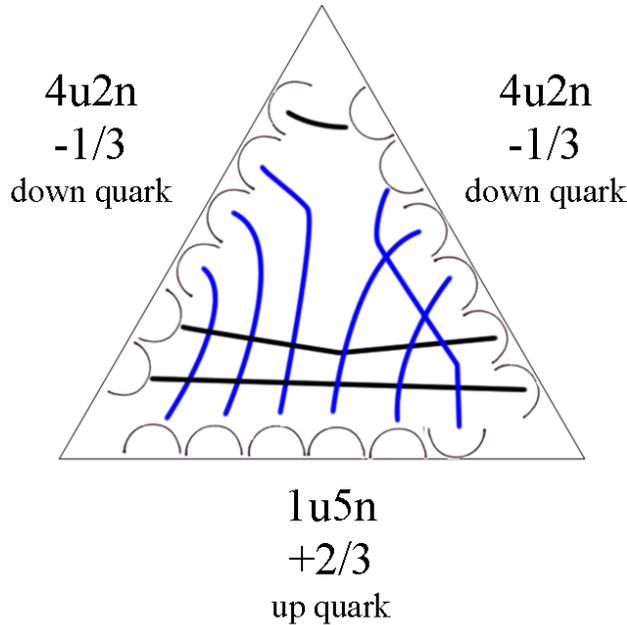


Figure 8. This triangle diagram for a neutron shows how the component quanta of the three quarks might interact. All three quarks are equally linked and no net charge remains.

## 6. Modeling Protons

A proton consists of three quarks: up, up and down. The charges are  $+2/3$ ,  $+2/3$ ,  $-1/3$ , giving a net charge of  $+1$ . The 'nu' quark orientations are nnnnuu, nnnnuu, uuuunn, or  $1u5n$ ,  $1u5n$  and  $4u2n$ , for a total of  $6u12n$ . There is a net excess of  $6n$ , exactly what is needed to bind to the  $6u$  of the electron.

Figure 9 shows a triangle representation. The lines show a possible binding arrangement between the component quarks. The dots highlight the six unpaired space atoms, leaving a net charge of plus one.

As with the neutron, there are no pairs of quarks within the proton that can pull together and annihilate; all pairings have both repellent and attractive interactions.

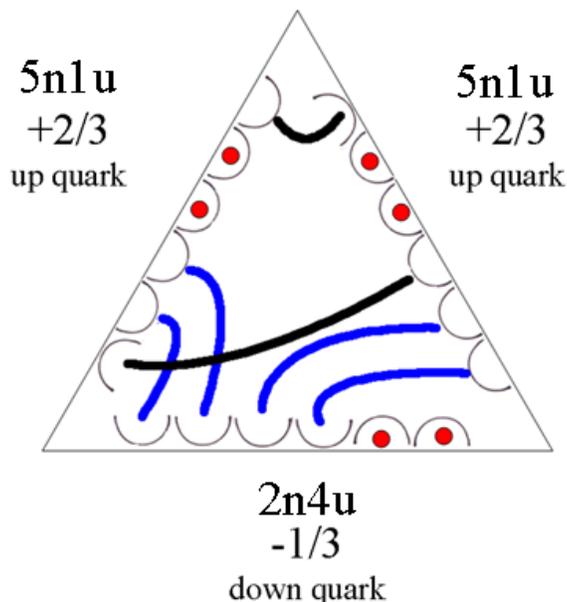


Figure 9. A triangle diagram for the proton. Each side represents a quark and the associated quantum linkages. Binding between the three quarks leaves a net of six positively oriented quanta, marked with dots, available for binding to an electron.

## 7. The Proton Carries Negative Charge

The proton, consisting of three quarks, has a total configuration of  $6u12n$ , giving six free, unbound, positively oriented quanta of space, a perfect complement to the electron's six negatively exposed quanta. The electron is held to the proton by six positively oriented quanta.

But also within the proton are those six negatively oriented quanta of space. Here we can deduce another property for the model. If we assume the bindings between all the particles are not firm, but have a more diffuse, flux-like or mobile nature, we can use the  $6u$  of the interior paired quanta of the proton, which help hold the three quarks together, to also serve as agents of repulsion against the electron. If the electron comes in too close to the proton, the six negatively oriented quanta will repel it and keep it away.

Thus the proton possesses both negative and positive charges. The  $6u12n$  structure gives us six negative and twelve positive elements. Internal binding of the  $6u$  and  $6n$  leaves a net of six positive elements free to bind to the electron's six free negatively oriented quanta. Due to the presumed flux character of the quantum spin connections, the six negative elements are still available to repel the electron if it gets too close. The electron is pulled by twelve

units and repelled by six units.

This is quite different from the standard thinking of the proton as only possessing positive charge, with no negative component. Our model provides for simultaneous attractive and repulsive charges within the proton, making it simpler to explain why the electron, although attracted to the proton, does not get pulled all the way into the nucleus. The electron cannot be pulled all the way in because of the existence of negative charge within the proton. Coexisting positive and negative charges both attract and repel the electron, and although attraction exceeds repulsion by two to one, repulsive charges are present and prevent collapse of the electron into the proton.

Standard explanations for why the electron does not fall into the proton, despite the opposite and highly attractive charges, usually revert to arguments regarding the violation of the Heisenberg uncertainty principle, and are fuzzy, complicated, and not intuitive. Simultaneous attraction and repulsion makes understanding this intuitive and much easier to understand.

## 8. The 'Condensation' Neutrino as the Dark Matter Particle

The theory of matter described in [4] implies particles of matter are created to conserve angular momentum and centripetal force, the particles essentially condensing from space. Upon collapse and particle formation, the orientation of the quanta, relative to the particle centers, is probably, mostly, random, and thus all the types of particles are presumed to be created by way of the condensation route.

Neutrinos are produced by nuclear decay, or collisions, and they move at nearly the speed of light. The condensation route implies that particles are created possessing little to no kinetic energy, which is quite in contrast to the speedy neutrinos emitted during nuclear decay or collisions. This suggests that there may be two types of neutrinos, based on how they are created.

Particle creation, by way of condensation, implies there is a 'condensation' neutrino, formed by the universe, just as it creates quarks and electrons, to conserve angular momentum. Nuclear decay and collision events create what we can refer to as an 'emission' neutrino, a high speed, high kinetic energy neutrino. Condensation neutrinos would be identical to emission neutrinos, except for their very low kinetic energy.

Thus we have two ways to create neutrinos: by emission and by condensation. This gives us a 'new' particle, essentially a neutral quark, our condensation neutrino, which would

serve very well as the dark matter particle. The condensation neutrino would be electrically neutral and therefore rarely interacting with matter. Its energy would be very low, and combined with its electrically neutral state, would make detection very difficult. Given that the antineutrino and the neutrino would be statistically the most commonly produced particle in Table 1, and, vastly more significant, that annihilation of these neutral particles would be much rarer than for the other particles, we can assume that condensation neutrinos are the most numerous of the elementary particles.

The model suggests that the condensation neutrino is the dark matter particle. It would be electrically neutral and therefore 'dark', and due to its near lack of kinetic energy, would be held by the gravitational forces of galaxies. It is the only particle in the model not yet shown to exist.

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