

The Mystery of the Continuum

According to Einstein, space-time bends, warps, stretches, creates waves and becomes a rigid wall to stop a massive particle that tries to travel at the speed of light. But Einstein forgot to tell us why.

My great discovery, after years of thinking, was that space-time must be filled with something, to justify its strange behavior, and this something must be a continuous substance that fills it up without leaving any empty space.

How is it possible to fill completely space-time without leaving any voids?

Well it is impossible, unless space-time is made of “logons” of zero size and zero mass. The “logons” are my great discovery.

Because the “logons” have no size, I reasoned that the distance between all the “logons” was zero in the beginning, (bereshit) before creation, when there existed only the One, i.e. God, and the future Universe was concentrated in one very small singularity, born from the Substance of God. Space-time surrounding the singularity was then probably a super-fluid substance, an undifferentiated entity made of “logons”. This is what I thought.

I went further with my thinking and I supposed that during Big Bang, the space-time within the singularity consisted of an infinite number of “logons” possessing potential energy that became quantized to allow mass to be created from the kinetic energy according to the laws of physics. In fact, with his famous equation Einstein proposed the equivalence of energy E and mass m dependent on the speed of light c and described by the famous equation:

$$E = mc^2$$

And light after all is an electromagnetic radiation made of photons. Moreover in 1900, Max Planck wrote an equation to show the relationship between energy and frequency of electromagnetic radiation :

$$E = hf$$

where E is the energy of a bit of light called a **quantum**. A quantum is the smallest bit of electromagnetic radiation that can be emitted. It is also called a **photon** of light or a small “packet” of electromagnetic radiation. The “ h ” in the above equation is a very small constant called “Planck’s constant” (6.626068×10^{-34} J s) and “ f ” is the frequency of the radiation. In the above equation, as the frequency of radiation increases, its energy increases by the increment “ h ”. In other words, energy was not continuous, it was **quantized** .

After the first few seconds following the Big Bang the space-time of the baby Universe became quantized and the distance between the quantized logons became "h" to allow the creation of all the mass of the Universe from the huge energy produced, but soon after creation space-time became again the continuous transparent immaterial super- fluid made of "logons " that existed before.

To support my view here is the astonishing commentary by Nahmanides on the creation of the world, written 800 years ago:

*"...At the briefest instant following creation all the matter of the universe was concentrated in a very small place, no larger than a grain of mustard. The matter at this time was very thin, **so intangible, that it did not have real substance.** It did have, however, a potential to gain substance and form and to become tangible matter. From the initial concentration of this intangible substance in its minute location, the substance expanded, expanding the universe as it did so. **As the expansion progressed, a change in the substance occurred. This initially thin non-corporeal substance took on the tangible aspects of matter as we know it.** From this initial act of creation, from this ethereally thin **pseudo-substance**, everything that has existed, or will ever exist, was, is, and will be formed"*

It was however the Cabalist Isaac Luria that in the sixteenth century completed the picture by speculating that in order to accommodate the world, a gap was opened in the substance of God, but added that by mistake a piece of God's holy substance was left behind, escaped and stayed behind into the world. This is the Shekhinah, the Holy presence of God in the Universe.

Based on the above revelations of these two illustrious Cabalists, I have tried to fit their inspired theories with what I know of the Big Bang, to derive a plausible picture of the Creation of the Universe starting from the Substance of God.

The model that I have used is the atomic structure of Diamond, the transparent crystalline form of tetrahedra of Carbon atoms created under conditions of extreme high pressure and high temperature in Kimberlite volcanic pipes. Similar conditions of high temperature and high pressure must have existed in the gap of the Substance of God that later became the Universe.

In accordance with Nahmanides' description of the *very thin, intangible matter* I suppose that the Substance of God consisting of "logons" (atoms of space-time) was utilized to build the Universe. The structure of the logons was an undifferentiated continuum leaving no gaps, but for a few seconds after creation, the distance

between the logons became “h”, the constant of Planck, as space-time became quantized to create the Universe. The process of quantization presupposes that the distance between the logons, that was zero before the creation, became “h” soon after the Big Bang, causing a tremendous expansion of the original ***grain of mustard*** of Nahmanides. As the logons separated they released their inertial energy and due to the high temperatures and high energies generated, the continuous structure of the logons broke up. For a split second after creation it is possible that the original logons involved in the explosion were transformed into tachyons, travelling at near infinite speed in absence of Time, due to the infinite density of the original singularity that caused Time to stop. The tachyons expanded the original gap and probably created the dark energy and mass that fills 90% of the Universe. Very little is known about the dark energy and mass created by the inflationary phase of the few instant following Big Bang. It is possible that due to the extremely high energy of the particles involved, most of the early energy and mass created were gamma-rays and x-rays, that don't generate any light. According to the prophetic description of Nahmanides, ***“this initially thin non-corporeal substance took on the tangible aspects of matter as we know it”***, therefore probably a few, maybe 10% of these early tachyons, as soon as Time was introduced in the Gap, slowed down to become very energetic photons and gamma rays that quickly were transformed into quarks. The remaining 90% was dispersed in space to form what is known as dark energy and dark mass of which very little is known.

Gravitational mass

Like the photons, the logons are bosons and they can gather in large amounts filling all the available space. During Big Bang 10 % of the compact Substance made of logons that filled all the space available near the center of the gap, were transformed first into energetic photons and finally into a discrete quantized grid of fermions (quarks) separated by the distance “h”.

During the first instants of the creation the distance between the quantized logons (quantized logons = energetic photons = quarks) was probably the same in every direction of space, therefore a tetrahedral arrangement is supposed, like in the packing of oranges, cannon balls or marbles. As shown by experiments with marbles, when randomly packed on a flat surface, they will preferentially form sheets of equilateral triangles, with an hexagonal symmetry.

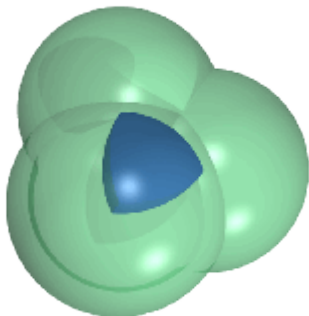
If we go from the world of marbles to that of “quantized logons”, which kind of packing would the quantized logons of a given portion of space-time prefer?



If the quantized logons placed on a flat surface (like the plane of the present of the Big Bang) are identical and are bound together mainly by inertial/gravity forces, which are completely non-directional, they will favor a structure in which as many

quantized logons can be in direct contact as possible. This will, of course, be the hexagonal arrangement of equilateral triangles, as shown in this picture. (Hereafter for brevity the word logons will be used to mean naturally quantized logons or quarks.) If a second sheet is added on top of the first, regular Tetrahedra will be formed by the juxtapositions of the two sheets, because this is the packing that most naturally fills the space available. If the logons are tightly packed in a three-dimensional space, they will be arranged as regular tetrahedra.

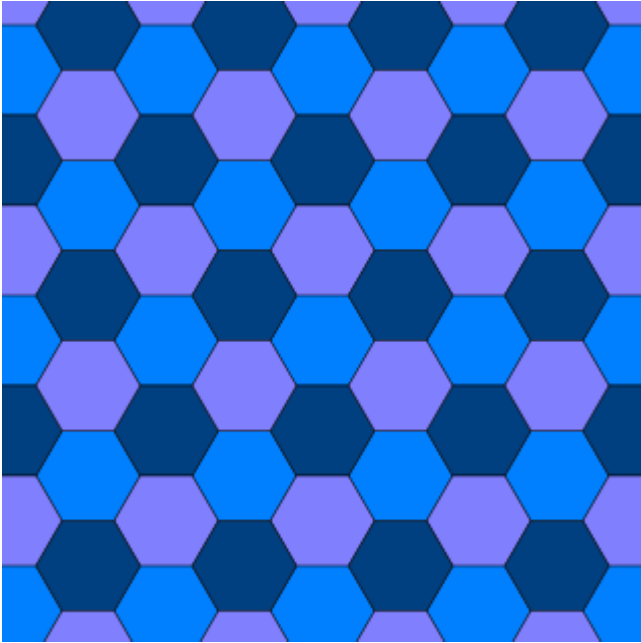
In the Talmud of Scicli, that can be download from my blog: [massimomelliblog](http://massimomelliblog.com), I discussed the Reuleaux tetrahedron, formed by four spheres of probability, whose centers are located on the surface of the other three spheres forming, between their four centers, a regular tetrahedron on whose tops could be located the logons. In my mind this is the demonstration that the Tetragrammaton, the Holy name of God revealed in the Bible, symbolizes a Tetrahedron of space-time. Below is a Reuleaux tetrahedron at the center of which is located a tetrahedron.



Hexagonal honeycomb lattice

Now let us study some peculiarities of the hexagonal symmetry caused by the tessellation of the plane with equilateral triangles fitting each other in every directions of the plane (for example the plane could be the plane of the present of the event “creation of the Universe”).

Each hexagon is made by six equilateral triangles converging on its center as shown below:



This is an hexagonal honeycomb lattice, which can be used to explain the characteristics of this particular symmetry, but in the case of logons, quarks and atoms, a circular shape would probably be more appropriate (see the chapter dealing with equilateral triangles lattice).

If one takes any hexagon, for example a dark blue one, one will see that it is completely surrounded by six lighter hexagons, with their sides touching the six sides of the dark blue hexagon, and leaving no gaps on the plane. This is called tessellation of the plane with regular hexagons.

The first thing to observe is that every hexagon touches six different hexagons and therefore shares $1/6$ of its total circumference with each neighbor. Moreover each hexagon is surrounded by six hexagons, sharing each $1/6$ of their circumference with it. Now notice that each hexagon belongs to a central vertical column made by hexagons sitting on top of each other. This column to its left and right touches two vertical columns parallel to it and to each other. Moreover each hexagon is the point of convergence of three lines of hexagons, two diagonal and one vertical, filling up all space available and forming angles of 60 degrees between them. So each hexagon is shared $1/3, 1/3, 1/3$ by each line of hexagons.

Any hexagon shares $4/6$ ($2/3$) of its circumference with the 4 hexagons of the diagonal columns on its right ($1/3$) and left ($1/3$), making a total of $2/3$ and shares $2/6$ ($1/3$) of its circumference with the two hexagons sitting on the vertical column, above and below it. It follows that $1/3$ is a characteristic number of this type of symmetry. If we imagine that the central column rotates clockwise, the two

adjacent columns , parallel to it will be dragged counterclockwise and rotate in the opposite direction. You can try with three round pencils on a table. Rotate the central pencil clockwise and the other two will rotate counterclockwise. This is precisely what we wanted to demonstrate, i. e. that these adjacent columns, when tightly packed together on a flat surface, must rotate in opposite directions.

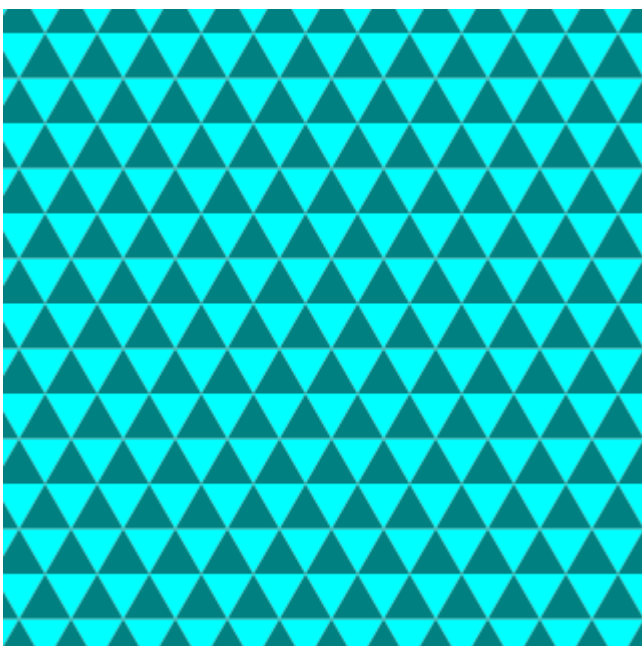
Everything was created from logons

Since I have introduced the concept of logon as the atom of space-time, forming the substance of God, the next step is the demonstration that everything was created starting from kinetic and quantized logons of the substance of God. I want, first of all, to demonstrate that a tetrahedron of logons was probably be mould and the basic structure and symmetry on which the neutron was formed during the first instants of the Big Bang.

Now the neutron is made by a triplet of quarks: two Down and one Up quark. The Up quarks have a $2/3$ positive charge and the Down quarks have a $1/3$ negative charge. The positive charge can be written $2 (+ 1/3e) = + 2/3e$ and the negative therefore becomes $2 (- 1/3e) = - 2/3e$ therefore the sum of the charges of the neutron consists of $4 (1/3)$, two positive and two negative and as shown below, their total is zero:

$$Q_n = 2 (+ 1/3e) + 2 (- 1/3e) = 0$$

Equilateral triangles lattice

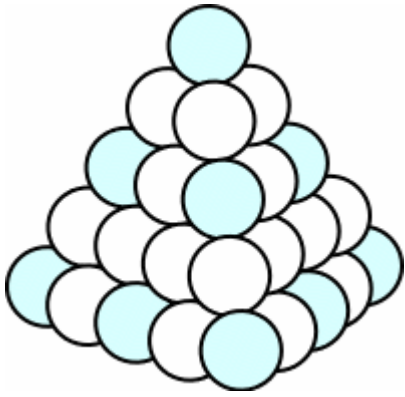


If we cut a slice of space-time at the base of the tetrahedra resting on a flat surface, like the plane of the present of the event Big Bang, the pattern above is what we probably see. Here it's even more evident the fact that the vertices of each equilateral triangle are shared by six converging triangles (to form a hexagon) and shared $1/6$ with each neighboring triangle. If we place quantized logons at the center of each six converging triangles, the logons will occupy the centers of regular hexagons and the distance between the logons will be the same in every direction (for example "h").

Here the two diagonals and the horizontal lines linking the logons, tangent to the sides of the triangles are clearly visible. Each vertical succession of black and green triangles could be considered equivalent to the needles of magnets with the black triangles pointing to the North pole and the green triangles pointing to the South pole in a step-like fashion that repeats itself every second column.

If each triangle formed by three logons contains a total amount of energy = 1 this energy will be shared $1/3, 1/3, 1/3$ by each logon. Supposing that two of these logons located on a diagonal rotate clockwise, because they are linked by a strong magnetic force, and become charged electrically positive, the other logon of the triangle will be dragged by friction forces and will rotate counterclockwise and charged negative. We need another logon charged negative to provide $1/3$ negative charge to balance the positive charge and complete the analogy with the neutron. We need therefore the logon located on the top of the tetrahedron to complete the picture. It can be demonstrated too, that this logon too will be dragged counterclockwise and charged negative.

The top of this pyramid gives an idea of "cannon balls" packing of marbles of equal size. The top of the pyramid shows very clearly a regular tetrahedron formed by four marbles and the light blue marble at the very top is what we need to complete the analogy with the neutron. The first thing to notice is that if the three logons forming the base of the tetrahedron are located on a plane, the top of the pyramid is located on a different higher plane. It follows that from one tetrahedron of logons it is geometrically possible to form a neutron, with a quark charged $+2/3e$ and two quarks charged $-1/3e$. The negatively charged quarks are different because they are located on two different planes.

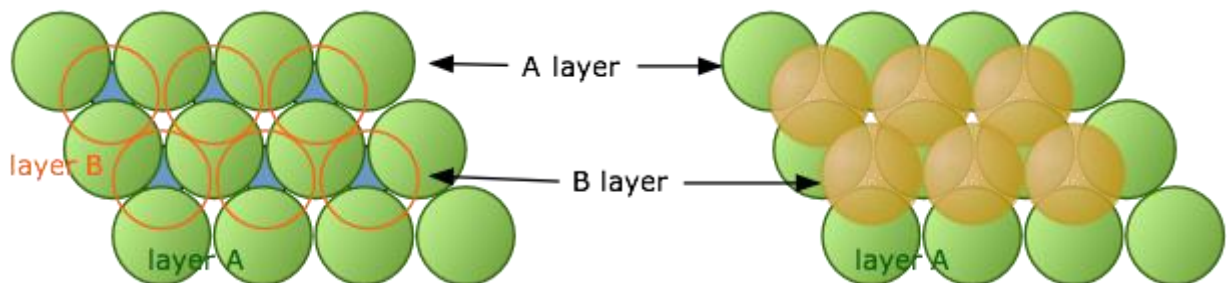


Close-packed lattices in three dimensions

I want to demonstrate now that not only a neutron, but also a proton has a structure that is compatible with the symmetry of logon tetrahedra. Two tetrahedra are needed to form a proton, but the two tetrahedra should be close packed on top of each other in a special way, compatible with an ABA hexagonal symmetry.

Close-packed lattices allow the maximum amount of interaction between logons. If these interactions are mainly attractive, then close-packing usually leads to more energetically stable structures. These lattice geometries are widely seen in metallic, atomic, and simple ionic crystals.

As we pointed out above, hexagonal packing of a single layer is more efficient than square-packing, so this is where we begin. Imagine that we start with the single layer of green logons shown below. We will call this the A layer. If we place a second layer of logons (orange) on top of the A-layer, we would expect the logons of the new layer to nestle in the hollows in the first layer. But if all the logons are identical, only some of these void spaces will be accessible.

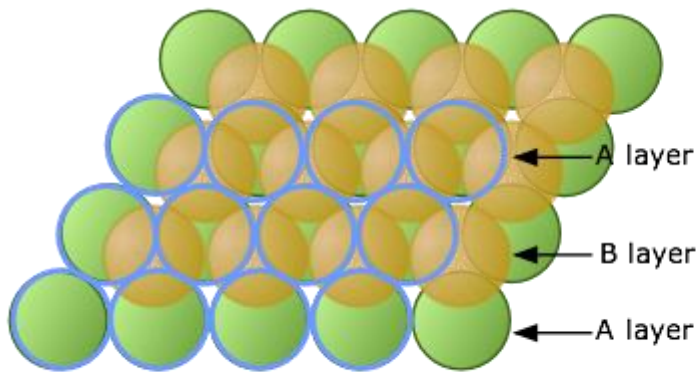


In the diagram on the left, notice that there are two classes of void spaces between the A logons; one set (colored blue) has a vertex pointing up, while the other set (not colored) has down-pointing vertices. Each void space constitutes a depression in which logons of a second layer (the B-layer) can nest. The two sets of void spaces are completely equivalent, but only one of these sets can be occupied by a second

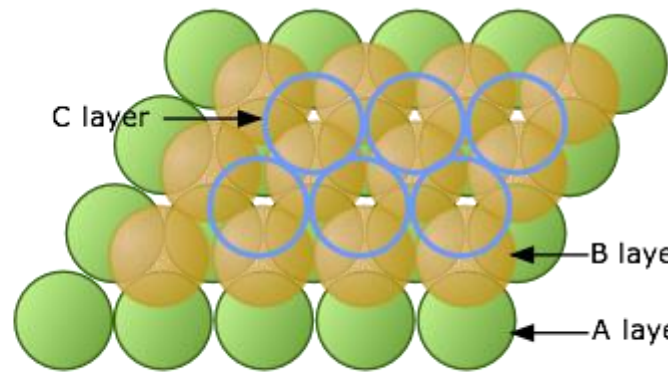
layer of logons whose size is similar to those in the bottom layer. In the illustration on the right above we have arbitrarily placed the B-layer atoms in the blue voids, but could just as well have selected the white ones. An interesting question would be: what fills the void spaces? *If it is a vacuum, it could generate the tremendous force to glue the logons together, as the force of inertia of the infinite space-time would not be balanced.*

Two choices for the third layer lead to two different close-packed lattice types

Now consider what happens when we lay down a third layer of logons. These will fit into the void spaces within the B-layer. As before, there are two sets of these positions, but unlike the case described above, they are not equivalent.



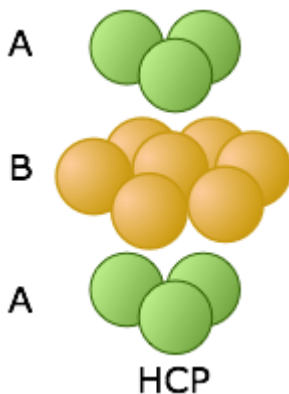
ABA hexagonal close packed



ABC face-centered cubic

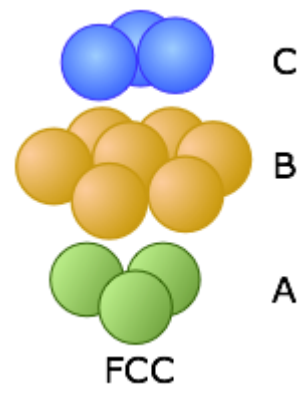
The logons in the third layer are represented by open blue circles in order to avoid obscuring the layers underneath. In the illustration on the left, this third layer is placed on the B-layer at locations that are directly above the logons of the A-layer, so our third layer is just another A layer. If we add still more layers, the vertical sequence A-B-A-B-A-B-A... repeats indefinitely.

In the diagram on the right above, the blue logons have been placed above the white (unoccupied) void spaces in layer A. Because this third layer is displaced horizontally (in our view) from layer A, we will call it layer C. As we add more layers of atoms, the sequence of layers is A-B-C-A-B-C-A-B-C..., so we call it ABC packing.



HCP

These two diagrams that show exploded views of the vertical stacking further illustrate the rather small fundamental difference between these two arrangements— but, as you will see below, they have widely divergent structural consequences. Note the opposite orientations of the A and C layers

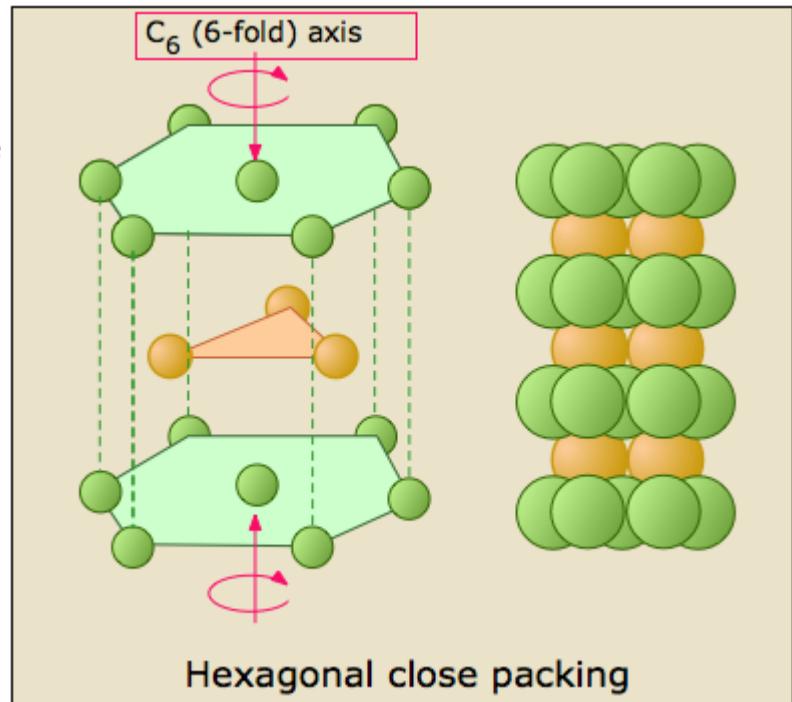


FCC

Only the Hexagonal closed-packed structure preserves the same “h” distance in every direction.

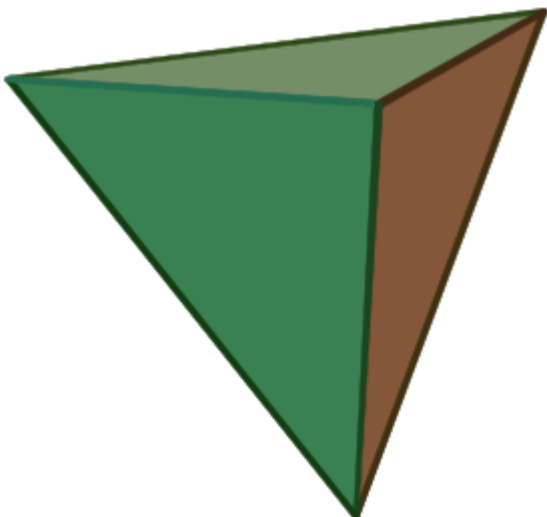
The HCP stacking shown on the left just above takes us out of the cubic crystal system into the hexagonal system, so we will not say much more about it here except to point out each logon has 12 nearest neighbors: six in its own layer, and three in each layer above and below it.

We will not consider the ABC face-centered cubic structure because it does not preserve the distance “h” in every direction of space-time.



Construction of a Proton

If we direct our attention to the diagram below showing a regular tetrahedron where four logons occupy its vertexes we will clearly see that if two logons are linked together in the NW – SE diagonal and are charged positive, the other two, charged negative are located on the axis linking the top with the NE corner.



If we add a second identical tetrahedron of top of it, respecting the hexagonal close packing symmetry ABAB, we will have the following:

2 (+ $2/3e$) up quarks with positive charges, and one down quark with negative charge ($-1/3e$), to form a proton of positive electric charge $+1e$. In addition there will be 3 ($-1/3e$) charges forming one electron of $-1e$ charge that will neutralize the positive charge of the proton.

The above describes exactly the atom of Hydrogen, the most abundant atom in the Universe and certainly the first to be created.

Conclusion

The logons are imaginary particles, described in the Talmud of Scicli as atoms of space-time filling up all the space-time available, which is infinite. They are supposed to form the substance of God from which everything was created with a Big Bang. The quantized logons form an hexagonal closed packed structure consisting of Reuleaux tetrahedra filling up all space-time and keeping an equal distance “h” between them, but leaving some small voids in the centers of their structure. These voids, presumably filled with vacuum, maybe cause the force that glues the quantized logons together. From these tetrahedra it is assumed that neutrons, protons and electrons were formed. I don't know all the details of this creation, in particular I ignore the causes of the electrical charges of quarks and electrons, I can only speculate that vacuum forces keep the quarks glued together, but I have to admit that at least the geometry seems to be right and appears compatible with the assumptions made. To conclude it takes two tetrahedra to make a proton (two up quarks and one down) ($2/3 + 2/3 - 1/3 = +1$ charge) and one electron (three down quarks), 3 ($-1/3 e$) charge that together with the proton will form an atom of Hydrogen. Only one tetrahedron is needed (two down quarks and one up) to make a neutron ($2/3 - 1/3 - 1/3 = 0$ charge).

But this conclusion, shocking as it is, does not describe the full implication of the initial conjecture. Because a logon was described as a “photon asleep” with this equation:

logon = inert photon (or logon = rest mass and rest dimensions of the photon)

it follows that an activated and quantized logon must become an energetic photon and a quark. So the conclusions are that:

active logon = energetic photon = quark

and if this assumption is correct, all the substance of the Universe is made from very energetic photons that were transformed into quarks !! This is precisely what the Bible tells us: ***then God said, “Let light be”, and there was light*** (Gen. 1, 3)

Any theory must make predictions. If what is said above proves to be valid, it will be one day discovered that the electron is made by three down quarks of $-1/3e$ charge each tightly glued together by vacuum forces.