Magnetism from iron's nuclear structure

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Abstract

In this proposed theory, the nucleus of the element iron has a shape that causes ferromagnetism. That shape also causes the stability that is the best of all elements. The protons in iron make loop shapes around the exterior of the nucleus. The loops are coaxial. The iron nucleus has a cube of protons and neutrons at its core. The faces of the cube are covered by pyramids of protons and neutrons. All ferromagnetic elements have the coaxial loop structure like Fe. No nonferrous elements have that shape, within tolerances. Most of the properties of the elements are related to the geometries of the nuclei. A new periodic table articulates the silhouettes of elements that were compared with the structure of the iron nucleus to be certain that all elements are consistent with the Pyramidal Cube Theory.

Geometric Theory of the Nucleus

The radius of the proton has been measured in the past to be about 0.9fm. This is interpreted as the radius of a spheroidal baryon. This spherical model will be used, without any quark substructure considered. Protons must touch protons. That geometric fact is easy to demonstrate for yourself. Use 57 spheres of two colors to put in a clear bag. For the common isotope Fe 57, this is 26 dark spheres and 31 light spheres to represent protons and neutrons. When the spheres are pressed together, a candidate nuclear mock-up can be produced by hand. The random locations of the protons are seen to make protons touch protons in more than half of the cases. Figure 1 shows an example of this using a corner of a box with 57 spheres in random positions. It is impossible for neutrons to insulate each proton from all 25 other protons unless a long line of spheres is formed. Even a deliberate positioning of the protons can only result in protons touching one or two protons, when trying to approximate a spherical nucleus. That must be stable. The conclusion is unavoidable: in the iron nucleus made by sphere stacking, it is required that protons touch other protons. That is a stable arrangement that can be used during the construction of this mock-up. This is a profound fact that needs to be emphasized: protons touch protons in stable nuclei. Neutrons are not needed to be positioned between protons to isolate them.

This theory proposes that the proton positions are static. The neutrons have stationary positions within a lattice called the pyramidal cube. Protons have permanent positions within a pyramidal cube of baryons. The nucleus is a placid place. When several protons form a line of protons, that is stable in the nucleus of an element. That line is accompanied by a line of neutrons in many elements. The nuclei are not random mixtures of moving spheres with a changing shape. Nuclei are made using static lines of protons in the pyramids. This arrangement is responsible for the A/Z ratio increasing with Z. It is expected from this theory that the ratio A/Z is between 3/3 and 8/3 for all elements. The heaviest element designed with this pyramidal cube theory has a A/Z ratio of 799/298, which is close to 8/3. In other words, the number of neutrons in a nucleus asymptotically approaches 1 and 2/3 the number of protons. The cube in the center of the iron nucleus has no protons at the center, as designed for Fig. 2.

Sphere Stacking Rules Used for Iron

1 A cube of baryons is designed at the center of the nucleus.
2 Protons in the cube are far from each other.
3 Outside the cube, protons tend to form lines of protons, seeded from the cube.
4 A pyramid grows to completion on each face of the cube.
5 Protons are sparse at the center of the nucleus and densely allocated near the tips of the pyramids.

Figure 1: Gray neutrons and red protons in mock-up

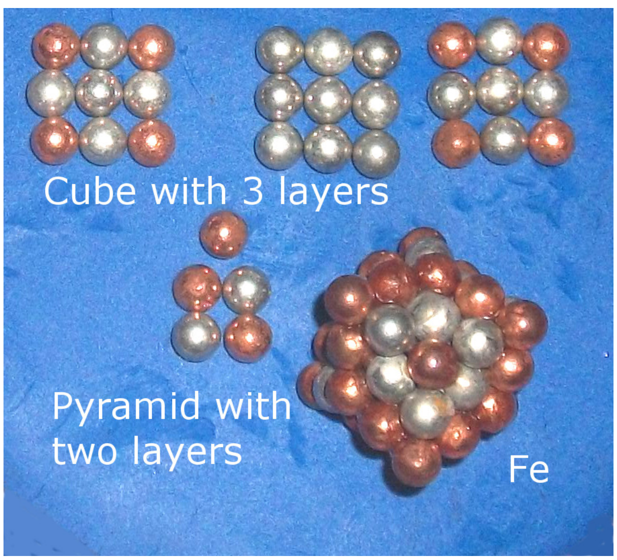

Figure 2: Articulated nucleons for the cube and pyramid

The Cube of Baryons at the Center of Each Nucleus

The iron nucleus has a central part that the author hypothesizes to be a cube. That core cube has 27 protons and neutrons. It is like a crystal lattice using a cubic stacking in Figure 3. The cube has six faces. Let K be the number of layers in the cube. A cube of protons and neutrons with a size of 3x3x3 has 27 baryons, so that is appropriate for iron 57. If a cube of 2x2x2 were used, only eight out of the 57 baryons would be accounted for. A 4x4x4 cube would have 64 baryons, exceeding the limited mass number A for Fe 57. When a nucleus is formed, baryons become nestled into the low areas between the cube spheres. The cubic lattice meets a different lattice type of the pyramid in Figure 4. This combination can be called a tetrahexahedron [4]. Another phrase for this lattice type is Face Armored Cubic.

The simple cubic structure is rare in solid elements. Polonium has that crystal lattice. More common is the face centered cubic lattice in an array of atoms. For the iron nucleus, the simple cubic core is always stablized by pyramids on the faces. This new lattice type is called face armored cubic. For the cubes of heavy elements, the protons are present near the center. There can be alternating neutrons and protons in the 3D geometric models that form a checkerboard matrix of 3x3x3 protons and neutrons.

The six pyramids must contain N baryons, with N being the difference between the atomic weight and the cube count:

N = 57 - 27 = 30 baryons outside of the cube

N baryons must be on six faces of the cube. Each face needs M baryons. Let M be the baryon count piled on each face of the cube:

M = 30/6 = 5 protons and neutrons per face of the cube

Five baryons can make a pyramid with two layers. There is a base layer with two protons and two neutrons and there is a capstone always made of a

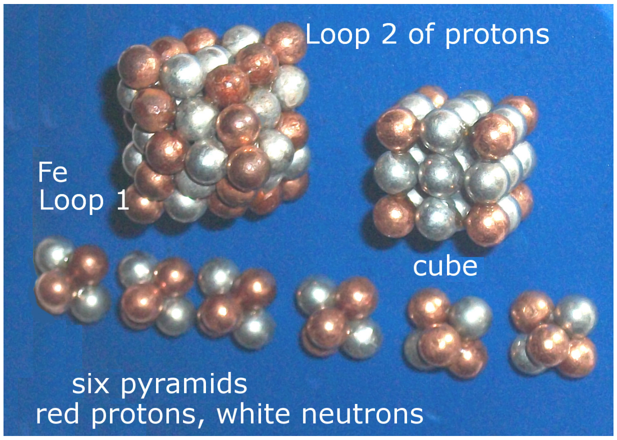

Figure 3: Protons modeled with copper bbs, neutrons zinc

proton. In figures 2 through 5 are shown the three layers of the cube for element 26: Fe 57.

Eight protons are positioned at the corners of the cube. This was a design decision meant to mimic the situation measured on common electrical apparatus, where the excess charges tend to be at the exterior surface of the matter. It is true that a cube has eight extreme points. That is why an attempted shape design was made staring with eight protons in the cube-3. The remaining eighteen protons are divided among the six pyramids. That means three protons are in a pyramid of five baryons. The protons must touch protons. A symmetric line of protons is formed in the pyramid, as a shape preferred over the alternative, non-symmetric allocation of protons next to neutrons. That alternative proton allocation is not shown. There are choices in the rotation of each pyramid as it is placed on a cube. The choice was made to line up lines of protons with other lines of protons. If a pyramid is rotated 90 degrees away from that line-up, a T shaped intersection of proton lines will exist. The choice was made to consider the T line-up to be disfavored by proton interactions, compared to the situation where a proton is placed in a line with other protons.

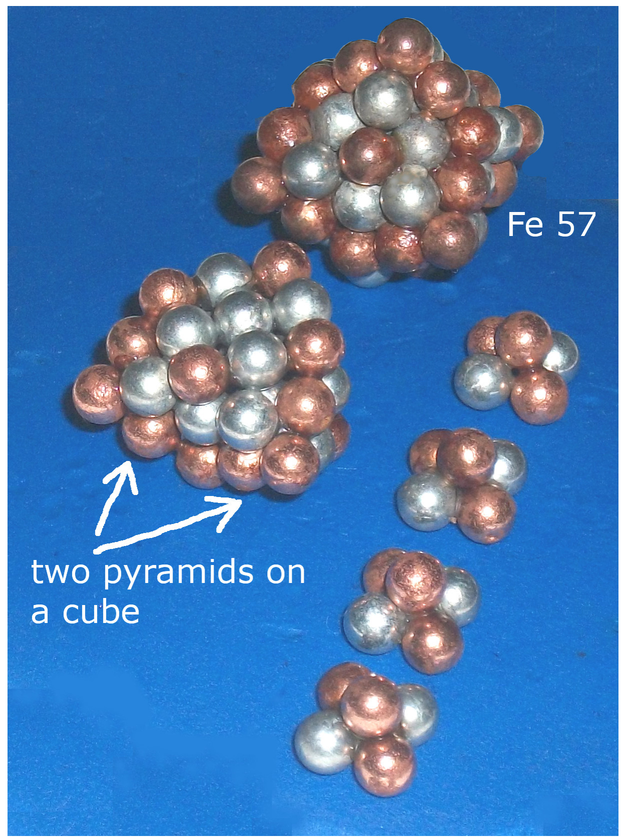

Figure 4: Dark protons, light neutrons

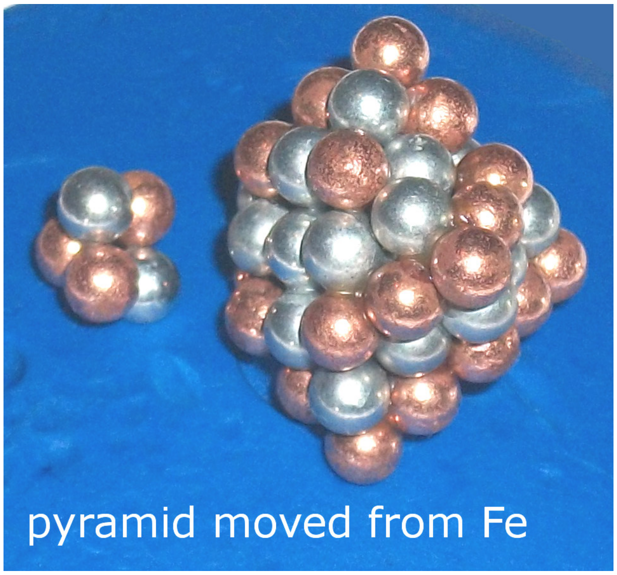

Figure 5: Five pyramids on a cube

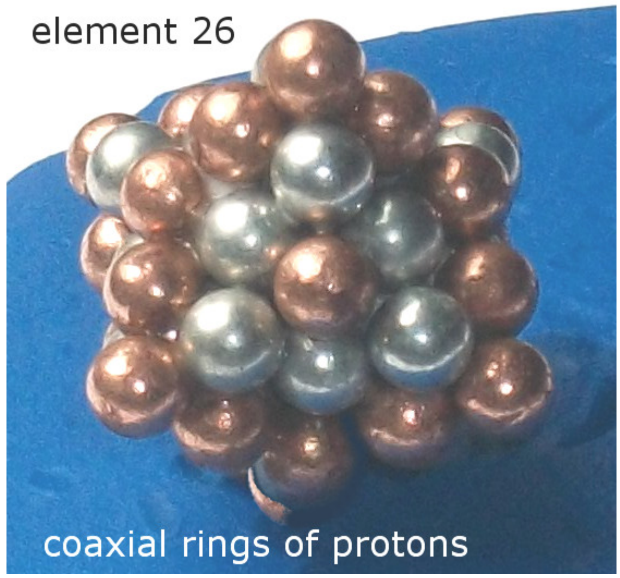

Figure 6: Dark protons, light neutrons

Iron was chosen to be the best candidate for trying to relate the element's properties to the shape of its nucleus. Iron's ferromagnetism, stability, and one other property are spectacular, compared to other elements. Iron sparks when struck and the only other element that does that is cerium. It was speculated that the shape of the iron nucleus would have some relationship with magnetic phenomena and stability. That was found to be a realistic concept of the nucleus in the geometric work that followed. The nuclear stability is due to the shape of the pyramids. Iron 56 and isotope 57 were both modeled and both are stable against nuclear decay. Iron 57 is less common, but it provides the best pyramidal cube paragon. Other exemplary elements are nitrogen and promethium, where the cube-K has six pyramids of $(K-1)$ layers. That is seen in Figure 12, the periodic table.

Rules for all elements

6 There are five linear elements where A is too small to have a cube: H, He, Li, Be, B.

7 A cube of baryons is at the center of each nucleus for elements heavier than boron.

8 Foundation Elements have only a cube and six pyramids with no protons on the exterior of that simple pyramidal cube. The 19 Foundation Elements are Carbon, N, O, Ne, P, Ar, Fe, Ge, Kr, Zr, Xe, Ce, Hf, W, Po, radon, uranium, mendelevium, and nihonium. Carbon has two faces without pyramids to armor them.

9 Incremental elements have added nucleons on the exteriors of foundation elements to fill the gaps between pyramids. There are 94 incremental elements.

10 Light elements have a sparse allocation of protons near the center and a denser allocation of protons near the tips of pyramids.

11 Heavier elements have a denser positioning of protons near the center of the nucleus than do the lighter elements. The tips are like light elements.

12 All of the side pyramids are equal. That includes proton positions in the four identical pyramids. Rotations of pyramids are not identical when nestled into the four side faces of a cube.

13 Relativistic contraction of pyramid bases occurs increasingly with heavier elements.

Pyramids on the Six Faces of the Cube

The cube at the center of a nucleus has six faces that are covered by piles of neutrons and protons. Iron has a cube with eight protons and nineteen neutrons for the 3x3x3 baryons. That is called the cube-3. See Figure 5 to see one pyramid removed from the nucleus to reveal the cube. It is proposed that all cube-3 elements come from cube-4 elements that failed to obtain pyramids on all sides. Only Technetium and three other elements have a cube-4 in their centers with six completed pyramids to armor the candidate nucleus during creation.

The pyramids are formed in two common fusion events. First, an omni-directional heat causes abundant collisions. Second, a unidirectional blast causes collisions during a week long flood of candidate fragments going at the target nucleus. That forms heavy, elongated elements and a more unbalanced top pyramid shape compared to the bottom pyramid. The heat related fusions create pyramids that have less elongation of the nucleus. Those elements are seen in a proposed periodic table in Figure 12 at the end of this paper.

The proposed theory of the creation of the elements includes the reason why technetium is so different from similarly lightweight elements. The sequence involves the triple alpha process to make the carbon cube-2 core. Then a cube-4 core is made from eight cube-2 nuclei. Any cube-4 candidate element that fails to cover its six faces with pyramids will decay into a cube-3 element. A cube-3 that encounters a lithium rich environment will make iron using six Li 5 isotope pyramids.

Observing the Geometry of the Mock-up

This theory of the shape of the iron nucleus uses geometry. That is one choice between the use of the algebraic versus geometric school of mathematics. Using the pure mathematics of geometry, a person holds the three dimensional mock-up in the hands, rotates it, looks at it from many angles. Insights are obtained by the researcher in ways that algebra does not provide. Figure 3 shows the iron nucleus from a perspective that reveals both loops of protons modeled as copper spheres. The iron geometric model was handled by the observer to evaluate any insights that are available. The two loops of protons are visible and they surprised the author when the mock-up was first assembled on May 25, 2017. If algebra is used for modeling a neon nucleus, one technique in [1] gives a probability distribution for the positions of the baryons in a nucleus of neon.

The Stability of Iron

The nucleus of iron is very stable because its shape is optimally allocated to have no vulnerable areas, compared to all other pyramidal cube shapes. Iron is stable against decay and it is difficult to fission iron or fuse it. Many shapes were predicted for the elements with known properties like Z and A, atomic number and mass number. Those shapes were compared to the shape of iron to see if any other element has a better shape for stability. The stability of iron is explained geometrically, without needing sub-particles below protons. This geometric evaluation features the gaps between the pyramid nucleons being more invulnerable to incoming matter than are elements with protruding ledges, like polonium.

The pyramids are narrower than the cube for the iron nucleus, as in Figure 4. The two layer pyramids on the three layer cube makes a clogging concept seem realistic. The baryons are draining a fluid and the gaps between spheres will be filled in with incoming spheres. This is not a geometry in which a force at the center of the nucleus pulls on the nucleons and the force passes through the spheres. The force is centered on each nucleon. The spherical nucleons block the flow of a fluid that goes around the outsides of the protons and neutrons. This makes higher time derivatives become important. Those derivatives are proposed to allow gravity become the strong nuclear force. Iron is stable because the pyramids stack with a structure that plugs the gaps between cube baryons. The cube would be vulnerable if the faces were not covered

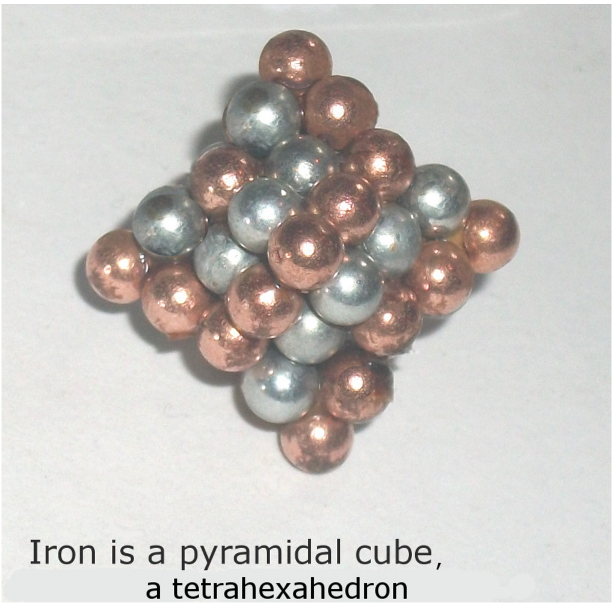

Figure 7: Fe has coaxial loops of protons

well. Cubes have gaps about four times as big as gap areas on pyramids. Gaps between spherical nucleons are where a strong nuclear force is available in this hydrodynamic model. Larger pyramids than those on iron would stack without nestling the spheres as they stack. That is less stable than nestled spheres of a pyramid. An element with a four layer pyramid would overlap the cube and that overhang would be vulnerable in a collision. The shape of iron armors the nucleus against additional fusions. All of the gaps on iron's surface are small gaps, compared to those in a cube.

Recognizing the Cause of Ferromagnetism

The shape of the iron nucleus was discovered, not designed. The author did not plan or expect two loops of protons to be in the shape of a coaxial connector. The author designed a cube to be at the core of iron's nucleus. The two loops were observed after the mock-up was assembled as in Figure 6. There are few choices that can produce a non-coaxial shape. A logical assembly of lines meeting lines is the choice that gave the insightful results. That figure helps the reader to appreciate the scale model's sculpted shape with a loop of protons in iron. This view is on the <111>crystallographic plane, relative to the cube. This is looking straight into the coaxial loop structure with a magnification of five trillion for the mock-up using 4.5mm metal bbs. The two loops were recognized using electrical engineering judgement to be the cause of ferromagnetism.

The goal of this research was initially to see if sphere stacking could explain ferromagnetism and stability. When the mock-up observations yielded surprisingly good results, a new concept of magnetism was immediately proposed. A loop of twelve protons in iron is polarizing and combining their fields to emerge from a coaxial nucleus. That is the magnetic flux that pairs with twelve distant electrons. Those electrons can be making eddy currents in a remote bar magnet. According to this proposed theory, Ampere was right: there are loops of currents in the nucleus and that can cause a looping of twelve electrons that are far from the iron magnet.

The Curie temperature can be explained by using the two loop currents going the same way or with random directions. In that theory, the electron temperature will affect the proton loop current direction. At low temperatures the two loop currents can oppose or go the same way in a nucleus. At high temperatures the two loop currents will have randomized directions due to the electron interactions with the nucleus.

The fact that iron has loops of current at a small scale was first proposed by Andre-Marie Ampere in 1820. Today, loops are common in electric devices like transformers, so it is easy to recognize the relationship between a shape and a magnetic phenomenon. In transformers, a primary loop and a secondary loop of wire provide a shape that is magnetically significant. That is true for the iron nucleus where the geometric reasoning of the pyramidal cube rules produces two loops of protons, as in Figure 7. This view is on the <100>crystallographic axis of the cube. The current is in the loop even though

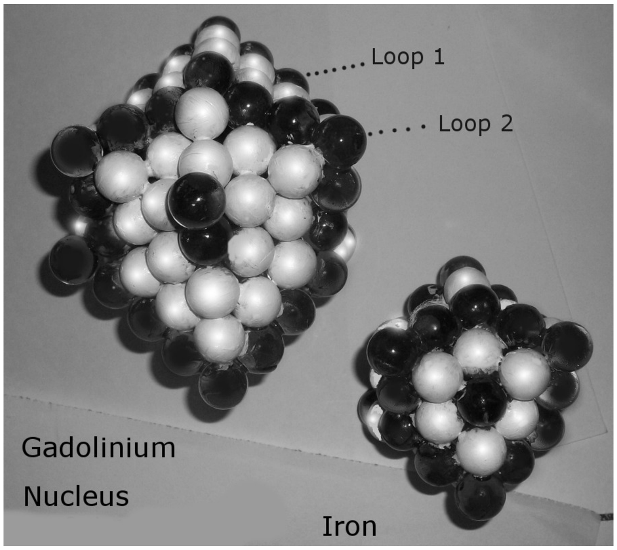

Figure 8: Coaxial shape for ferromagnetism

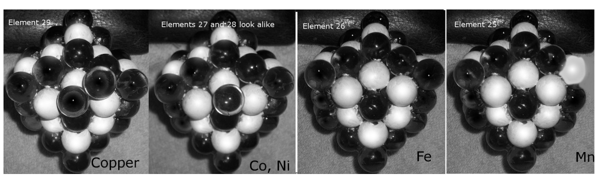

Figure 9: Nonferrous loop shapes not tolerable

the twelve protons are not moving. A dimensional flow is making a current, not a relative motion of particles. That loop creates a harmony and collective behavior of the flux which emanates from the iron nucleus. The author suggests that in a bar magnet, the primary loop of 12 protons sends its flux out through the center of the secondary loop and it goes to a remote bar magnet with electrons that are paired with protons in the first bar magnet of iron. Flux bundling allows magnetization to occur from an outside flux. Another example of magnetic effects being well known for two loops is the example of two antenna.

Tolerances for Geometric Irregularities

The elements Fe, Co, Ni, and Gd all have the two loops. Gadolinium has provided strong confirmation of this static sphere stacking theory. See Figure 8 to compare element Z=26 Fe and element Z=64 Gd. The main difference is Gd has twice as much neutron isolation between loops and Gd has eighteen protons in each loop instead of twelve. The degree of perfection of Gd is less than for Fe because the six pyramids are not all alike for Gd. The top and bottom pyramids are bigger than the side pyramids, unlike iron. At the coaxial centerline, there are some protons out of the axial line. But that misalignment is in a plane that intersects the tips of the two large pyramids. Those two imperfections seem to cancel each other to allow gadolinium to be ferromagnetic.

Iron has the perfect shape of a tetrahexahedron. Cobalt is like that but it has an extra proton near a loop in Figure 9, so cobalt is not as magnetic as iron. Manganese and copper are not ferromagnetic and the figure shows that copper has a proton that ruins the loop shape. Most elements are not ferromagnetic. To prove that the pyramidal cube theory is correct, it is necessary to evaluate all elements to find out if some elements other than Fe, Co, Ni, and Gd have the coaxial shape of two loops.

Gadolinium is an incremental element based on cerium. The elements Fe and Ce will spark when hit with a hard edge. The shape of Ce is like Fe, but the top and bottom pyramids are two layers larger.

Carbon has a 2x2x2 cube with two protons and six neutrons. Iron has a 3x3x3 cube with eight protons and nineteen neutrons. Tungsten has a 3x3x3 cube with a checkerboard pattern of protons in the neutron matrix of the cube. Fig. 10 shows the elements Tc, Hg, and Zr. Those structures were evaluated and it was discovered that none of the non-ferrous elements have the two coaxial loops of protons. Zr has two loops that are not coaxial. Tc is modeled with a checkerboard pattern visible in the model, since the cube 4x4x4 has only a 1 layer pyramid on five faces. That sparsity of protons covering the faces lets the cube be seen in its raw structure.

Confirmation using Neon, Barium, and Radon

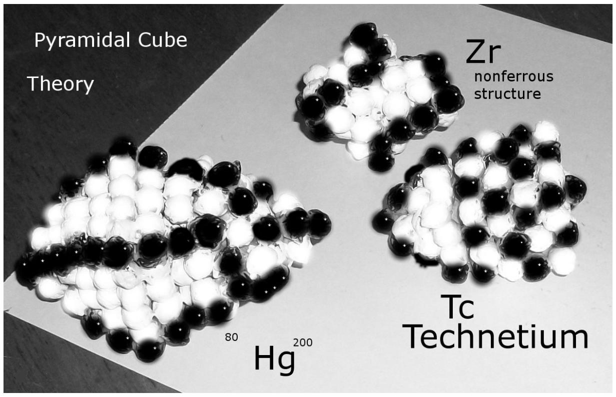

Figure 10: Pear shaped Hg near Zr and Tc

The confirmation of this geometric theory of the shape of the iron nucleus is provided using algebra and experiments of other researchers. The algebra of Schrodinger's Equation was used in [1] for neon. In that paper, a color image is provided for the silhouette of neon's probability that a nucleon is in a position. The shape of that nucleus is the same as the shape of neon in Fig, 11 where the neon mock-up is using yellow spheres for protons and gray spheres for neutrons. This shape of neon as a pyramidal cube matches the silhouette provided by other people in [1]. Experiments for barium and radon show a pear shape for those nuclei [2]. That paper gives a color image of a blurred pear shape. That shape is like in the periodic table of nuclear shapes for barium and cesium. The pear shape is also seen in Figure 10 for the mock-up of the mercury nucleus. The uranium model in Figure 11 also shows the pear shape, due to a six level pyramid at one end of the nucleus. Iron did not have reference information available in the ways neon and barium were available from independent people who showed projections of the shape of a nucleus. Iron has been expected to have an almost spherical shape. The new theory of iron's shape is confirmed due to several factors. The neon shape in [1] has the right proportions to have a cube 2x2x2 and that is indirect confirmation of iron as a pyramidal cube 3x3x3 nucleus.

Ramifications

The static nucleus theory has protons and neutrons in fixed positions for each element. This leads the way for future research on chemistry and magnetics. Chemical property predictions are realistic from this theory. The 2s orbital concept for light elements is consistent with this model because the cube-2 has 2 protons. But from iron upwards, elements could be modeled with a new 8S nomenclature attempt because the cube has 8 protons in iron. Inert gases can be supplanted as the basis for describing heavier elements. Instead, the foundation elements will provide a more articulate way to name orbitals of elements.
Paramagnetic and diamagnetic elements can be matched with the small loops seen in some elements. The cross sectional areas of these pyramidal cubes can be used to calculate the mass. A new stable element number 123, isotope 305 is proposed. It is expected to be ferromagnetic. The strong nuclear force can be understood as being made by gravity near the shapes in the nuclear sphere stacking that provide curved gaps for producing higher derivatives of time. The space sinking into the nucleus and the time growing of of it are constrained by the tightly curved radius of each nucleon. This curved spacetime is what makes the strong nuclear force out of gravity.

The pyramids on iron have three protons, like lithium. It is proposed that lithium abundance is suppressed in the Sun because iron and many elements fuse lithium to be a pyramid of Li 5.

Conclusion

Using engineering judgment, the author asserts that this theory of iron magnets is more realistic than any previous understanding of the shape of the nucleus. This certainty about iron allows inductive logic to be used to define the shapes of all 118 elements. The evidence is so abundant that it is important for scientists to someday have full confidence that this pyramidal cube theory is the correct theory for the structure of the nucleus. That confidence should be based on observing how the properties

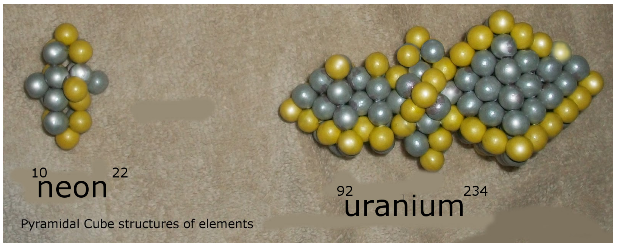

Figure 11: Neon and Uranium mock-ups

of element 26 match the geometries of its nucleus. This synthesis of the measurable forces from iron and the theoretical crystalline shapes of one nucleus has provided the geometric reasoning for expecting all elements to follow the same tendencies during the creation fusion. This sphere stacking approach is better than the algebra of Schrodinger's heirs for understanding how the shape of a nucleus brings insights into the nature of the magnetic flux from iron that is paired with remote electrons.

Acknowledgments: The author acknowledges the work of many scientists who used the mass spectrometer of Francis Aston to provide the mass numbers of all of the elements. Those facts enabled the geometric reasoning for the pyramidal cube theory of the shape of the nucleus.

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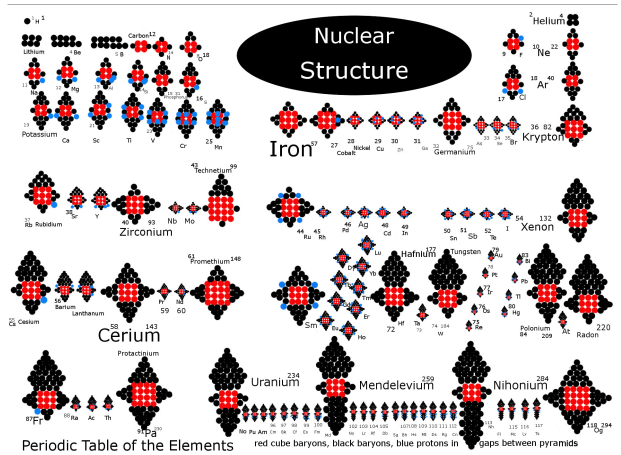

Figure 12: Periodic Table of Shapes of Nuclei