# Antiferromagnetic nucleus of Cr

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**Abstract**

The protons and neutrons in the nuclei of the elements are, in this theory, positioned in fixed locations for all common isotopes. Sphere stacking of baryons is used with both cubic and hexagonal packing. It is asserted that all elements heavier than boron have a cube of nucleons in the center of each nucleus. To provide evidence for this theory, the properties of iron and chromium are compared using their nuclear structures. Cr has two rings of protons. Geometric reasoning shows it may be possible to make a Boolean logic gate out of four atoms because of the magnetic phenomena of chromium.

**Summary**

This is a static nucleus theory in which chromium has ten protons in a ring and ten more in a second ring. Antiferromagnetism is implied by the non-coaxial positions of the rings. That is compared to the rings of protons in iron and to all elements that were articulated using the same geometric rules as were used when the Cr mock-up was assembled. It is asserted that this static theory with a simple cubic lattice is the correct theory of the nuclear structures of iron and chromium. The choice of Cr and Fe was made to relate the properties of these elements to the A and Z, the mass number and atomic number, for those elements. Chromium is the only element that is antiferromagnetic. Iron is one of four ferromagnetic elements near room temperature. That is why these two elements are featured in this article. Their nuclei have shapes that produce those properties. Other elements do not have the nuclear structures that cause ferromagnetism or antiferromagnetism at room temperature.

In this theory, the nucleus of chromium has structures that produce antiferromagnetism. This static nucleus theory uses a stacking of spherical protons and neutrons to produce a type of lattice that is called face armored cubic. A simple cube of baryons (protons and neutrons) is at the center of all elements heavier than boron. Each face of the cube is covered by a pile of baryons. That shape acts to armor the face of the cube so the cube will not be broken during a collision. That armor is usually shaped like a pyramid. The Cr nucleus is based on the Ar nucleus. Fig. 1 shows the components of argon's nucleus: a cube and six pyramids to cover the six faces. The four sides have a one-layer pyramid and the two other faces have a three-layer pyramid. The white spheres are protons and the dark spheres represent the neutrons.

Protons tend to form lines of protons in the nucleus. This is seen even in a random collection of 57 baryons for iron. The 31 neutrons and 26 protons commonly have protons touching protons. It is not possible to place neutrons to isolate protons in that model. Details were given in [1]. The proton lines sometimes form rings of ten to twenty protons around the nucleus. Chromium has two rings of 10 protons in the nucleus. The 12 proton rings in Fe are compared to the proton rings in Cr using geometric reasoning. Iron's rings are coaxial but each chromium ring has an axis which passes outside of the other ring. This reveals the cause of antiferromagnetism and ferromagnetism for nuclei. To provide certainty, all elements are compared to Cr in a periodic table of nuclear structure.

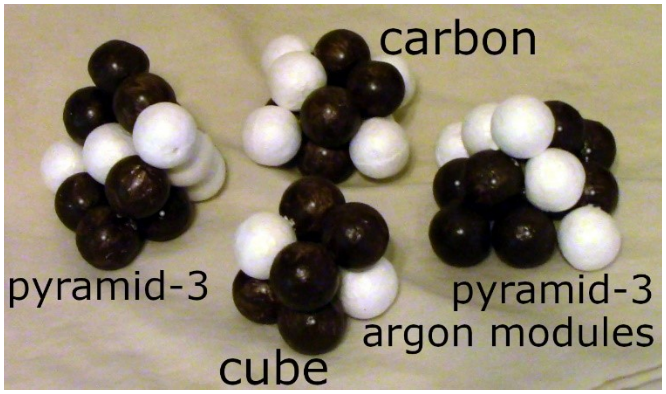


Figure 1: Argon is made from carbon and two pyramids with 3 layers, white protons

**Introduction**

Element 24 is called chromium and it has already been tested by other researchers. Some unusual properties have been reported for Cr. It is able to self-passivate its surface. A five-fold bond in dichromium was well publicized in *Science* [2]. Ten electrons are said to be involved in a Cr atom using that five-fold bond [3]. Paramagnetism is sometimes observed in chromium. Antiferromagnetism is reported for Cr. The magnetization of one atom is cancelled by a reversed direction of magnetization in the adjacent Cr atom. Large chromium blocks are not ferromagnetic, but at a small scale, an atom can produce a magnetic flux that goes to a nearby Cr atom that points the flux the other way. A line of flux is defined as a line from one proton to one remote electron. Ruby lasers use Cr. Cryogenic temperatures affect an antiferromagnetic element in a way comparable to their affects in superconductors, laser devices and ferromagnets. The giant magnetoresistance effect [4] uses a structure like in Fig. 12, with an iron layer on a chromium thin film. This paper on the nuclear structure of Cr asserts that the static allocation of baryons in the nuclei accounts for many of these phenomena. In contrast, iron is also shown with details next to chromium, with models of nuclei that are ten trillion times larger than is natural. The ferromagnetic iron is compared geometrically with the antiferromagnetic geometry of the chromium nucleus so that the reader will be convinced that this is the correct representation of reality. The static nucleus theory fits the properties of these elements well. Other elements also fit with this pyramidal cube theory well, such as technetium and uranium.

Nuclear structure has been a mystery to past researchers. Strong magnetic affects are ascribed to electrons, not to nuclei. The standard idea was that nuclei have very weak magnetic moments and the iron nucleus was negligible compared to its electrons. It was said that spins of electrons cause ferromagnetism, with little discussion of the structure of the protons being in loops. An exception is from Andre'-Marie Ampere in 1819. He said he expected those loop currents in Fe. In recent years, the structure of the Ne nucleus was calculated using Schrodinger's equation and a computer in France [5]. The shape of Ra was experimentally measured as having a pear shape [6]. The periodic table in this paper shows the same shapes in the theory as shown in images on those papers on neon, barium [7] and radium. That periodic table is in Fig. 7. This pyramidal cube theory shows why uranium decays into two products with a bimodal distribution of masses. The 27-nucleon cube goes to one fission fragment or the other fragment. That is why the two mass modes differ by 27 in mass number A. There are many such instances of evidence that support the pyramidal cube theory of the structure of the nucleus.

Nuclear structure was sometimes described in books as dynamic or chaotic, without a static placement of protons or neutrons. In [6], those authors wrote: "For certain combinations of protons and neutrons there is also the theoretical expectation that the shape of nuclei can assume octupole deformation, corresponding to reflection asymmetry or a "pear-shape" in the intrinsic frame, either dynamically (octupole vibrations) or statically (permanent octupole deformation). " Gaffney et al. In that quote, a static nucleus theory was described.

The two rings of twelve protons in Fe were discovered in May, 2017 by the author and are reported in [1]. The proposed theory of Cr and Fe uses a static nucleus theory. A fixed stacking of neutrons and protons (baryons) is proposed in this paper. No quarks are needed to describe any kind of magnetism. Proton spheres are expected to be more than 0.83fm in radius, according to standard physics. Sphere stacking has provided realistic results in the effort to describe every nucleus.

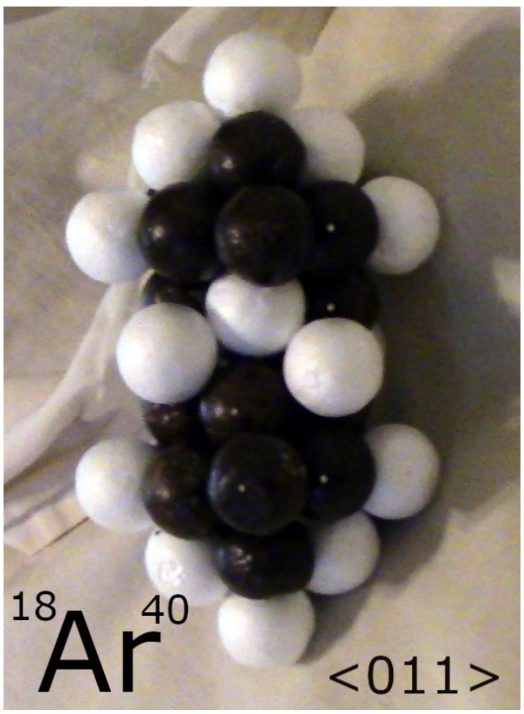


Figure 2: the argon nucleus is the foundation element supporting chromium

**The simple cubic lattice of baryons at the center of the nucleus**

All elements beyond boron have a simple cubic lattice of baryons at their cores. A cube-2 is the name given to an eight-baryon stack. This cube is used inside carbon through manganese, the cubes all have two protons and six neutrons, as shown in Fig. 1. Protons are white and neutrons are dark. Four modules are shown for sphere stacking: a cube. A carbon nucleus, and two pyramid-3 modules for argon. The cube has two layers of protons and neutrons, so the geometric module is named cube-2. That cube has two protons and six neutrons, evenly distributed so the two protons are far from each other. The carbon nucleus is a cube-2 with four protons added onto four of the six faces. The protons tend to make lines of protons as they are added one at a time to assemble Cr. First, the Ar nucleus is made as a foundation element for Cr to be produced by adding six protons and six neutrons.

carbon = cube + 4 protons

Ar = carbon + 2 pyramids

Cr = Ar + 6 protons + 6 neutrons

Those simple equations express how the mock-up was produced. Here is a more detailed version of how the chromium mock-up was assembled.

Carbon.12 = cube + 4 protons

Ar.40 = carbon + 2 pyramids

K.40 = Ar changing a neutron to proton

Ca.40 = K changing a neutron to proton

Sc.45 = Ca + 4 neutrons in deepest pits, 1 proton in line with protons

Ti.48 = Sc + 2 neutrons in deepest pits, 1 proton in line with protons

V.51 = Ti + 2 neutrons in deepest pits, 1 proton in line with protons

Cr.52 = V + 1 proton in line with protons

The added neutrons are allocated to Ar due to isotopic facts and by estimating hydrodynamic sinks in the structure of the nucleus. Deep gaps are allocated with neutrons as if gravity pulled all nucleons together. Each nucleon is treated as a sink for a liquid and nucleons fill the gaps in the stacked face armored cubic (FAC) lattice. Symmetry is maintained during allocations. Proton allocations are additionally constrained by the trend for protons to join lines of protons. As each element, from Ar with Z=18 to Cr with Z=24, is fabricated, the mock-up benefitted from the fact that the first three elements all use isotope with A=40. In the periodic table in Fig. 7, the reader can see that Ar, K, and Ca all use isotope 40, so they all have the same silhouettes.

The argon nucleus is shown in Fig. 2. This is a foundation for chromium, upon which a succession of elements will be made. The potassium mock-up has one neutron changed to a proton so A, the mass number, is 40 for potassium. Argon is seen to have carbon in the middle, with its simple cubic center. On the top and bottom faces of C, two pyramid-3 modules are placed. Each pyramid has six protons and eight neutrons. The cube in Fig. 2 is seen with the <011> crystallographic plane displayed. The pyramids are nestled onto the cube, since 3 layers fit onto 2 layers snugly.

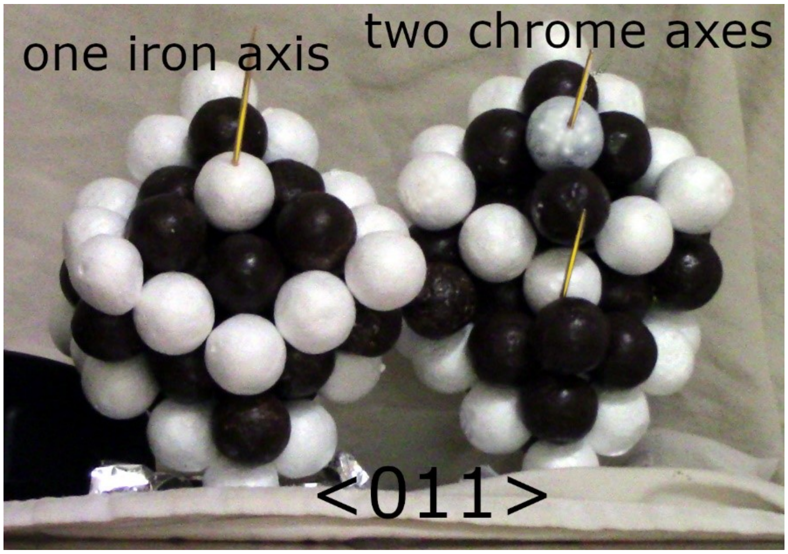


Figure 3: the six faces of each cube have armor to be stable. Fe is a pyramidal cube. So is Cr.

The completed chromium model is shown in Fig. 3, next to the iron model. The three axes are marked in yellow highlights. The top axis on Cr comes out of a ring of 10 protons. The lower axis on Cr emerges from a place outside of the top ring. It comes from the center of a hidden ring on the rear side of the Cr model. The iron model, on the left, has one axis emerging out of the center of a ring of 12 protons. That axis is also passing through a second ring of protons that is on the other side, out of sight. The two rings in Cr have a mutual area that is less than half of the area of a ring. If flux is emitted evenly from each loop, then there is simultaneously a mutual flux and two external flux bundles entering a Cr nucleus. The author considers that electrons are paired with each of these protons, and the lines of flux which make that pairing are shown in Fig. 12. Some remote electrons are paired with a subset of the Cr protons with a magnetic flux vortex. Some atomic Cr electrons are in bonds with nearby elements. Some local electrons in one Cr atom have a line of flux that passes through a vortex to a nearby proton ring and which is terminated on a remote proton. In this limited way, it is like iron as a ferromagnet. Iron has a flux from one ring passing through the second ring locally. Chromium has a flux from one ring passing through the second ring remotely. These are phenomena of antiferromagnetism at the particle level.

Five faces of the cube inside a Cr nucleus are shown in Fig. 4 and Fig. 5. Alongside Cr is the Fe nucleus so the reader can see how a ferromagnetic integer topology differs from an antiferromagnetic integer topology. Iron uses a cube-3 core with 27 baryons [1] while chromium uses a cube-2 with 8 baryons. Fig. 4 has Fe on the left and Cr on the right as the four faces are shown together, labeled front, left, rear, and right. The axis through Fe is labeled f and the two axes through Cr are labeled r and c. The Cr model has red numbers on the six protons that were placed onto the argon foundation nucleus. The number 19 is on a proton to make K and the numbers 20 through 24 are on the proton that was added to Ar to get, respectively, Ca, Sc, Ti, V, and Cr.

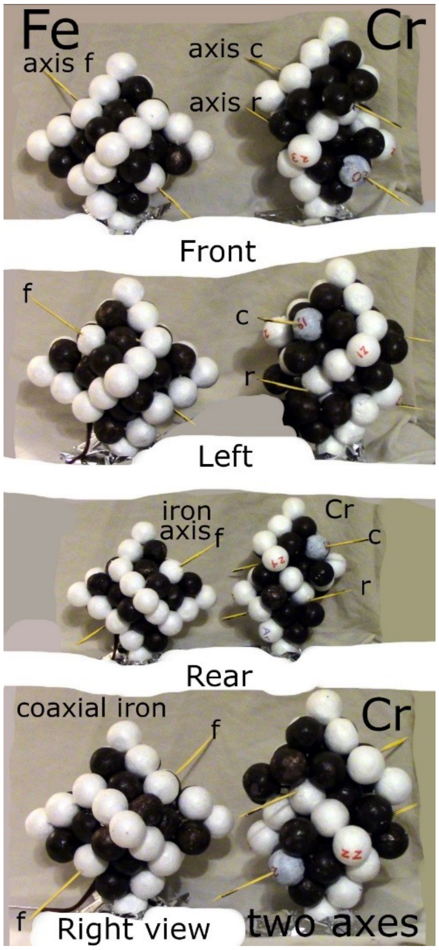


Figure 4: ferromagnet versus antiferromagnet: four views

**Six faces of the cube are armored with baryons**

The chromium nucleus has a cube with 2x2x2 baryons. That cube-2 then becomes carbon by adding four protons on four faces of the cube. Carbon then becomes argon by adding armor to the remaining two faces. A pyramid of baryons with three layers is nestled onto the two-layer cube's top face and another is on the bottom face. Protons tend to form lines of protons.

A hexagonal close pack lattice was evaluated as an alternative to the pyramidal cube theory of nuclear structure. This hexagonal lattice has disadvantages because it is finite. The lattice is terminated and a then the hexagonal close pack produces a porous exterior.  The gaps between the nucleons is as large as on a cubic lattice. The armoring on a cube produces small gaps as pyramids are stacked. In summary, a cubic core gets an outer surface of a hex lattice but a hexagonal core gets a cubic exterior. That allows the cubic core to survive and the hex core to be destroyed during nuclear collisions.

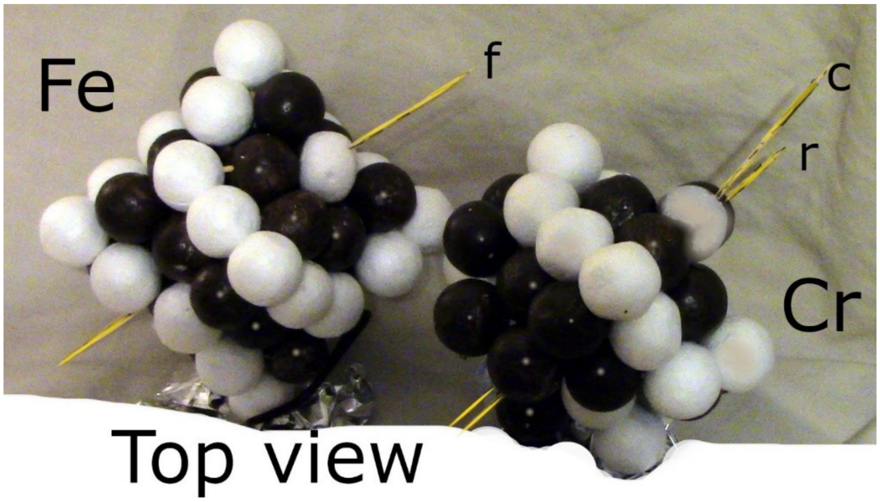


Figure 5: protons form lines of protons

**Argon is the foundation element for chromium**

There are eighteen foundation elements. They are defined as elements with:

1. a cube with pyramids of baryons on all six faces
2. with all four sides being the same
3. pyramids have up to six layers or zero for carbon
4. incremental elements are based on foundation elements (18)

The foundation elements are: C, O, Ne, P, Ar, Fe, Ge, Kr, Zr, Cd, Xe, Ce, Hf, W, Po, Rn, U, Md, Nh. Notice that all noble gasses are foundation elements. Argon is the foundation element for chromium. Six protons and six neutrons get added to Ar-40 to build the incremental element Cr-52. All elements are incremental elements, except for the foundation elements and elements lighter than carbon.

Rules for constructing an argon mock-up for later building of the mock-up of chromium:

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.

**Incremental elements building up for chromium**

The Argon foundation has 40 baryons with 18 protons and 22 neutrons. Potassium also has A=40 and calcium also has A=40. That is a clue that those three elements should use, in this evaluation, A=40. As a result, two neutrons were converted to protons. In the periodic table of nuclear structure, elements 18, 19 and 20 have the same silhouette. The element with 21 protons is scandium and its isotope has 4 more neutrons and 1 more proton than calcium-40. The mock-up was examined and the low points in the Argon pyramidal cube were treated as hydrodynamic sinks. The nucleons were place to fill the holes and to continue lines of protons. These rules are made because hydrodynamics is expected to be the most realistic phenomenon responsible for the structures of nuclei. Details about the rules are in [7] with images of mock-ups of Cu, Ni, Co, Gd, Ne, U, Hg, Zr, and Tc.


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Figure 6: iron is like a coaxial connector shape, Cr is like a parallel port

**The two rings of protons in Cr**

A sketch is provided in Fig. 8 to give a schematic simplification of the Cr nucleus, as it relates to magnetic phenomena. Ten protons make one ring and ten more make the second ring in Cr. That number is related to the five-fold bond by expecting five pairs of electrons to be involved in the chemical bond. The two rings of iron are sketched next to the two rings of chromium. Spheres in this simplified schematic make a toroid. The rings have an undulating shape because of the pyramidal cube structure of nuclei heavier than boron. The six faces of the cube-2 are armored by symmetrical piles of nucleons. The face armoring is also called a pyramid. The argon foundation provides two lines of protons on two faces of the cube in Fig. 2.

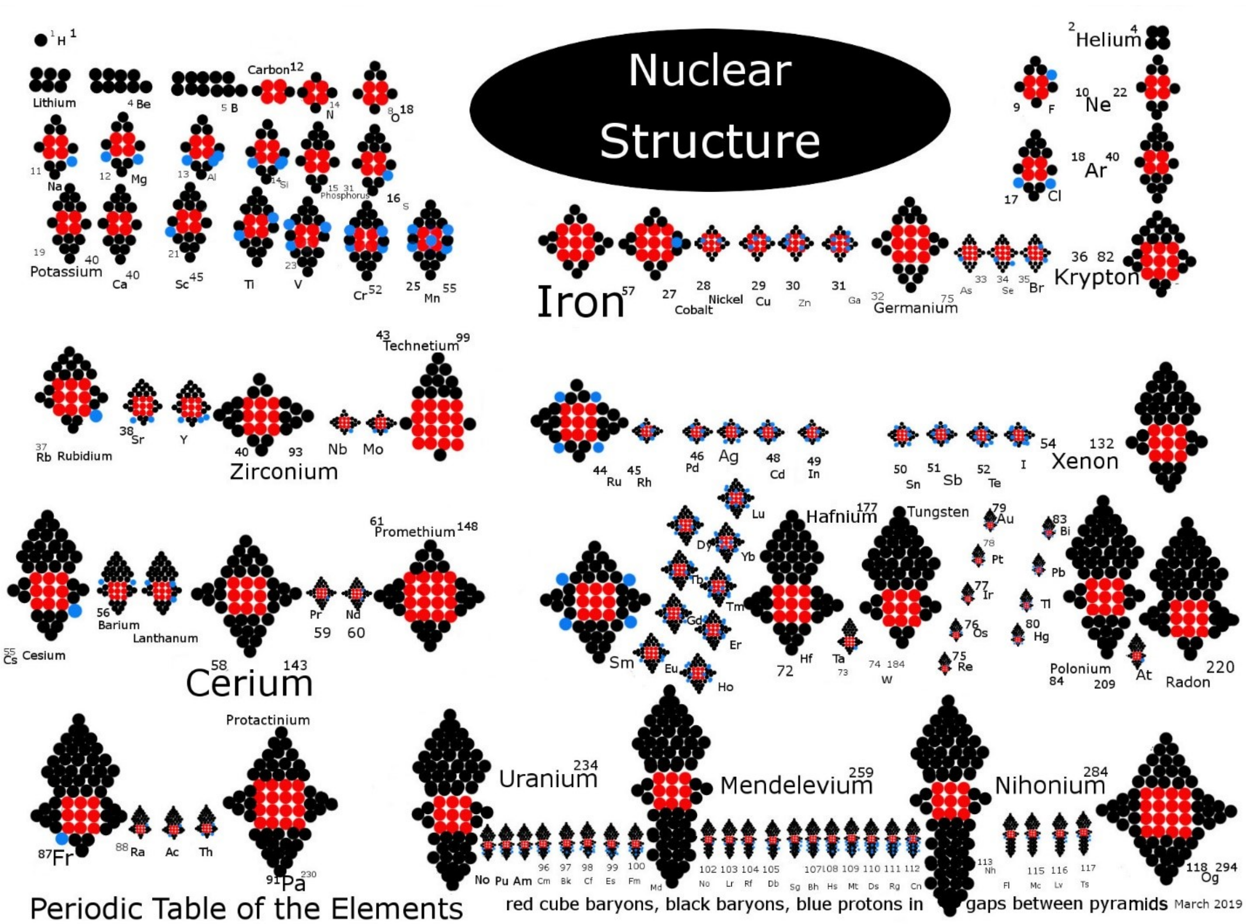


Figure 7: silhouettes of nuclei using the pyramidal cube theory

**Predictions from the Static Nucleus Theory**

This article will show that each loop of ten protons in chromium can receive independent magnetic flux bundles from remote locations outside of that particular atom. Each ring can receive two parallel fluxes with opposite spins. If the spins are polarized the same way, the two flux vortexes drive the mutual area of Cr to emit flux. If the two spins are not going the same way, no flux is emitted. This can make a chain of magnetically entangled Cr atoms, without a macroscopic magnetic flux. The two input ports from that situation can allow a possible Boolean logic function to be done. The result from a Cr nucleus is a new flux from the place where a mutual area is made between the two rings. This is a special place because torque is available. One proton ring is a fulcrum and one ring is the source of magnetic flux. The electron is at the other end of this flux. This type of gate has no amplification of spin, nor of a magnetic vortex. Boolean logic gates must have amplification, so this needs more development.

Iron has twelve protons in each loop. The direction of the ring currents can be set by electron eddy currents. At high temperatures, the electrons disrupt the nuclear ring currents so the iron is demagnetized. At low temperatures, demagnetization is done by having electron eddy currents drive the proton ring currents in two opposite directions. Since these rings are coaxial, the external flux that sets the two ring currents must enter from opposite directions to set the currents to oppose each other. In contrast, chromium can accept two parallel fluxes to the two loops. That is the difference between ferromagnetism and antiferromagnetism. Iron is less influenced by parallel opposite fluxes than Cr. Iron will adapt to those parallel inputs by having both ring currents go the same way. Cr will adapt to parallel opposing fluxes by easily having the two ring currents go the opposite ways. At high temperatures, Fe and Cr have disrupted ring currents due to electron temperatures influencing the nucleus.

**Significance of this allocation of protons in chromium**

The theory of the static nuclear structure is given persuasive evidence for its correctness by the facts about chromium, iron, and gadolinium [1]. The Cr nucleus has two axes for two rings of protons. The first axis is tangential to the second ring. This can be interpreted as the axis being important for flux. An alternative way of using this geometry is to give importance to ten discrete flux lines from ten protons to ten electrons. In the second case, there are at least two lines of flux that are mutually inside both loops. That is like a ferromagnetic part of Cr. The other protons in the loops can be considered to cause antiferromagnetism by cooperating with other chromium atoms that are nearby. Then, a mutual flux can be made, or a reverse flux can be made.

Fig. 12 represents a thin-film logic gate attempt with 3 inputs on top left and bottom of the figure, and with one output at top right. Fig. 12 shows one situation where Cr atoms are chained by flux that needs two input fluxes with the same spin to have a mutual flux emerging from the middle of the nucleus. This understanding uses the shape of the nucleus in the schematic. The iron nucleus is also shown in profile to feeding magnetic flux to a chromium nucleus by way of electrons in eddy currents. The words “north and south” are poles, relative to an observer, so please excuse any seeming contradictions, and adjust your perspective.

Fig. 8 shows a simplified view of the chromium nucleus next to iron in Fig. 9. No neutrons are shown so the proton loops are clear. The blue loop is over a white loop in Cr and the mutual area of those loops is small. Iron has a large mutual area. The idea is that Cr has two antenna areas and one mutual flux area in the middle. The antenna areas with a single loop area are available to intercept flux to set the direction of ring current. If both antenna lobes of the rings are intercepting two fluxes that go opposite spins, then the mutual flux is zero. If the two inputs to the two antenna zones are spinning the same way, the mutual flux is sent outwards as a vortex of flux.

In Fig. 10, the side view of the protons in Cr are shown. Below that is iron in Fig. 11. These shapes are used in Fig. 12, the schematic of antiferromagnetism.

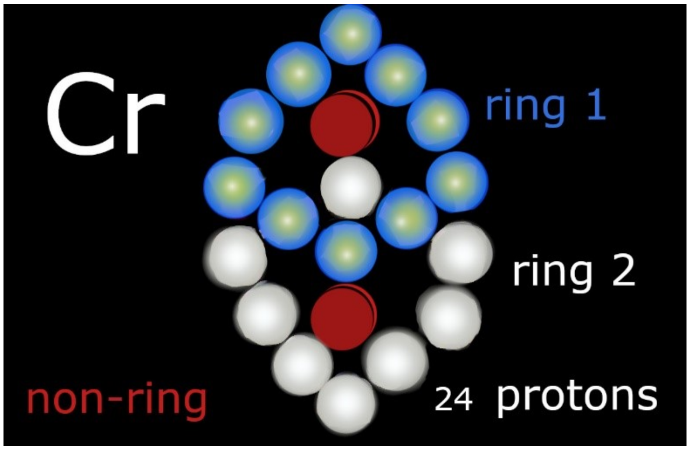


Figure 8: the two rings in chromium, ten protons in each ring, neutrons not shown

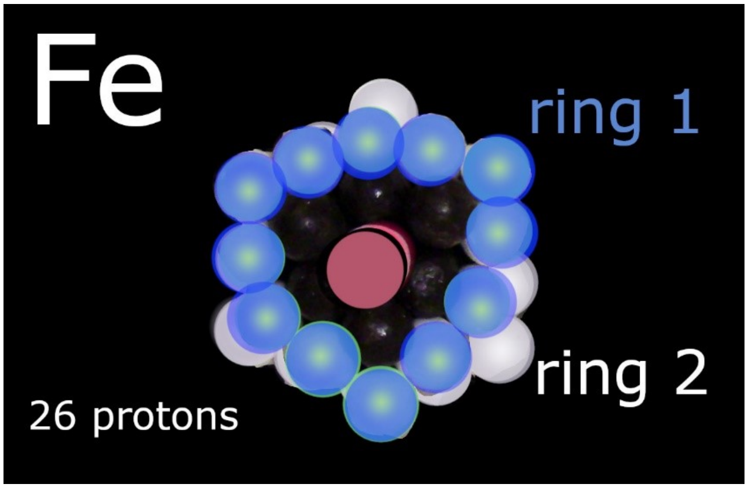


Figure 9: iron has one axis for two rings, view from <111> crystallographic axis

**The schematic of antiferromagnetism**

In Fig. 12 are some Fe atoms and Cr atoms. Little versions of Fig. 10 are used in this figure for the Cr nuclei. Also, small copies of Fig. 11 are used to show the side view of the Fe nuclei in Fig. 12. The flux from the top left Fe nucleus is sent to a Cr atom. Each red electron is paired with only one proton. The proton ring currents drive a north pole flux vortex, if the ring current spin is clockwise (CW). Black is for north poles, and all black lines are from nuclei to electrons. Red lines are for south poles where electrons drive a nuclear ring current spin direction. The lines do not cross, they are entwined so a rotating bundle of lines drives a different bundle of lines from a different electron eddy current, which is paired with a remote nuclear proton ring. This is the non-crossing law that the author proposes to be consistent with Lenz's Law. Nuclear ring currents going CW are paired with electrons that are moving CW in an eddy current.

The path will be traced from the top left Fe going down to Cr and bending right to go to the top right corner of Fig. 12. In that way, flux is reversed. That is antiferromagnetism. Random orientations of many Cr atoms will statistically negate any macroscopic directionality of flux.

The Fe atom at top left in Fig. 12 sends flux to the left and right antenna of the Cr nucleus. That drives currents in both rings of Cr, so the mutual area emits a flux. That flux goes to another Cr atom, and that is chained onwards to other atoms. The two input ports at the bottom of the schematic are available for quantum computation, Boolean logic, frustrated magnets, rapid reversal of magnetization, and self-passivation. A Boolean function might be made from four atoms in Fig. 12. A two input NAND gate could be made. More than four atoms, for example four billion atoms, might be used for one NAND gate. This would use thin layers of Fe and Cr to separate the logic inputs from each other. Test devices could be built with connections made with macroscopic sizes, until smaller connections become achievable.

Notice that the CW flux from the Fe nucleus is sent to make an eddy current of electrons that is also CW. The north magnetic pole is from the protons to electrons and it is shown in black. This is using a CW flux vortex. That north pole is bent on a path on Fig. 12 so it makes a 180 degree turn through several Cr atoms. The flux emerges at the right top side of the figure as a north pole (N) with counter clockwise (CCW) property of spin. The south poles are in red and they are from an electron eddy current to a proton ring current. Each eddy current is driven by a nearby second eddy current.

The result of Fig. 12 is seen where the north magnetic pole has the N letter with an arrow pointing down on the left, and on the right side of the figure, another N is there with an up arrow. That means a north pole was going down, but another north pole is less than a nanometer away and it points up. The spin is CW on the left and on the right the spin is CCW. That change in polarity is cause by random orientations of Cr atoms.

**Comments on chemistry of Cr versus Fe in the s orbital**

The education in chemistry uses the 1s orbital in all elements. The new understanding of the nucleus shows that to be justified for elements up to Mn, with Z=25. The cube-2 in those light elements has two protons. That is why a 1s orbital is accurate to hold up to two electrons. Iron and some middle weight elements have a cube-3 with 8 protons, not 2. Therefore, the author expects that iron through bromine may be modeled without the 1s orbital being limited to two electrons. A new 8 electron s shell is recommended. This illustrates how the static nucleus theory can be related to several phenomena.

Elements starting at Fe do not have 2 protons in the core, they have 8. This implies that chemistry can change its description of the transition elements so the 1s orbital is obsoleted. Elements from manganese downward can use 1s orbitals to fit the two protons in the cube. Elements from iron to iodine should have no 1s orbital, but should use eight electrons in the lowest shell to match the eight protons in the central part of the nucleus.

**A new periodic table is provided**

The periodic table of nuclear structure is in Fig. 7. The silhouettes of 118 elements are shown using color coded baryons. The red circles are baryons in a simple cubic lattice. The black circles are baryons. Blue circles are added onto incremental elements so that gaps in the foundations are filled. A prioritization of placements of the blue circles is intended to reflect a hydrodynamic flow into each baryon. The shapes of nuclei have also been evaluated in simulations [5] and experiments [6][7]. Please notice that the two radioactive elements Tc and Pm have a cube-4 structure. That is why they decay more readily than elements adjacent to them on the periodic table.

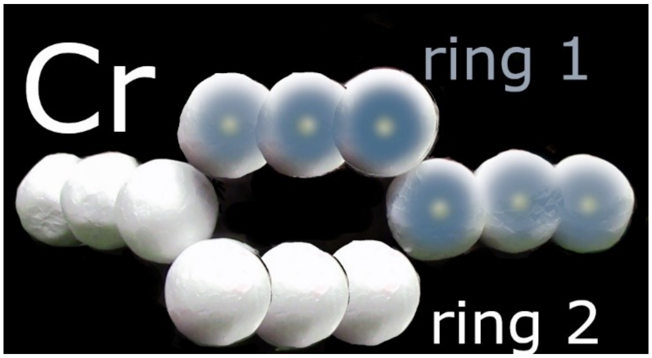


Figure 10: protons in chromium rings, side view with no neutrons shown

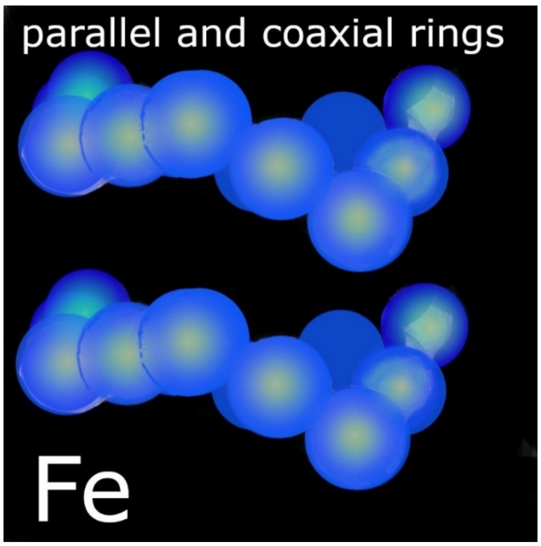


Figure 11: side view of protons in iron rings, no neutrons shown

**Antiferromagnetism and the rings of chromium**

The only element that is antiferromagnetic is Cr. That category is defined by its ability to have local magnetic flux near atoms, but to then negate that flux with a negative flux. This is called frustrated magnetism by some authors [4]. The nucleus of chromium, the author asserts, is a static lattice called face armored cubic. The two loops of ten protons provide a plausible explanation for the unique antiferromagnetic property which no other element possesses. The north pole was defined as being sourced from protons in Cr nuclear rings that carry a clockwise current. Those protons are paired with remote conduction electrons which are also the north pole. A line can be drawn between the paired particles, like in a bond path in chemistry [8]. That reference describes that line between two atoms as an exchange channel. In the current paper, this is made to specify also that one proton in one atom has a bond path to an electron, and that this is where an exchange process is involved in antiferromagnetism. Figure 12 shows the black lines as north and the red lines as south magnetic poles. That means one proton is north and one electron is north because the spin of the nuclear ring current is clockwise. That nuclear current in 10 protons is tracked by each of 10 electrons. The 10 lines form a circling vortex of lines from a Cr nucleus to an eddy current. The motion of the north electrons drives nearby electrons of the south pole. Those electrons connect the south pole to protons. Those protons also have a clockwise ring current, relative to the electrons. Conversely, that south pole proton ring current has a counterclockwise rotation relative to the nucleus.

The positioning of protons and neutrons used hydrodynamic expectations and goals of symmetry for stability. Integer geometries were based on A and Z, the mass number and the atomic number. This gives a geometric reason for spin polarization. The rings of protons have a ring current that makes a magnetic flux. This flux vortex is made lines from protons to electrons. For chromium, some bond paths make a mutual flux in both rings and some parts of each ring do not emit a flux vortex. Those protons are paired with electrons without using a flux vortex. There is no torque available from single ring of protons, compared to the two-ring topology.

The two rings give torque to some remote electrons. That structure provides a chaining into nearby chromium nuclei with opportunities for unique interactions. Self-passivation may be enhanced by this flux chaining from one Cr atom to the adjacent Cr atom. A distinction is made between a paired proton-electron and its bonding theory as compared to a flux vortex which is always from a loop current with a torque enabling topology. The pair theory is for every proton. The flux theory is only for the few pairs that have their fluxes originated by nuclear ring currents or a macroscopic loop current. Large inductors have torque without needing iron ring currents. The electron current alone can make torque because billions of atoms are supporting each other as fulcrums. In iron and chromium, the two ring currents are set by external electron conditions. Once started, the currents persist without external drive. Chromium is more controllable than iron for changing the magnetization polarity because it is susceptible to parallel fluxes of opposite polarities. Iron's susceptibility to opposing fluxes only comes it the two fluxes are originating from opposite directions. The pyramidal cube theory of the nuclear structure of chromium provides a fertile area from which many applications can be produced.

**Conclusion**

This paper has two goals. The first goal is to use a unique element, chromium, to add to the confirmation of the pyramidal cube theory of the structure of the nucleus of all elements. The second goal is to announce that antiferromagnetism is caused by a topology in the nucleus of Cr. The definition of a north pole was given relative to a nucleus and its associated electrons. A new definition of a line of flux was given. The torque from a magnet was explained as using a fulcrum in iron or chromium that is based on the two rings of protons. That is why magnetic flux is different from electric attraction. The spinning of the nuclear ring current keeps the electrons spinning with the same polarities. All of these insights became clear after confidence was achieved in the correctness of the static nucleus theory.

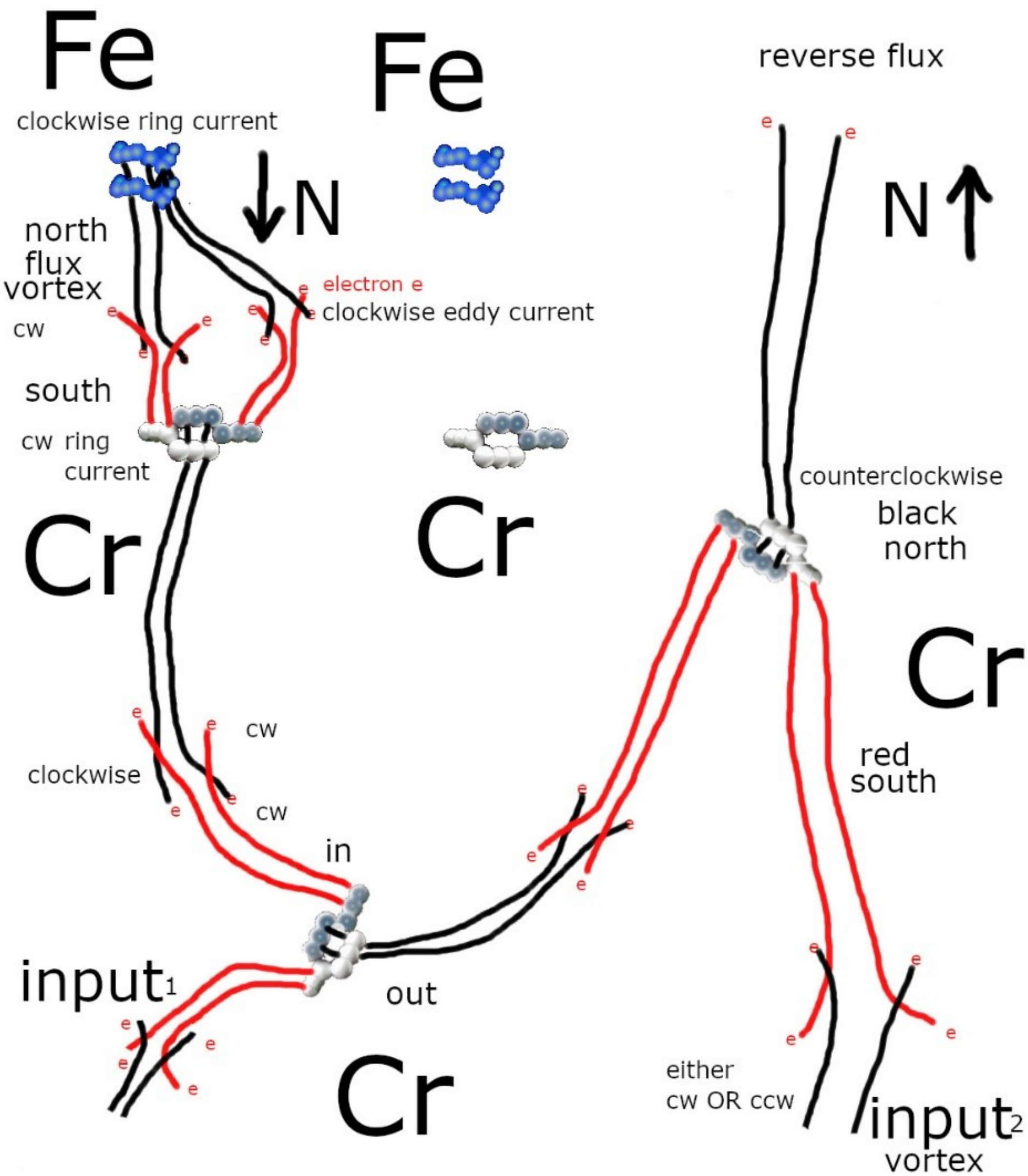


Figure 12: Schematic of antiferromagnetic functions of each nucleus

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