# Molecular shapes from proton lines

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The author is unaffiliated on April 19, 2025

Abstract

A theory of nuclear shape has been verified as I worked alone for eight years. A cubic lattice of protons and neutrons is at the center of most chemical elements. On the nuclear surfaces, elements commonly have a hexagonal close-pack arrangement. Protons commonly touch each other, creating lines of many protons. Chemical valences are determined by the number of ends of lines of protons, plus other prominent protons. Molecular crystallography is influenced by the nucleus, with cubic molecular crystals and hexagonal crystals. This letter is about atoms, ions and molecules that are believed to have shapes that are directly related to the shapes of nuclei. Bond fulcrum vectors were tabulated and they are a major contribution to chemists. Iron was the first element to be evaluated because its properties are so easy to measure. Catalysts are discussed. The theory is The Static Nucleus Theory of the Face-Armored Cubic Lattice. After seeing more evidence than is written in this letter, I believe this is the correct theory of nuclear shapes. This provides deeper understandings of the sources of the properties of all materials. Knowledge of natural sources helps inventors to make synthetic molecules and magnets with the expected properties.

The atomic nucleus was known to determine many properties of the chemical elements, but it was not known whether the nucleus was a collection of moving particles with no fixed shape, or if the nucleus had a static shape. Electrons were said to produce the strong magnetic fields of a few elements and the nucleus was believed to have a negligible influence on the ferromagnetic property. The theory in this letter has changed those assumptions. Iron has two rings of protons that create the ferromagnetic property. Lines of protons determine the shapes of molecules and chemical valences of atoms.

Chemical and magnetic phenomena are partially explained by this nuclear theory.

A. A law of physics is that protons make lines of protons
B. Chemical valence limit of 8 is due to the few ends of proton lines
C. Electrons and protons are always paired using flux, temporarily, even in stars
D. The flux-wrapping bond theory is mechanistic for realism
E. Bond fulcrum vectors were tabulated for nuclei to direct the electrons
F. Some catalysts have a hooked line of protons
G. The sources of ferromagnetism and antiferromagnetism are proton rings

H. Magnetic hysteresis varies in the cubic cores of a few elements
I. Spins of two lines of flux start a bond or agree to slide in iron's core
J. Coordinates of 17,000 protons and neutrons are written, Ref. 1

There are nineteen rules that were used to model all 118 chemical elements, Ref. 2. This summary only lists the rules that were used for iron.

Fig. 1 shows the ideas for the Static Nucleus Theory. Sphere stacking for nucleons gave good results. Iron is shown to be composed of a cube with six pyramids of nucleons. Neutrons are black and protons are white. The two-layer pyramids nestle into the pits on the 3-layer cube. All elements were modeled. Tables 1, 2, and 3 give the number of proton line-ends for each nucleus, Ref. 3. Next to that, the valence is listed. Both integers are less than 9 for all elements except technetium, which has 10 ends of proton lines. This small magnitude of the **counts of ends of proton lines** is evidence that this is the correct theory of nuclear shapes.

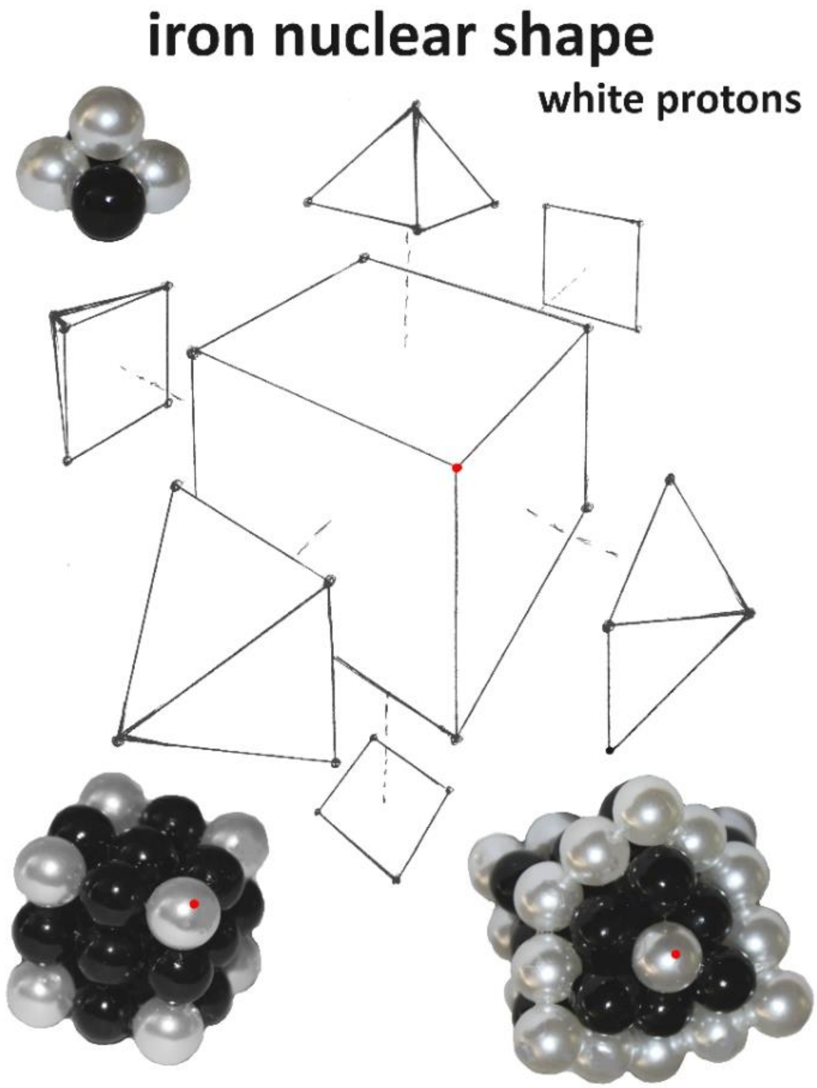


Figure 1: The idea for the iron nucleus. Plans for six symmetrical pyramids on a symmetrical cube. White protons and black neutrons. The cubic lattice of protons and neutrons has its six faces armored by pyramids of protons and neutrons.

Rule 1: There is a simple cubic lattice of protons and neutrons at the core of each element that has a Z atomic number that is greater than five.

Rule 2: Protons in the cube are far from each other as if electrostatic repulsion is in effect.

Rule 3: The six faces of the cube are armored by pyramids of protons and neutrons.

Rule 4: Protons outside of the cube tend to form lines of protons as if electrostatic repulsion is not true in all three dimensions.

> Rule 8: Pyramids should be rotated to avoid creating a three-way intersection of lines of protons. Some elements cannot avoid that structure, like promethium and nitrogen.
>
> Rule 16: Symmetrical arrangements of protons are preferred over non-symmetrical structures. The same is true for neutrons. The two-layer pyramid sets the example in iron. The cube-2 and cube-3 are also symmetrical in their allocations of protons and neutrons.

In the year 2017, I made the following fourteen decisions. I decided to try to make a law of physics or propose a shape from nature. Nuclear shapes needed to be proposed, to fill the blank pages of the books on chemical elements. Fe was chosen as the first element to be evaluated because its ferromagnetic property is so easy to measure and magnetism has been thoroughly studied by past scientists. A static nucleus theory was chosen because other researchers had tried using many dynamic nuclear ideas. Spherical nucleons were chosen to be stacked to have the Z and A values according to standard tables for chemical elements (atomic number and mass number). Crystallographic arrangements would be attempted with cubic, random, or hexagonal close-pack arrangements of spherical nucleons for nuclei. Experiments were done using random collections of 26 protons and 31 neutron beads. That showed that protons must touch protons because there are not enough neutrons to isolate them. Protons can make lines of multiple protons, while avoiding making branched lines. The core of Fe was modeled using a cubic stacking of proton and neutron spheres. The six faces of the cube were planned to be covered by piles of nucleons. The cubic core would stack a 3x3x3 lattice of nucleons because Fe-57 would get 27 nucleons in the core. (8 in the core seemed too small and 64 in the core, too large). Simple arithmetic revealed how plausible it is to use 6 piles of protons and neutrons (nucleons) to cover the 6 faces of the cube. The mass number was calculated to be precisely appropriate, using the cube and six pyramids:

$A = 57 = 27 + 6(N)$

where N is 5 nucleons to cover each face with a pyramidal stack. The integer results from that calculation gave me hope that this is an excellent candidate structure for the Fe nucleus. So, I continued the research. The atomic number was calculated, and the answer fit together like a key in a lock.

$Z = 26 = 8 + 6(3)$

Symmetry and electrostatic repulsion were used for allocating protons in the cube. The core protons are at the 8 corners of the cube. The maximum distance from a neutron to a proton is one neutron diameter. That ensures that neutrons do not decay quickly. Protons feed neutrons. The 19 foundation elements simply have pyramids on six faces of the cube. 90 incremental elements add nucleons to the surfaces of foundations.

A proton is bonded to another proton using an electron that orbits another electron using durable lines of flux. The wave function is also called a magnetic line of flux. Chemists are accustomed to modeling a bond as having a spring constant, Ref. 4, as if a bond is a real object. The $H_2$ molecule is shown in Fig. 2 with the $N_2$ molecule. One electron-proton pair has its line of flux wound around the other line of flux. It unwinds and repeats the wrapping of flux lines, like rubber bands.

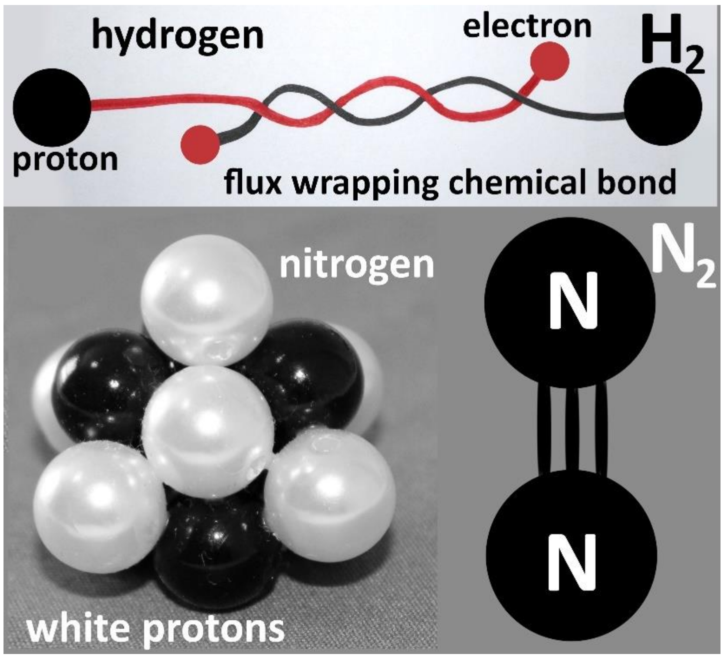


Figure 2: hydrogen and nitrogen molecules, showing nuclear shapes. A mechanistic bond for $H_2$ is shown like rubber bands wrapping around each other. The $N_2$ has a triple bond because of the 3 prominent protons.

The nuclear shape of N has three prominent protons (Fig. 2). The triple bond of the $N_2$ molecule is the result of those three protons. The simple theory of nuclear shape gives correct-seeming answers for elements from H to U. Molecular shapes have a deterministic relationship with the allocations of protons in nuclei. The nucleus has a fixed shape, so the dynamic theories of nuclear shapes are not as credible as this, for low energy interactions.

The principal quantum number n could be the number of times the two lines wind around each other. Other quantum numbers l, $m_l$ and $m_s$ can be defined in the same wrapping scheme, like two wide rubber bands in this reference video, Ref. 5. A mechanical engineer could write algebra or simulations about the wrapping phenomena so that kinetic energy and angular momentum can be quantified for the four quantum numbers. Non-Newtonian fluid dynamics could help model the bond's spring constant for torsion and wagging. The bond may have properties similar to "silly putty", which is rigid for fast motions and soft for slow changes. Stored energy changes during a bond wrapping sequence can be calculated. Spin choices occur naturally when using flat flux mock-ups, because it's realistic.

Carbon has two protons in its cubic core, Ref. 6, associated with the two s-orbital electrons. Fig. 3 shows carbon and oxygen nuclei making a $CO_2$ molecule. Light elements have two core protons in the middle of two lines of protons. All elements from carbon to manganese have two protons in the cubic core. Iron is where the transition occurs from 2 protons in a two-layer cube to eight protons in a three-layer cube (Fig. 1). The two planes of protons in carbon cause graphite to have flat crystals. Carbon dioxide has a linear shape because the carbon proton lines make two symmetrical V shapes. Two ends of a proton line bond to an oxygen atom. The other two ends point the opposite way to the other oxygen atom.

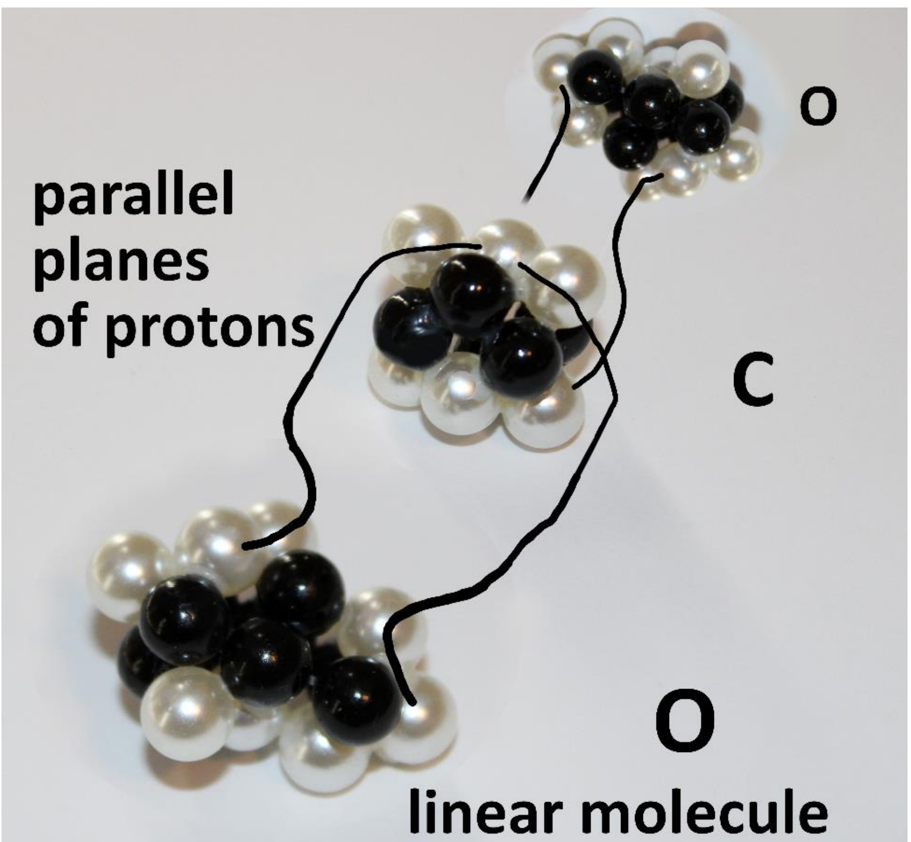


Figure 3: Carbon and oxygen nuclei are shown making carbon-dioxide. The C nucleus with two parallel planes of white protons. The oxygen is driven by the carbon proton lines to be in the same plane. The oxygen-17 nucleus has a helical proton allocation

The model of the oxygen nucleus in Fig. 3 shows the protons in oxygen forming two lines. The black lines are bonds, like in Fig. 2. The water bond angle is set by the directions of ends of the two proton lines. The three protons at the bottom have a line-end that points up and left. The two protons at the top bottom have a line-end that points down and left. Using vector geometry, the angle between those two line-ends was calculated, Ref. 7, to be the arccosine of -1/4. This theory has precision. The bottom three protons have a helical shape compared to a vertical axis. The top five protons make a helical shape. Some O nuclei might have a clockwise helicity and some could have a counter-clockwise helicity or maybe O nuclei all have the same shape. DNA could have a double helix because of the helical shape of the charges on the oxygen nucleus.

Iron is magnetic because of currents in two loops of protons (Fig. 1). Cr has a two-layer cube and Fe has a 3-layer cube. That is the transition that chemists have named for elements near Fe. Iron's atom was measured to have a triangular shape that is similar to the proton ring, Ref. 8. A definition of the ferromagnetic property results from seeing the shape of the iron nucleus, compared to all other elements. Iron has two coaxial rings of twelve protons in an undulating shape. Two prominently positioned protons are on the axis of the rings. Superconducting loyalty currents flow in the rings. Hysteresis occurs in iron because the magnetic lines of flux start in protons in a first ring, pass through the center of the nucleus, and emerge from the other end of the nucleus. The second proton ring does the same thing, in a mirrored direction. Electrons sequentially pass through the cube and each flux spin encounters adjacent flux. That causes a complicated mixing of 24 lines of flux that takes time to arrange the flux so the spins of adjacent fluxes are compatible. When the two spins allow, they slide. If not compatible, the flux spins of the two electrons will start bonding. They will fail to bond, due to the small size in the cubic core in iron. The electron in the cube will repeatedly encounter other flux lines. That is iterated until magnetization is finished, after the spin-handshaking sequence eventually succeeds. It is driven by a big external induction coil apparatus. This explains the slowness of the magnetization dynamics, for an iron atom.

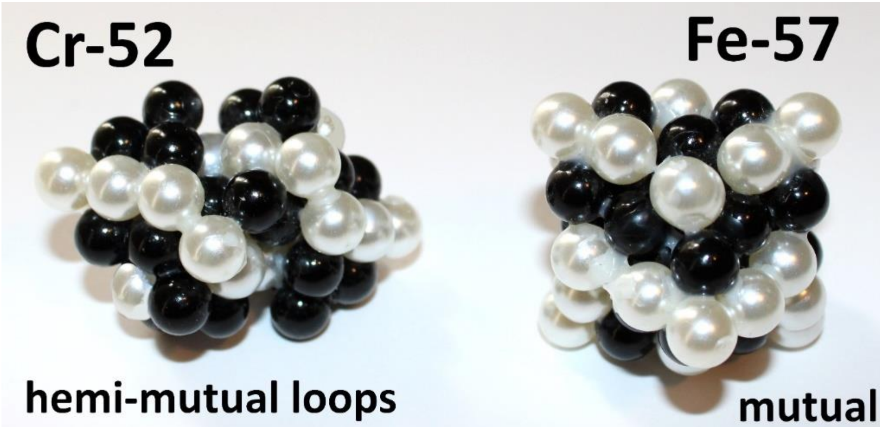


Figure 4: Chromium and iron. Cr is antiferromagnetic because the mutual area of the proton rings is only a fraction of the area. That is called a hemi-mutual inductor.  Fe has white protons in two undulating rings of 12 protons that are coaxial. Cr has 10 protons per ring.

Antiferromagnetism is observed for chromium atoms, Ref. 9, which has two rings of ten protons. The rings share a mutual area where flux is confined and two other areas that are not mutual. I call this the hemi-mutual inductor shape. Those three areas of the Cr nucleus make antiferromagnetism. In Fig. 4, the top ring of protons overlaps the bottom ring for about 30% of its area. Like iron, a proton on the bottom ring has a line of flux going up through the mutual area and it goes out of the top to an electron eddy current. Spin-handshaking occurs for a minority of the flux lines in Cr. Electromagnets are not like Cr and Fe because the proton currents are more polarizing than electron currents. In particular, the bottom Fe proton ring makes the upper electron eddy current, so flux goes through the cube for both poles.

Platinum is known as the paragon of catalysts. Pt has a proton line that is shaped like a hook, near a ring of 24 protons (Fig. 5). Vanadium also has a hook near a ring of ten protons, Ref. 10. Maybe the platinum hook of protons interacts with molecules to provide a proton loyalty current source and sink. A third molecule could be handed a second molecule that is primed. A general theory of catalysis could be made, using proton lines.

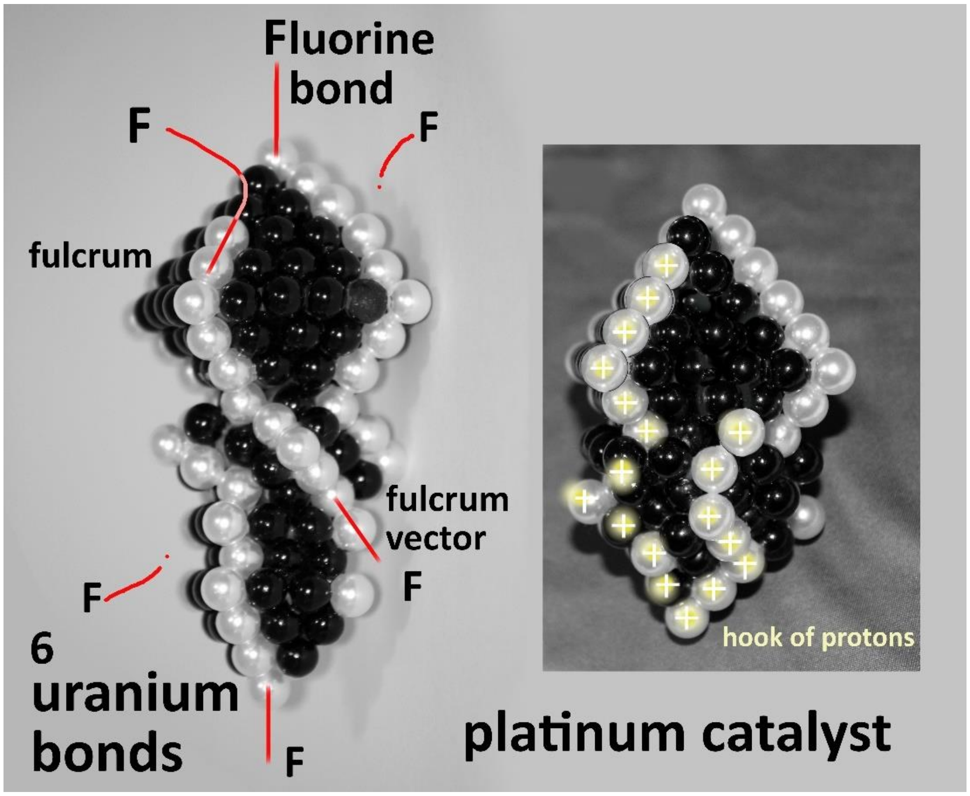


Figure 5: Platinum and uranium nuclei. For Pt,18 protons make a hook shape with yellow highlights and + symbol in white. The U proton line ends that bond 6 fluorine are shown using white protons and dark neutron beads.

Uranium has a valence of six. This seems be due to two proton lines having four ends, plus two other protons. The two most-prominent tips of the nucleus could provide the two additional bonds, or maybe the two lone protons could provide them. The fluorine nucleus looks similar to oxygen, so it is shown as the letter F in Fig. 5. Please consider the six red bond lines that connect the F atoms to be like the twisted bands illustrated in Fig. 2.

In Fig. 5, a line of eleven protons is connected to two F atoms. At the bottom-right, a bond fulcrum vector is defined by two protons that end a line of protons. At the top-left, torque is applied by a second fulcrum, as the wave function bends in response to an adjacent bond. A chemistry book calls this “valence angle bending” on page 128 of Ref. 3. The fulcrum vectors can help chemists to model the shapes of molecules.  Two more F atoms in the figure have wave functions that go behind the U atom to penetrate two more proton line-ends. The fifth and sixth F atoms are bonded to the most prominent protons at the top and bottom of the U atom. Those are on a ring of thirty-six protons. There are two lone protons, one of which is visible on one side of the U atom. Fission fragments of U-235 have two ranges of mass. The big fragment is from the big pyramid plus a 3x3x3 cube, with a total of 159 nucleons. The small fragment is from the other nucleons. The cube can stay with the smaller fragment or the bigger one. The bi-modal mass distribution has the small fragment with 75 to 104 nucleons. The big fragment is known to have masses from 131 to 159 nucleons. The theoretical shape of U matches those experimental facts, almost exactly.

The Static Nucleus Theory of the Face-Armored Cubic Lattice was discovered to be plausible on May 25, 2017. It was intended to fill in the mysterious size-scales smaller than the atom, and bigger than the sub-proton research. A correct theory of nuclear shapes gives correct-seeming answers, quickly and easily. Bond fulcrum vectors are in Table 4 for all elements up to scandium, Ref. 11. A fulcrum is made by two protons at the end of a line of protons in almost all elements. The bond fulcrum vectors enable calculations of induction between bonds that interfere with each other near the nucleus. Then, the force fields that make $H_2O$ and $H_2S$ have different bond angles can be quantified. The bond fulcrum vectors were first posted in my website during January, 2025. For all elements, the lengths of proton lines are expected to major contributors to the values of the electronegativity, bond enthalpy and atomic radius.

Supplemental Material

Conflict of Interest Statement: The author has no conflicts to disclose.

Ethics approval is not required.

Data Availability Statement: The data that support the findings of this study are openly available in https://nuclear-data.com/wp-content/uploads/2024/02/nuclei_118_m.txt , reference number nuclei_118_M.txt. That small text file has 17,000 nucleon coordinates in xyz format. Also, Tables 1, 2, 3, and 4 are linked in the references here. They give the numbers of rings, the line end counts, and other facts for all elements. Table 4 gives the bond fulcrum vectors for elements up to scandium.

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