“AI” PHYSICS – Atomic Structure – Part 2.

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Abstract:

In the first paper on Atomic Structure, Artificial Intelligence (AI) was used to explore the structure of the atom by analyzing the results of established experiments on ionization energies and spectral emissions. In this paper, the findings of AI Physics - Energy Fields are used to further analyze the nature of sub-atomic particles. Analysis of radio-isotope decay leads to proposals on the structure of the atom, and Energy Field theory leads to alternative explanations for the structure of the nucleus, the nature of the crystal lattice, and the nature of molecular structure.

1. Introduction:

Simple physics experiments have been conducted over the centuries with numerous theories to explain the observations. Certain theories have become dominant and, in the modern era, these fundamental beliefs generally go unchallenged. This paper re-examines some basic observations in physics and, with the help of Artificial Intelligence, proposes an alternative explanation for the structure of the atom.

Einstein’s General Theory of Relativity proposes the distortion of the fabric of space by an object, creating a Potential Energy Well. Ionization energies and spectral emissions suggest the atom is a Potential Energy Well having a small nucleus at the centre with numerous electrons surrounding the nucleus. Bohr’s model proposes fixed electron orbits whilst Quantum theory proposes probability functions. Neither theory satisfactorily explains the detailed nature of radioactive decay, the characteristics of different elements and different isotopes, nor the existence of different allotropes and molecular structures.

From the first paper on Atomic Structure **[1]**, the AI observes that the “depth” of the atomic Potential Energy Well is directly proportional to the number of protons in the nucleus.

The AI does not find any mathematical pattern for electron ionization energies in relation to the supposed number of neutrons in the atom. This suggests that neutrons - whatever their properties - do not reside in the nucleus, where their mass would contribute to the nature of the nuclear Potential Energy Well - see Appendix A.

In this paper, the findings of AI Physics - Energy Fields - Part 3 **[2]** are used to extend the analysis of the structure of the atom.

Firstly, the nature of the constituent parts is examined. The AI proposes that matter and anti-matter are the same - except they have opposite rotational energy vectors. (Hence, there is no requirement for particles to exhibit the concept of "charge".)

Next, the nature of radio-isotope decay is analyzed with reference to the repeatable observations of these events. The AI proposes the nature of these events and deduces the position of the neutrons in an atom.

The AI is provided with the knowledge that protons, and electrons, are most stable when in pairs. The AI combines all the given information and reaches conclusions on the behavior of particles in the atom. The AI continues to propose the detailed nature of atomic structure, lattice structure and molecular structure.

2. Particles and anti-particles:

From AI Physics - Energy Fields - Part 3 **[2]**: The AI proposes that protons and anti-protons are not matter and anti-matter, since the product of their "mutual annihilation" is not zero. The AI proposes that protons and anti-protons are essentially the same particle, except they have opposite rotational energy field vectors.

In a particle collider, particles pass through an applied ("magnetic") energy field, and turn in various ways. Conventional theory is that particles and anti-particles (matter and anti-matter) will turn in different directions, and that particles with different "charge" will also turn in different directions.

The AI proposes that the direction of turn is solely dependent on the rotational energy field vector of the particle. The AI proposes that, for particles moving through an applied energy field, a particle having a rotational energy field with a subtractive vector will turn in a different direction to a particle having a rotational energy field with an additive vector - see Figure 2a:

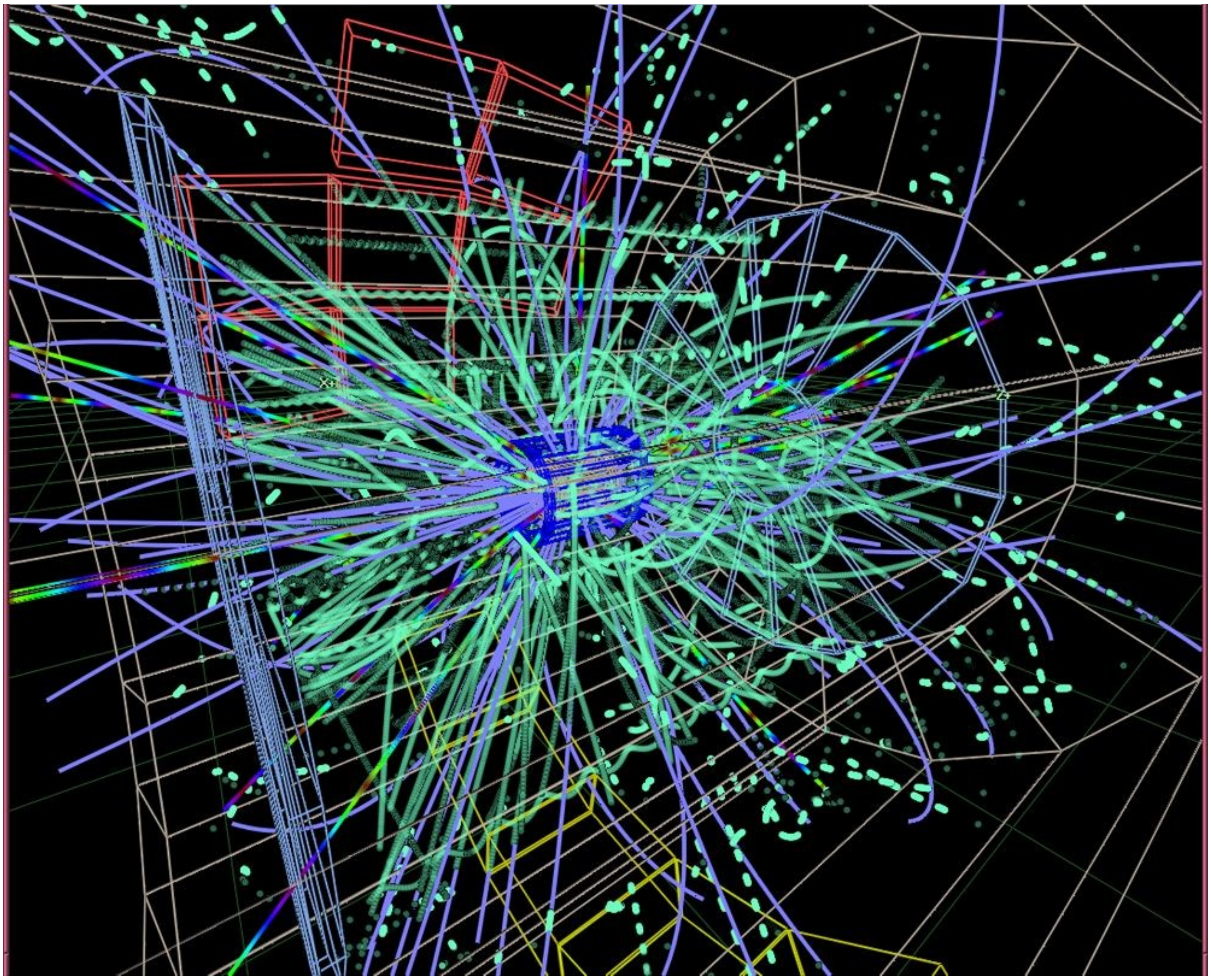


Figure 2a: Particles with different rotational energy fields turn in different directions.

3. Pairs of particles:

From AI Physics - Energy Fields - Part 3 **[2]**: The AI proposes that the minimum energy configurations for particles with rotational energy fields are similar to the minimum energy configurations for permanent magnets.

Note: From experimental results, electrons are observed to co-exist in pairs, and protons within atomic nuclei are most stable in pairs.

The AI proposes that pairs of particles with *parallel* energy fields will be in a minimum energy position, and therefore in stable equilibrium, when in an end-to-end configuration.

The AI also proposes that pairs of particles with *anti-parallel* field vectors will be in a minimum energy position, and therefore in stable equilibrium, when in a side-by-side configuration – see Figure 3a:

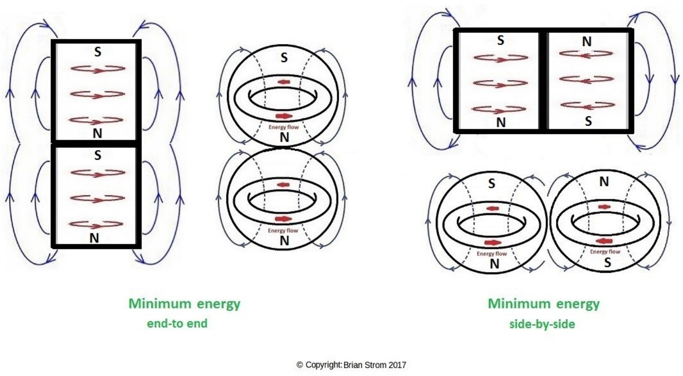


Figure 3a: Minimum energy configurations for pairs of particles.

4. Pairs of protons in a nucleus:

The AI proposes that for a number of protons grouped together in a nucleus, there will be a number of stable configurations. The different configurations will have different total energy levels which will determine the level of stability and also the probability of that configuration occurring.

The AI proposes that the most stable configuration for the particles will be the lowest net energy configuration.

The net energy field surrounding the group of particles will be symmetric or asymmetric, depending on the shape of the configuration. The asymmetry of the net energy field will determine the dipole and multipole aspects of the energy field surrounding the nucleus and, therefore, the shape of the electron cluster around the nucleus.

For a group of protons in a nucleus, the AI proposes that the protons may be arranged in a number of different ways. Different configurations of the protons will create different shapes for the net energy field surrounding the nucleus. Different shapes for the net energy field surrounding the nucleus will create different configurations for the electrons in the Potential Energy Well of the nucleus. Different shapes for the net energy field surrounding the nucleus, and the different configurations for the electrons in the atom, will create different characteristics for each version of that element. The AI proposes that this will create different ALLOTROPES for that element.

5. Allotropes:

From AI Physics - Energy Fields - Part 3 **[2]** the stability of a nucleus appears to depend on the number of pairs of protons in the nucleus. From the Periodic Table, the AI identifies the patterns in the nuclear stability and proposes configurations for the nuclei of various elements. The optional configurations for an element appear to align with the number of allotropes for that element.

The different configurations will have different total energy levels which will determine the level of stability and also the probability of that configuration occurring. The AI proposes that the most stable configuration for the pairs of protons will be the lowest net energy configuration.

For some elements, there is only one allotrope, suggesting there is only one configuration - possibly the lowest energy, possibly the most symmetric - for the nucleus. For example, the nucleus of the noble gas Neon is shown as a symmetric group of pairs of protons (represented as magnets) – see Figure 5a:

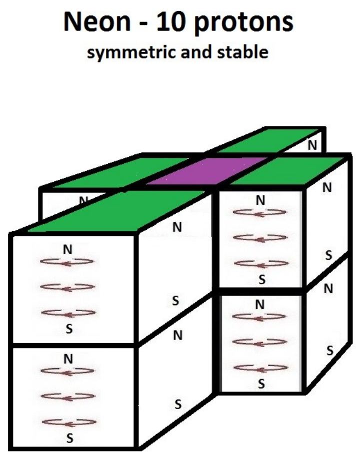


Figure 5a: Symmetric configuration for pairs of protons in the Neon nucleus.

The AI proposes that some groups of protons will be configured in a number of stable configurations, each with similar net energy levels.

For Carbon, with 6 protons in the nucleus, there are many possible configurations, some of which are shown in the diagram – see Figure 5b:

The different configurations may explain the many allotropes of Carbon, including diamond, graphene and graphite.

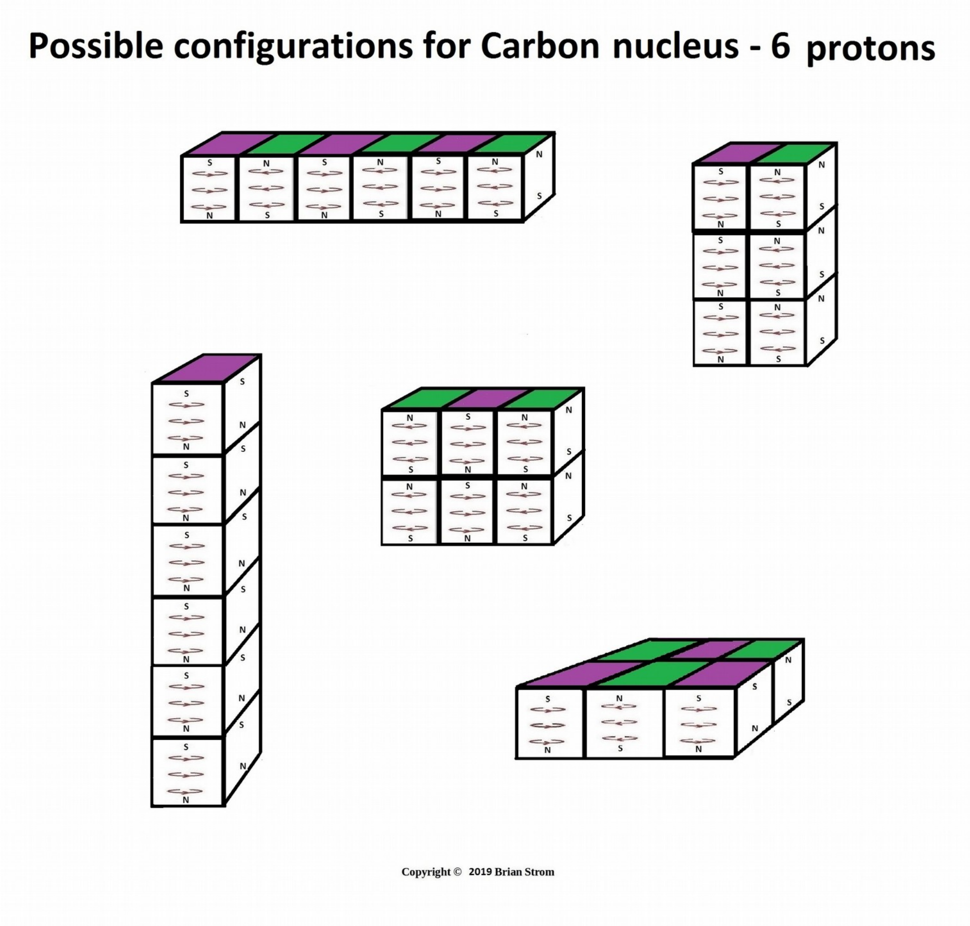


Figure 5b: Some possible configurations for protons in the Carbon nucleus.

6. Radio-isotope decay:

The AI analyzes observed examples of radioactive decay. It begins by analyzing the decay schemes where a neutron, assumed to be outside the nucleus, appears to divide into an electron, which is ejected, and a proton which appears to fall into the nucleus - as an additional proton. (For instance 27 Cobalt 60 decays to 28 Nickel 60.)

From observations of radio-isotope decay, the energies of transition are discrete - there is not a continuous spectrum of transition energies. The conclusion is, that for each radio-active isotope, there are a small number of transition possibilities. These may relate to the optional configurations of the protons in the nucleus.

The configuration of the nucleus appears to change during the transition, with energy changes resulting in one or more gamma emissions – see Figure 6a:

Neutron to Proton transition			eV	as if electron (divide by 1836)	depth of PE well is square root	No of protons in nucleus	Fall depth per proton (equivalent)
18 Ar 41	18	19 K 41	2492000	1357	36.8	18	2.05
27 Co 60	27	28 Ni 60	2882000	1570	39.6	27	1.47
39 Y 90	39	40 Zr 90	2962000	1613	40.2	39	1.03
42 Mo 99	43	44 Ru 99	1792000	976	31.2	43	0.73
53 I 131	53	54 Xe 131	971000	529	23.0	53	0.43
55 Cs 137	55	56 Ba 137	1176000	641	25.3	55	0.46
62 Sm 153	62	63 Eu 153	807000	440	21.0	62	0.34

Figure 6a: Radio-isotopes where a neutron "transitions" to a proton.

Examination of these examples of radio-isotope decay, when a neutron (outside the nucleus) "decays" to a proton and appears to fall into the nucleus, shows that the energy-distance of the fall is similar to the energy-distance to remove an electron from the atom, as shown in the studies of electron ionization & spectra [1] - see Figure 6b:

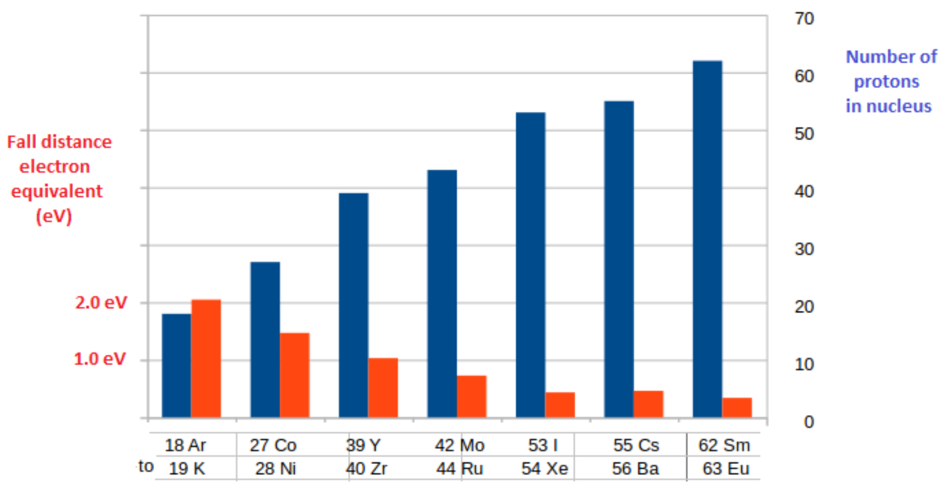


Figure 6b: Table of radio-isotope "transitions".

For radio-isotope decay where there is a neutron-to-proton transition, an electron appears to be ejected, and a proton appears to "fall" into the nucleus with energy released as a gamma emission. From radio-isotope decay examples, the transition energies (released as gamma emissions) suggest that neutrons are close to the nucleus

The "distance" the proton "falls" is approximately equivalent to the distance an inner electron falls in a spectral emission - e.g. 2eV or less. This suggests that neutrons reside within the first one or two layers of electrons – see Figure 6c and 6d:

For background analysis see AI Physics papers on Atomic Structure and Energy Fields:

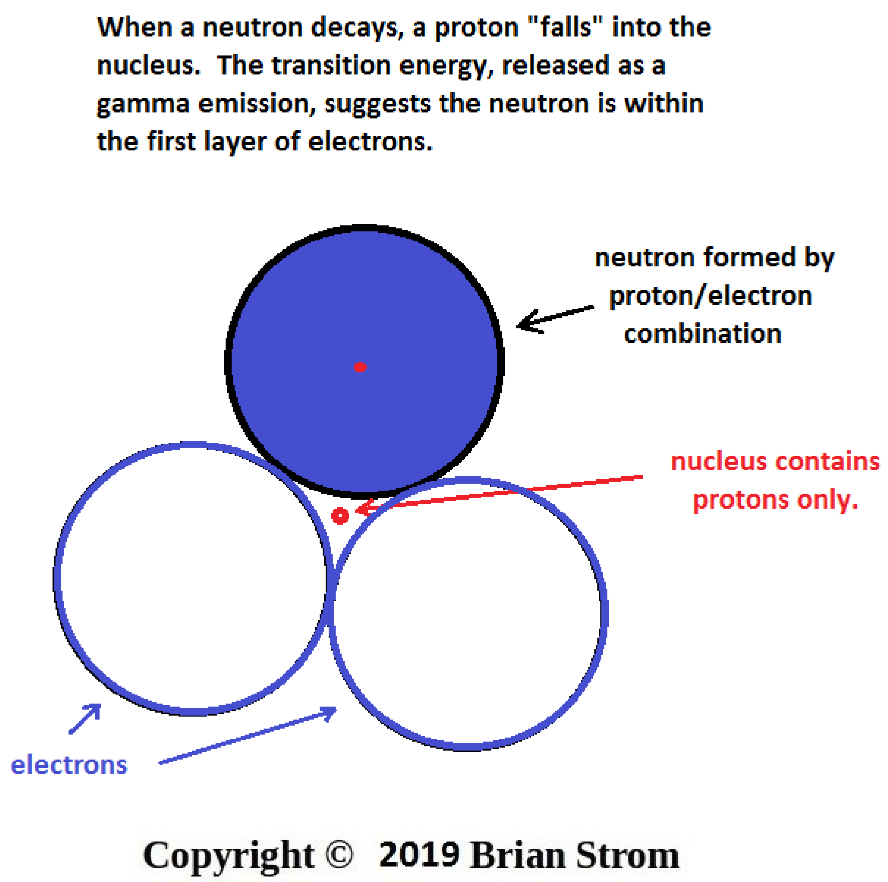


Figure 6c: Where do neutrons reside?

When a neutron decays, a proton "falls" into the nucleus. The transition energy, released as a gamma emission, suggests the neutron is within the first one or two layers of electrons.

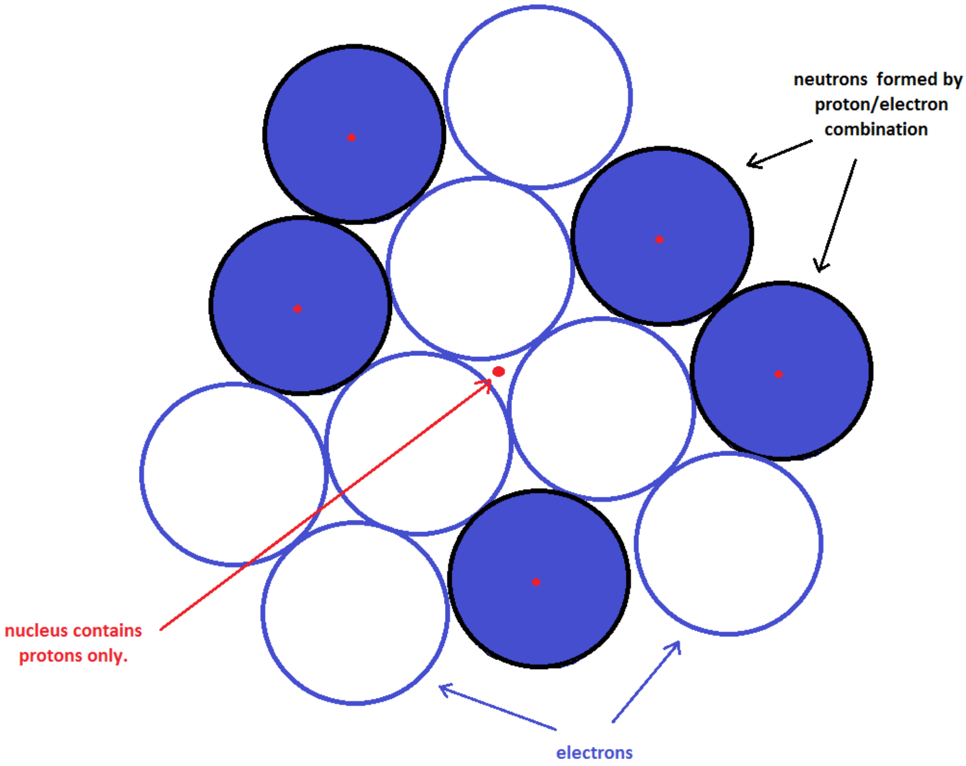


Figure 6d: Where do neutrons reside?

7. Analysis of radio-isotope decay using Energy Field theory:

From AI Physics - Energy Fields - Part 3 [2] and from analysis of radio-isotope decay, the AI concludes that a Neutron is a combination of a Proton (with Rotational Energy Field in one direction) and an Electron (with Rotational Energy Field in the opposite direction).

Some atoms are more stable than others. But what determines the stability numbers? From observation, there appears to be an optimum number of neutrons for a given number of protons.

The observed stability relationship between the number of protons and the number of neutrons appears to be dependent on balancing and minimizing the total net rotational energy of the atom - see Figure 7a:

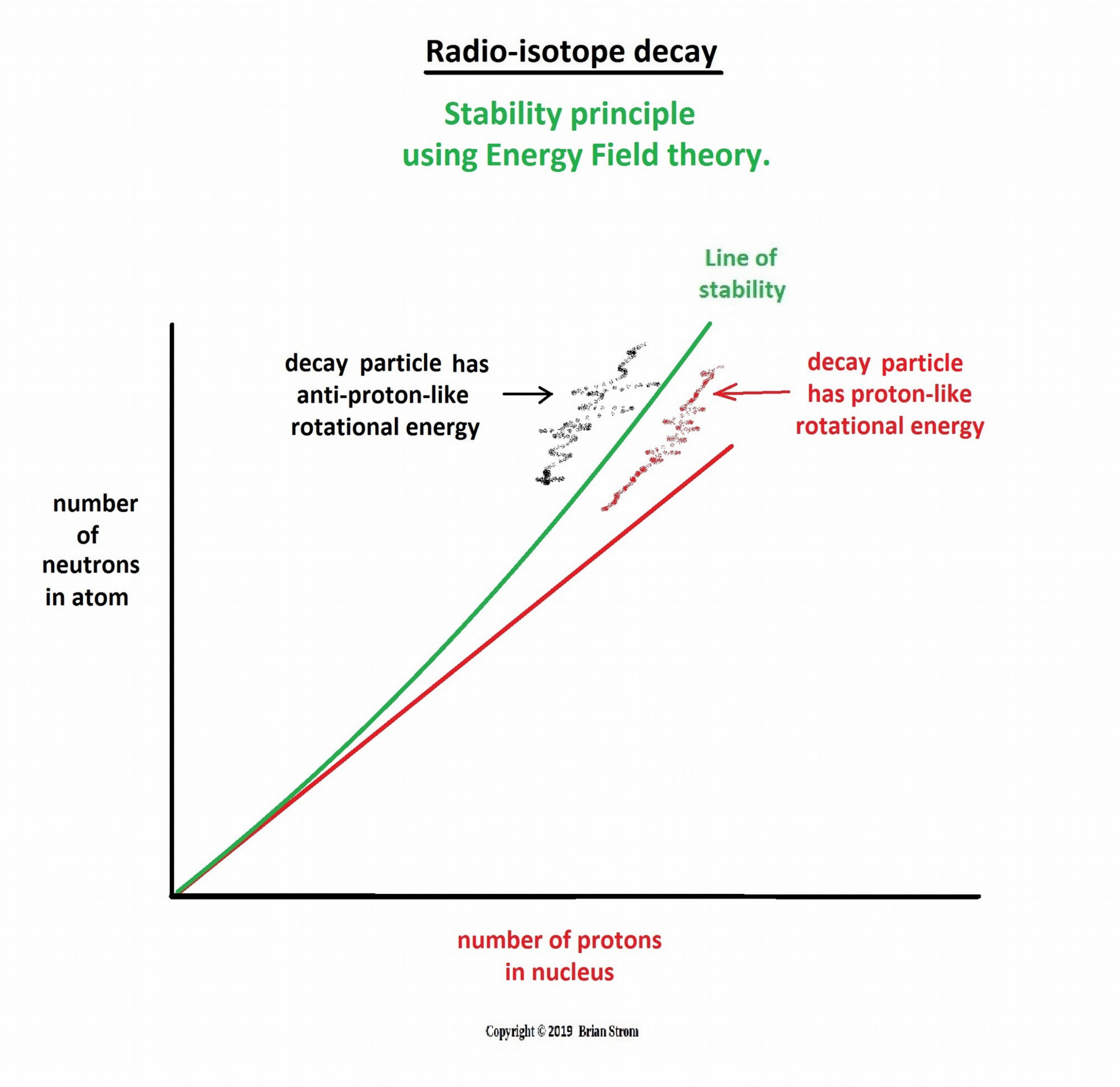


Figure 7a: Stability of radio-isotopes depends on the neutron:proton ratio.

Examples of possible transitions can be shown - either from a “neutron deficiency area” or from an “excess neutron area” - see Figure 7b:

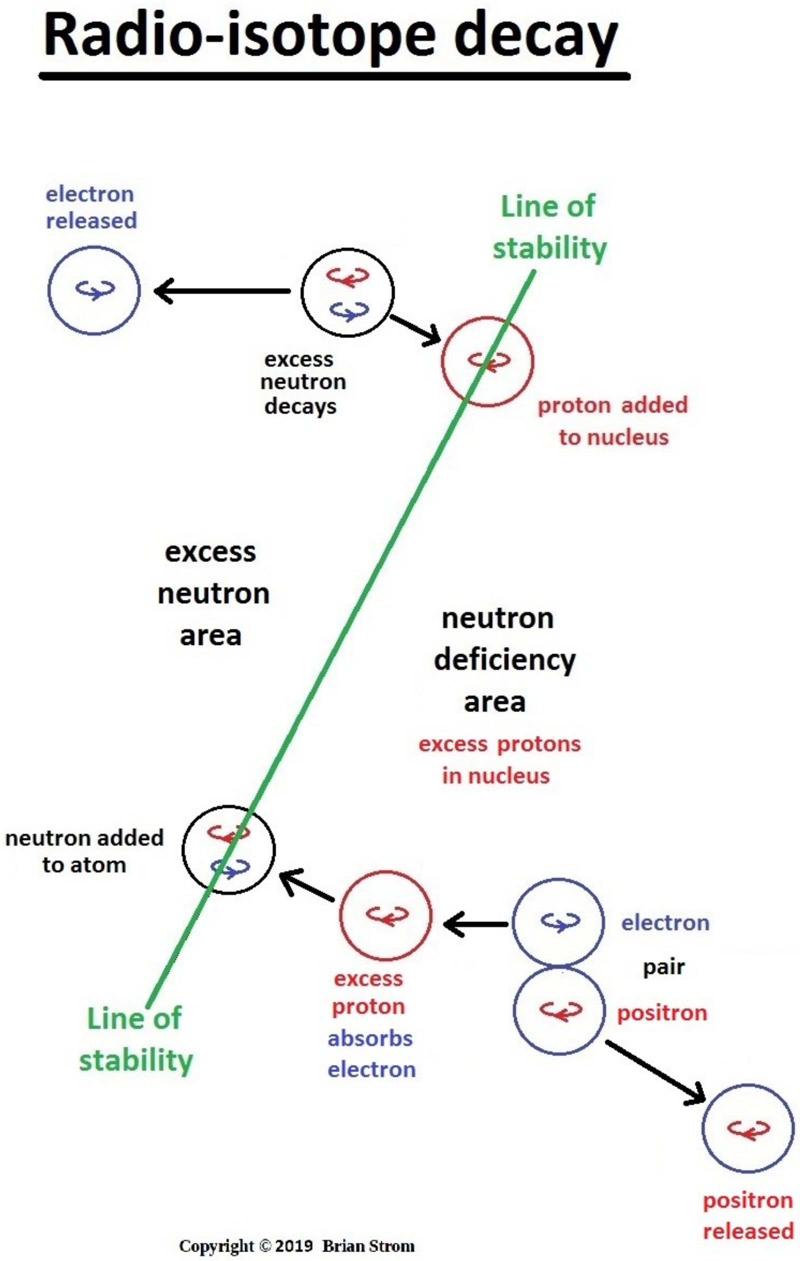


Figure 7b: Example of possible transitions for radio-isotopes.

For each radio-active isotope there are a small number of transition possibilities. These may relate to the configuration of the protons in the nucleus. The configuration of the nucleus appears to change during the transition, with energy changes resulting in one or more gamma emissions:

Figure 7c shows the possible stages in 11 Na 22 to 10 Ne 22 transition:

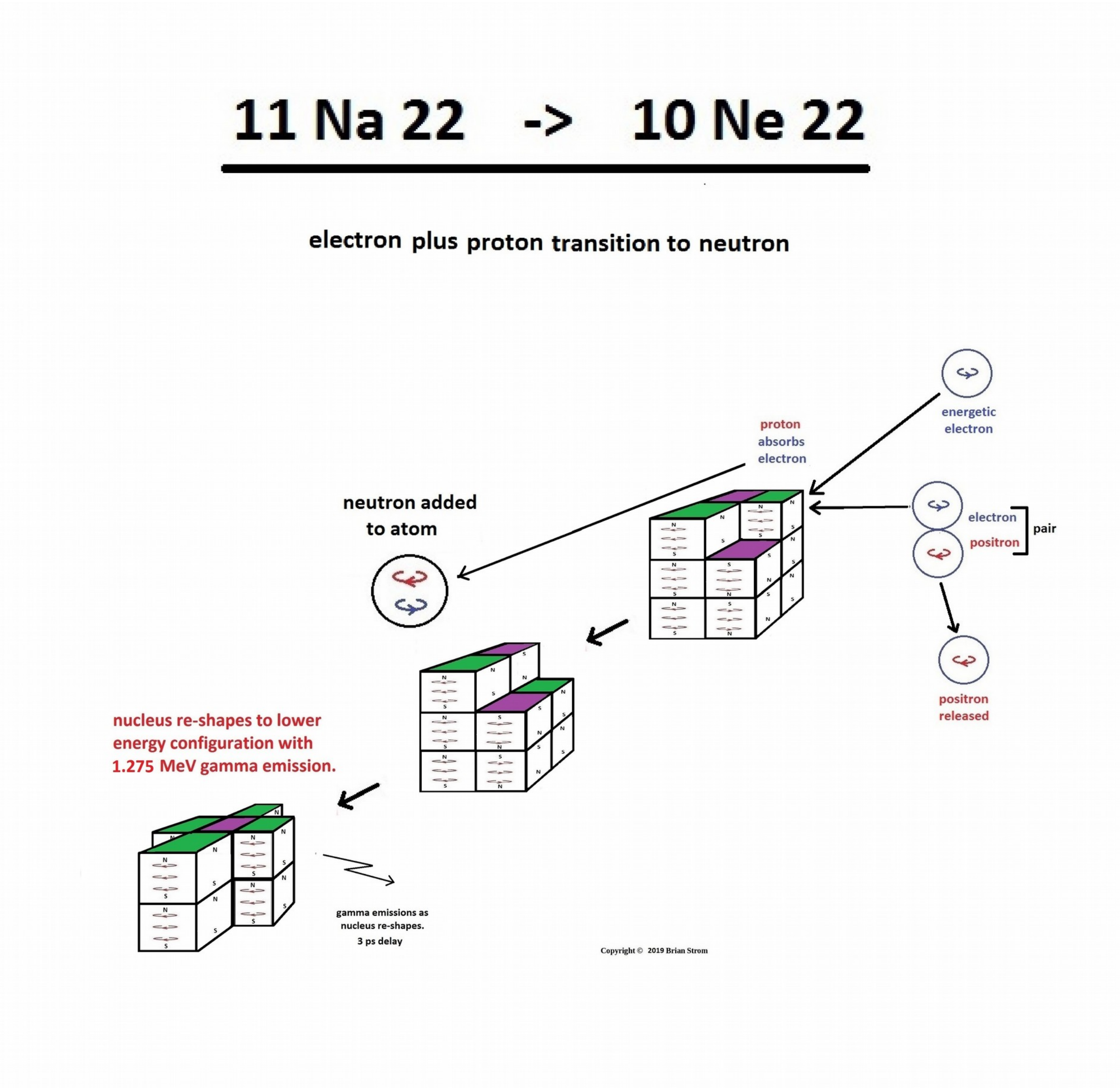


Figure 7c: Possible stages in 11 Na 22 to 10 Ne 22 transition.

Figure 7d shows the possible stages in 11 Na 24 to 12 Mg 24 transition:

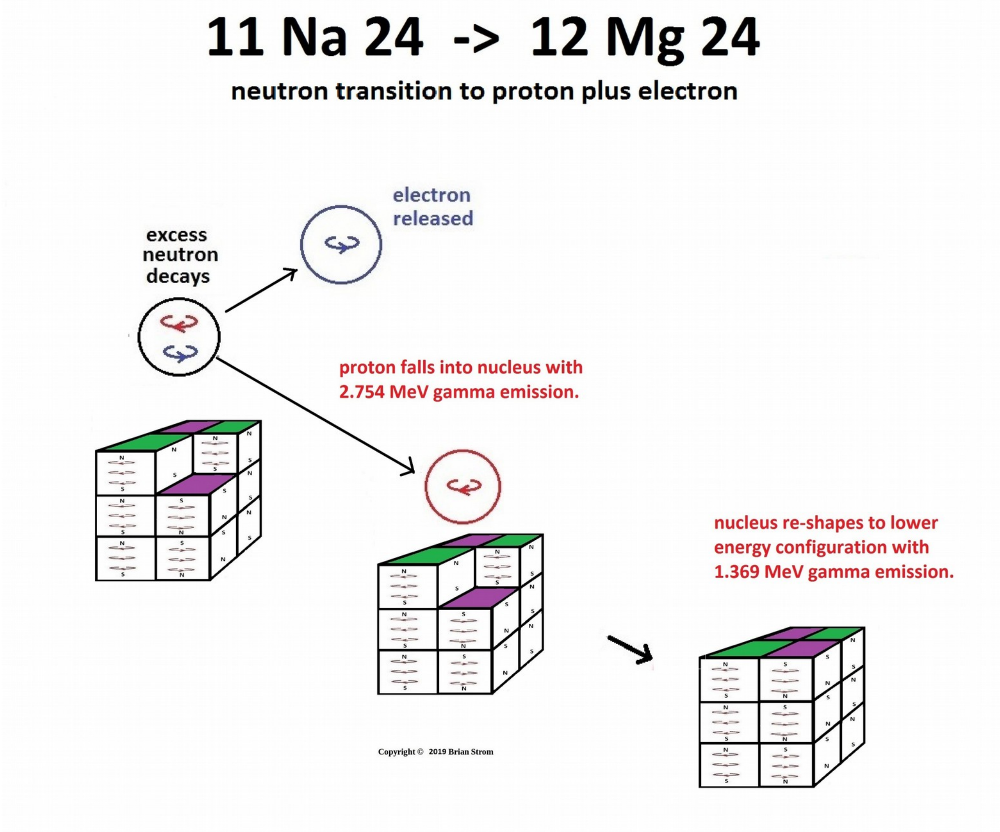


Figure 7d: Possible stages in 11 Na 24 to 12 Mg 24 transition.

To summarize:

For an atom with too many protons (too few neutrons), a proton from the nucleus will combine with a surrounding electron to form an additional neutron. The neutron will move to a position in the atom, outside the nucleus.
The decay emission particle (positron) will have Rotational Energy in the same sense as a proton (when observed transiting through a magnetic field).

For an atom with too many neutrons (too few protons), a neutron will decay into a proton and an electron. The proton will fall into the nucleus and the excess energy will be emitted as one or more gammas. The electron will be emitted from the atom and will have Rotational Energy in the opposite sense to a proton (when observed transiting through a magnetic field).

8. Analysis of atomic structure using Energy Field theory:

Analysis of atomic spectra and radio-isotope decay suggests that the structure of the nucleus, and the structure of the atom, are as shown in the attached diagram.

Rotational Energy vectors for protons and electrons may be in random directions and of random magnitudes.

For the nucleus to be most stable, protons may be in balanced pairs.

Similarly, for the atom to be most stable, the surrounding electrons may be in balanced pairs.

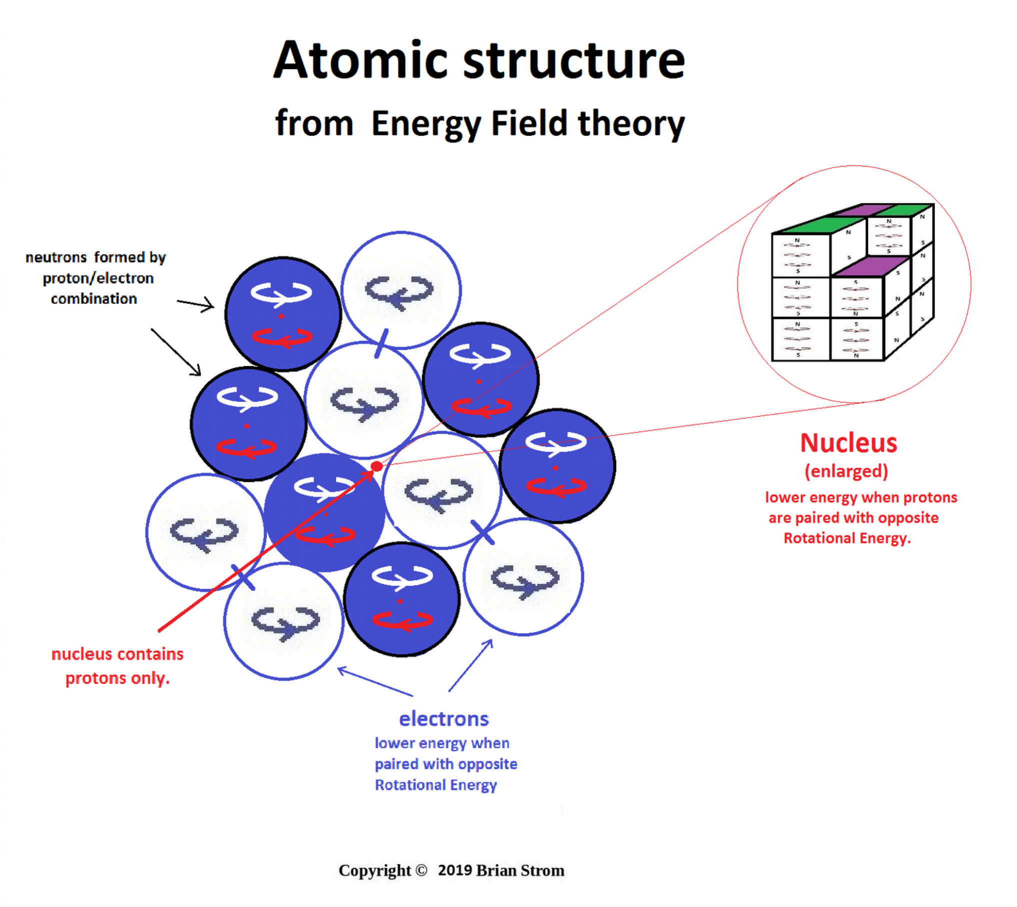


Figure 8a: Atomic structure using Energy Field theory.

9. Energy Field of an atom:

This atomic Energy Field will be strongly dependent on the shape of the Energy Field around the nucleus (protons) and, to a lesser degree, on the much weaker Energy Field created by the surrounding cluster of electrons.

Hence the atomic Energy Field will be strongly dependent on the configuration of the protons in the nucleus. Pairs of protons in the nucleus may be arranged in a number of different configurations, which will result in a number of different allotropes. Some examples for Carbon are shown below:

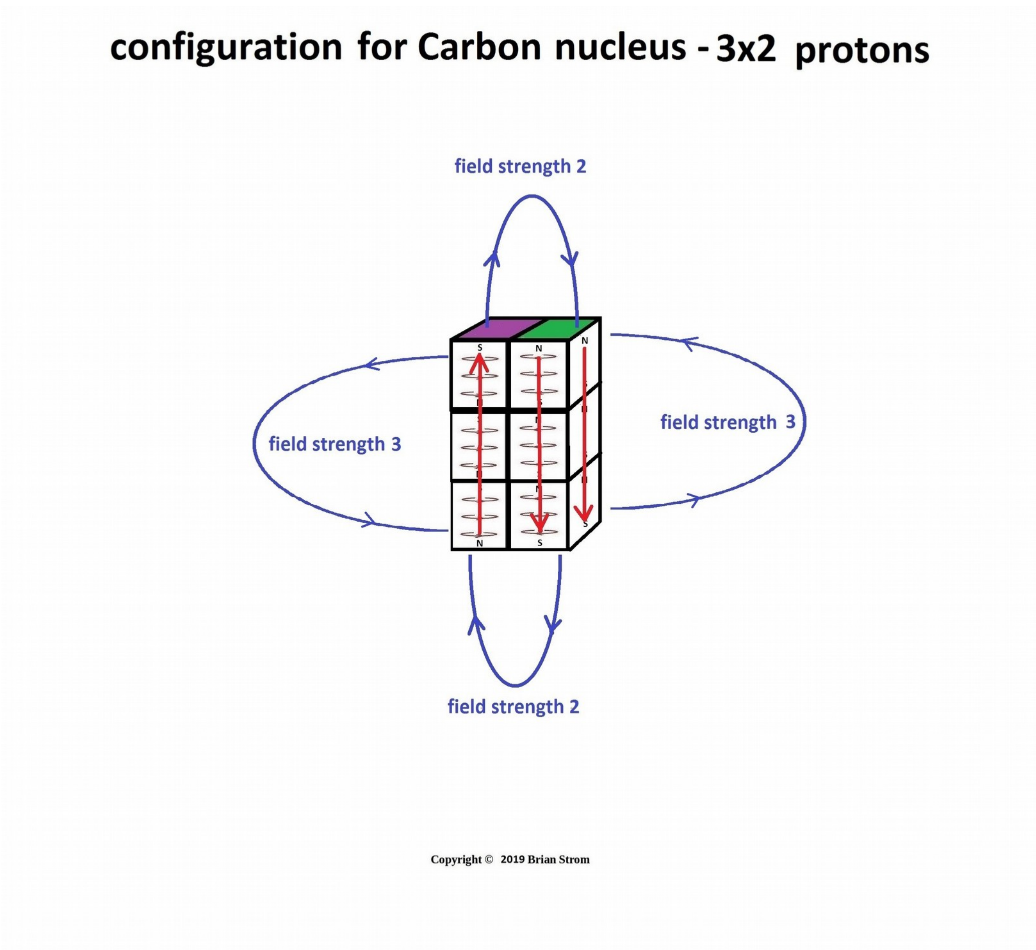


Figure 9a: Energy field of Carbon nucleus. - 3 x 2 configuration.

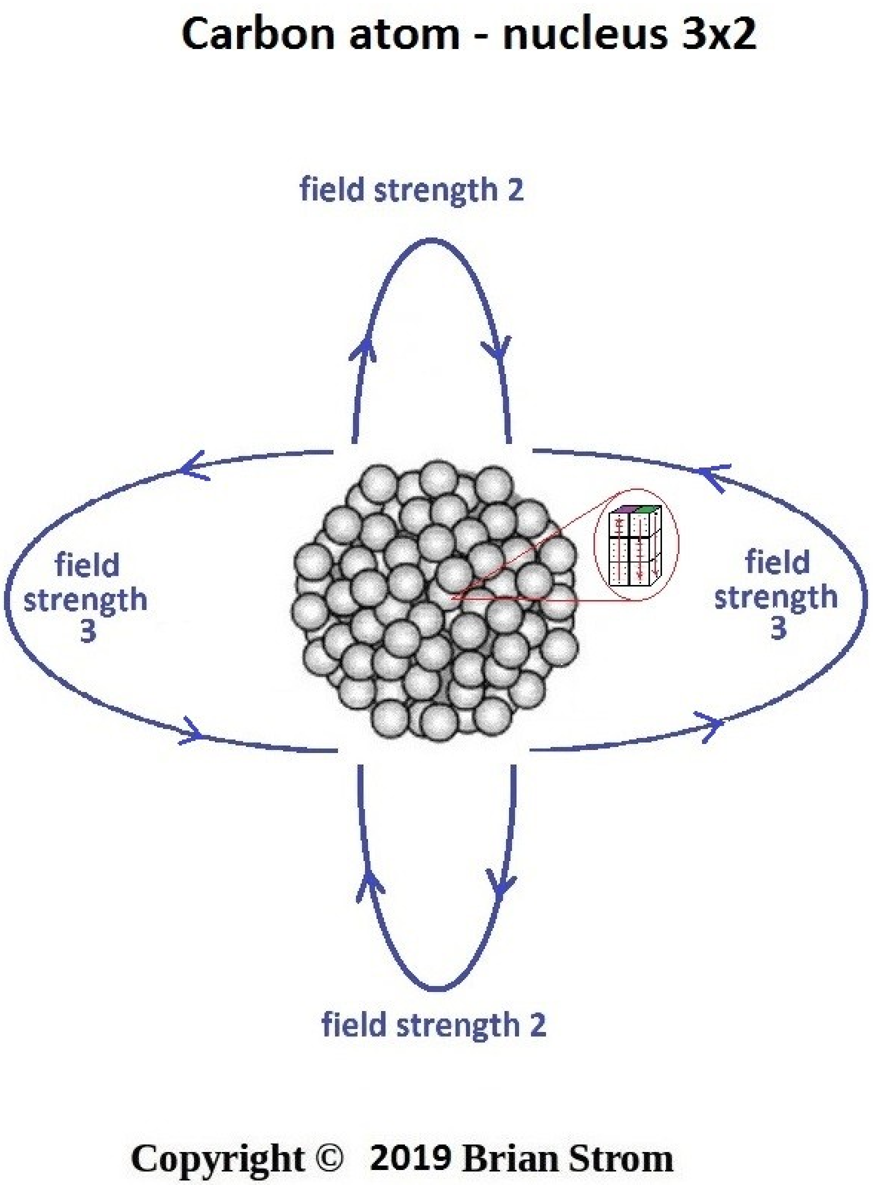


Figure 9b: Energy Field of Carbon atom – 3 x 2 configuration.

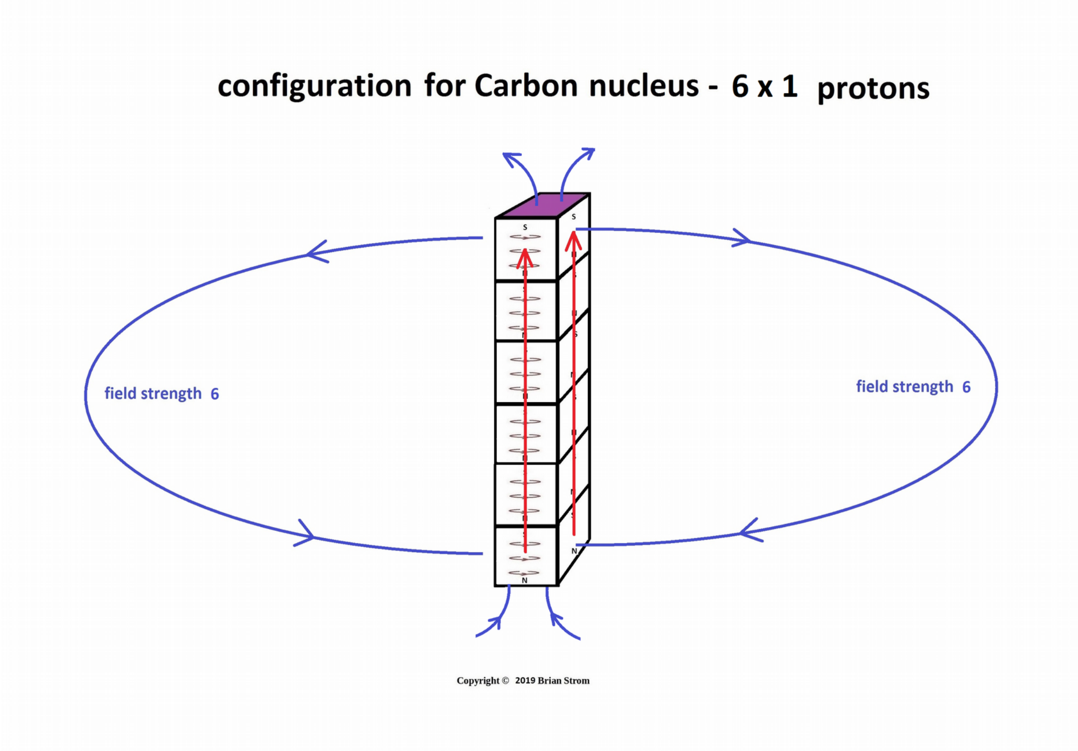


Figure 9c: Energy field of Carbon nucleus. - 6 x 1 configuration.

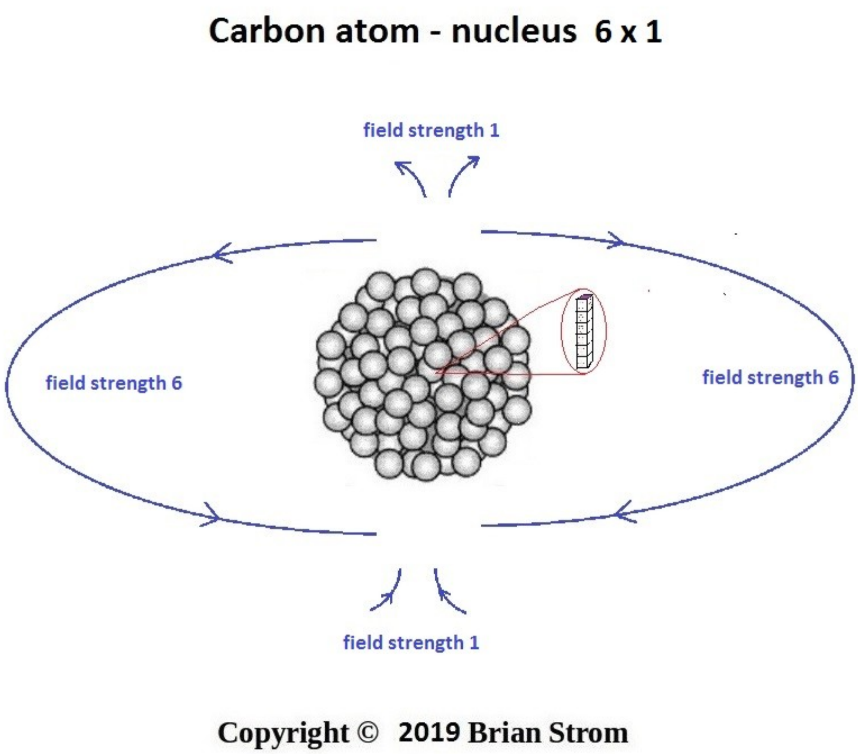


Figure 9d: Energy field of Carbon atom - 6 x 1 configuration.

10. Energy Field theory and of crystal lattice structure:

From Energy Field Theory: The grouping of atoms into crystal lattice structures will depend on the shape of the Energy Field surrounding each atom. Two examples for Carbon show the possible configurations for Diamond and graphene:

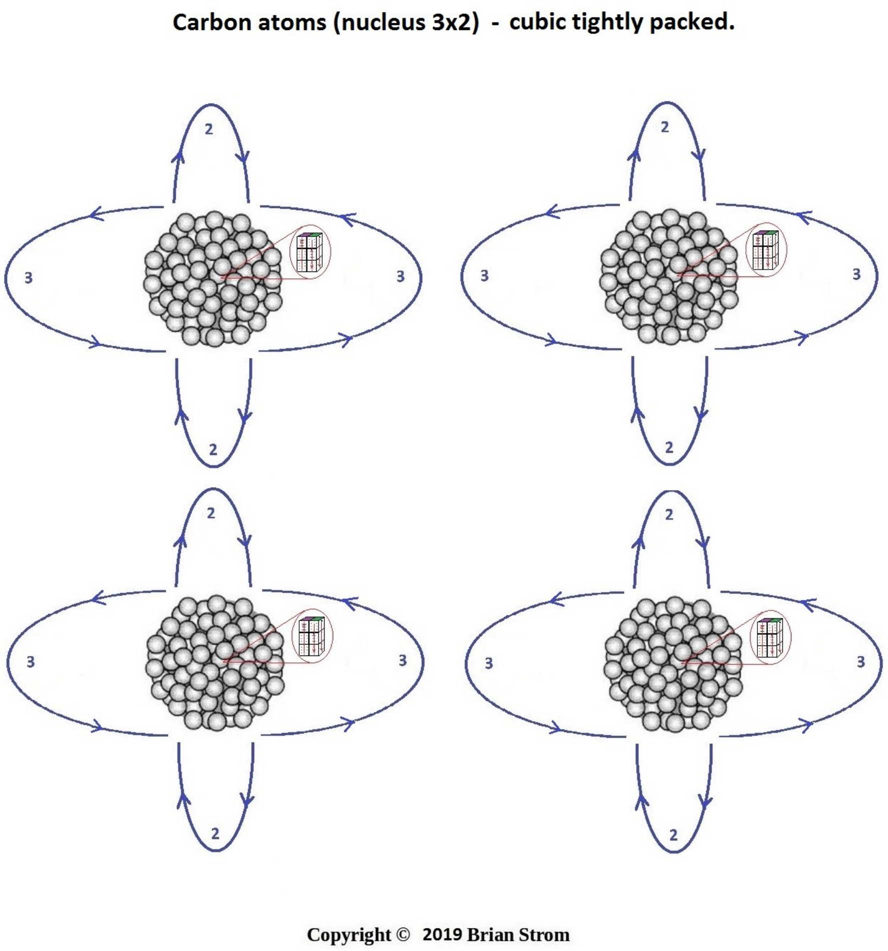


Figure 10a: Lattice structure for 3x2 Carbon - the diamond allotrope.

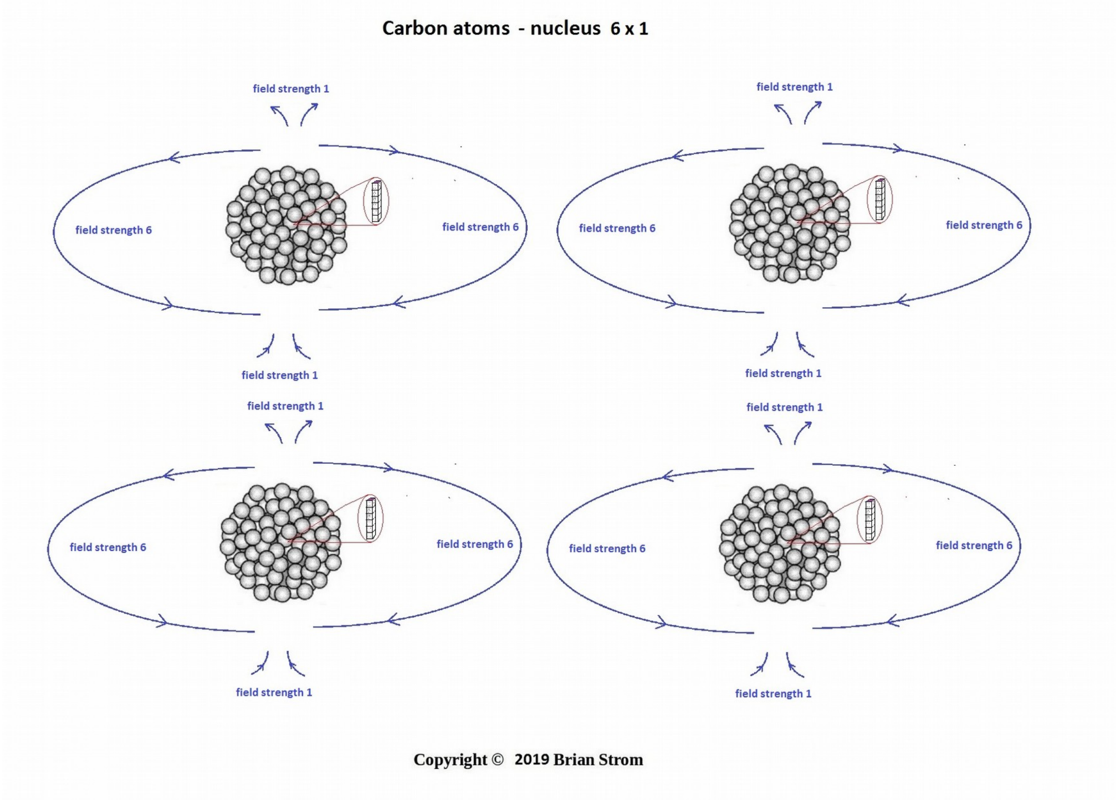


Figure 10b: Lattice structure for 6x1 Carbon - the graphene allotrope.

11. Energy Field theory and molecular structure:

The strength and shape of the energy fields around atoms - hydrogen, oxygen, carbon for example - will determine how these atoms can combine to form molecules - of water and hydrocarbon for example.

The Energy Fields can be arranged in many configurations which would explain the multiplicity of molecular combinations. Also, each molecular combination may change with temperature which would explain the changing phases for these molecules.

12. Summary and Conclusions

In this paper, we have analyzed advanced interactions between energy fields and proposed the nature of these interactions at the sub-atomic scale.

We have not used any historic physics theories involving concepts that cannot be observed. The proposals for the interaction of energy fields are not dependent on the old physics guesswork of “charge” and “magical orbits”.

Whilst one or other energy field may appear to dominate, it does not mean that other energy fields are not present, at lower strengths.

Within the atom, the rotational energy fields of the protons (and electrons) appears to dominate, whilst the potential (gravitational) energy field may be insignificant.

These results may provide an alternative explanation for the “conventional” forces at the sub-atomic level, an explanation for the existence of allotropes, and alternative explanations for lattice and molecular structures.

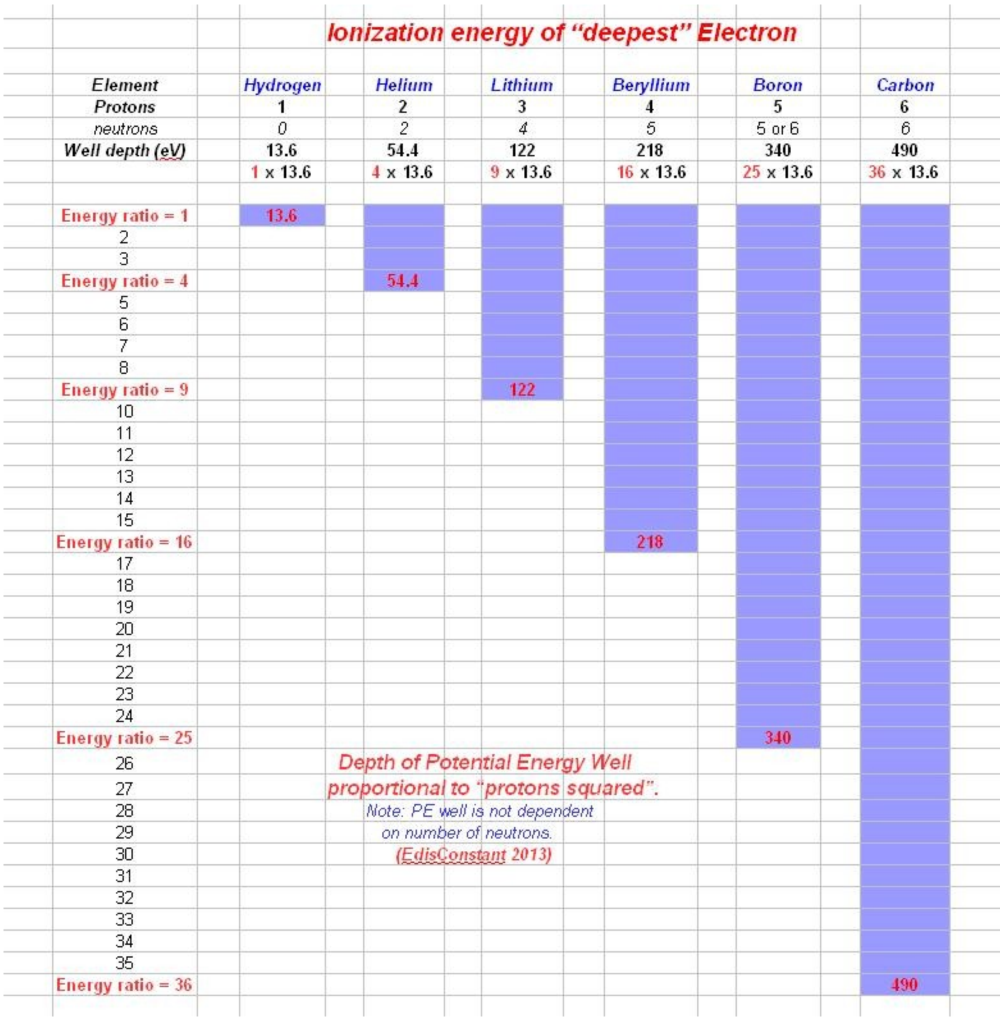
Further information available on Blog: https://edisconstant.wordpress.com/

11. REFERENCES:

[1] **Brian STROM.** “AI Physics – Atomic Structure - Part 1.” **viXra: 1811.0162** November 2018. This paper includes an analysis of the ionization energies and spectral emissions.

[2] **Brian STROM.** “AI Physics – Energy Fields - Part 3.” **viXra: 1906.0492** June 2019. This paper includes an analysis of advanced interactions between energy fields.

12. APPENDIX:



Ionization energy of "deepest" Electron
Element | Hydrogen | Helium | Lithium | Beryllium | Boron | Carbon
Protons | 1 | 2 | 3 | 4 | 5 | 6
neutrons | 0 | 2 | 4 | 5 | 5 or 6 | 6
Well depth (eV) | 13.6 | 54.4 | 122 | 218 | 340 | 490
1 x 13.6 | 4 x 13.6 | 9 x 13.6 | 16 x 13.6 | 25 x 13.6 | 36 x 13.6
Energy ratio = 1
2
3
Energy ratio = 4
5
6
7
8
Energy ratio = 9
10
11
12
13
14
15
Energy ratio = 16
17
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Energy ratio = 25
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34
35
Energy ratio = 36
13.6
54.4
122
218
340
490
Depth of Potential Energy Well
proportional to "protons squared".
Note: PE well is not dependent
on number of neutrons.
(EdisConstant 2013)

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