"AI" Physics – Molecular Stucture (Part 2)

Brian Strom

Email: brianstrom999@ aol.com

Abstract:

In earlier papers on Atomic Structure and Energy Fields, AI was used to explore the structure of the atom and the size of the electron, by analyzing the results of established experiments on ionization energies and spectral emissions. Radio-isotope transitions were analyzed to propose the nature of the nucleus and allotropes. In the first paper on Molecular Structure, an AI model was used to propose the nature of the crystal lattice, and the nature of molecular structure. In this paper, molecular bonds and molecular structure are analyzed in detail, which leads to a different perspective on the nature of inorganic, organic, photosynthetic and super-conducting molecules.

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 and Machine Learning, proposes an alternative explanation for the structure of atoms and molecules.

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 radio-isotope transitions, the characteristics of different elements and isotopes, nor the existence of different allotropes and molecular structures.

In 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. The AI goes on to conclude that electrons are larger than presently imagined.

In the second paper on Atomic Structure **[2]**, Energy Field Theory **[3][4][5]**is used to further analyze the nature of sub-atomic particles. The AI is provided with the principle that protons, and electrons, are most stable when in pairs. The AI combines the given information and reaches conclusions on the behavior of particles in the atom. The theory leads to further detailed proposals for the Rotational Energy Fields of protons in the nucleus, and hence to proposals for the structure of the nucleus and an explanation for allotropes.

In the first paper on Molecular Structure **[6],** Atomic Structure Theory and Energy Field Theory are used to extend the analysis of the structure of atoms, molecules and allotropes. The characteristics of the nucleus suggest that protons will align their Rotational Energy (magnetic) Fields to form a minimum energy configuration for the external conditions which apply: temperature, pressure and "magnetic" field.

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.

The AI proposes that the adjacent atoms in a molecule are attracted by the Rotational Energy Fields of their nuclei. The atoms tend to move together, displacing and deforming the electron clusters surrounding each nucleus, until a position of stable equilibrium is attained.

The nature of allotropes, the nature of the crystal lattice, and the nature of molecular structure are all examined. 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.

The AI proposes that some groups of protons will be configured in a number of stable configurations, each with a similar net energy level. For Carbon, with 6 protons in the nucleus, there are many possible configurations. The different allotropes of Carbon may have have different arrangements of the protons in the nucleus. The bonds between the different Carbon atoms have different strengths resulting in different bond lengths and bond energies. For carbon, the different bond strengths are designated single, double and triple bonds.

In this second paper on Molecular Structure, the relationship between molecular bonds and energies is examined in more detail. The links between the different strengths of bonds and the different characteristics of atoms, molecules and allotropes are explored.

If the elemental allotropes and the myriad of chemical compounds are dependent on the energy fields of the protons in the nucleus (and not on shared electrons in magical orbits), then exciting new discoveries may be possible.

Can the nuclear proton configuration be changed by a strong (magnetic) field? Can one allotrope be changed into another?

2. Molecular bonds: the relationship between lengths and energies:

With reference to Atomic Structure Part 1 **[1]** and to Molecular Structure Part 1 **[6]**:

The AI model indicates that atoms are formed of electron clusters surrounding nucleonic protons and that, as atoms combine with other atoms, the electron clusters become displaced and deformed.

A typical resultant molecule will have the shape of the "space-filled molecule" in analytical chemistry – see Figures 2a and 2b:

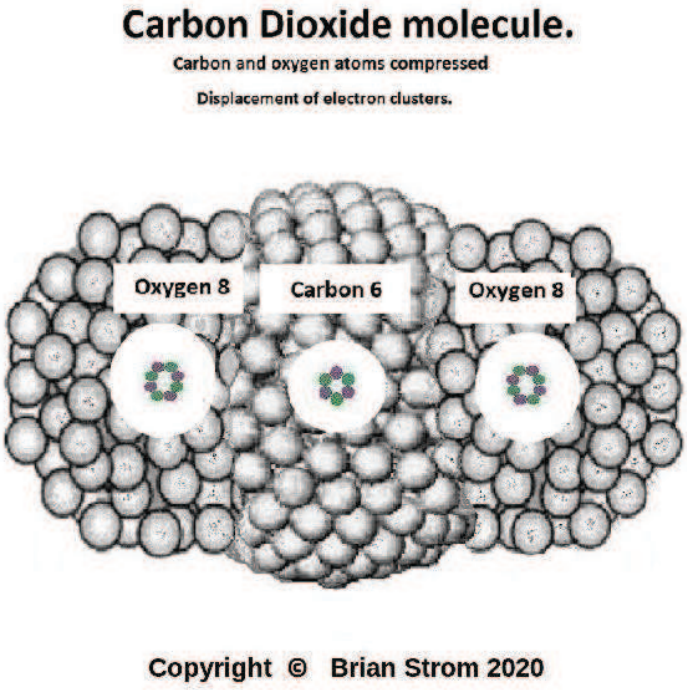

Figure 2a: Carbon Dioxide: Displacement and deformation of electron clusters:

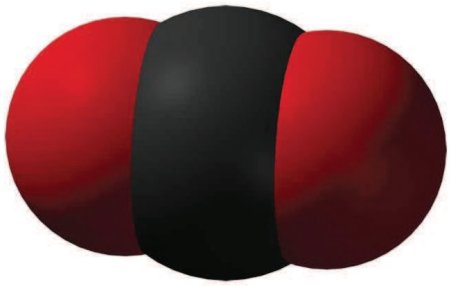

Figure 2b: Carbon Dioxide: Space-filled molecule:

From measured values, there is an inverse relationship between molecular bond lengths and molecular bond energies. Hence, a longer molecular bond requires less energy to break it than a shorter molecular bond.

3. Analysis of molecular bond lengths:

The AI model is programmed to follow the rule that atoms will tend to move along Potential Gradients to positions of lower Potential Energy. Hence the Potential Energy Wells of two atoms will move towards each other and start to merge, thereby reducing the total energy of the system – see Figure 3a. The depth of the Potential Energy Wells, and hence the attraction between them, is dependent upon the number of protons in each nucleus.

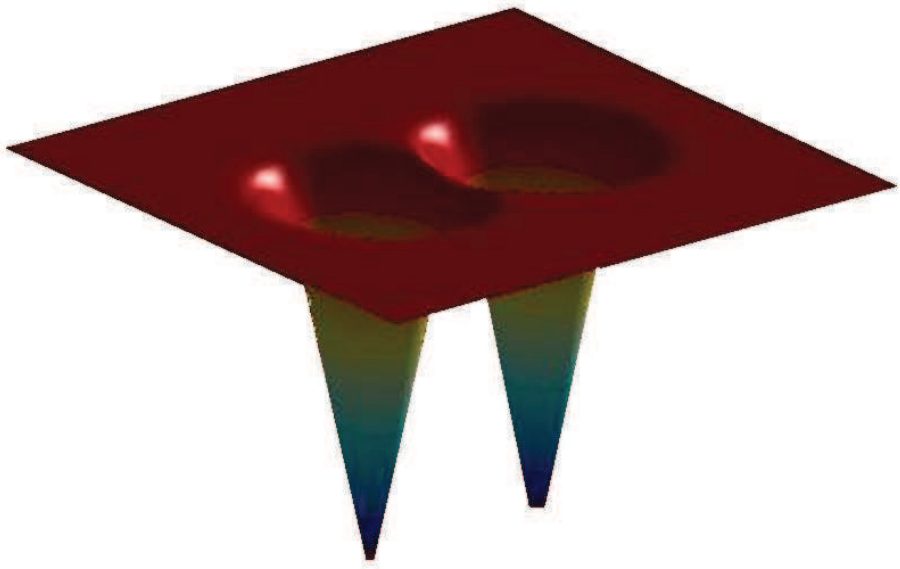

Figure 3a: 2-dimensional representation of merging atomic PE wells.

Additionally, the atomic nuclei will turn such that the Rotational Energy (magnetic) Fields of the nuclei attract one another, as would two permanent magnets.

As the two atoms begin to merge with each other, the electron clusters surrounding the atomic nuclei will be displaced and deformed, increasing the “Displacement Energy”.

The combination of the Potential Energy Field, the Rotational Energy Field and the oppositional Displacement Energy Field will determine the resultant molecular bond length. The mathematical representation is shown in Section 5.

Similarly, the energy required to break a molecular bond will be dependent on the number of nucleonic protons in each atom, and the configurations of those nucleonic protons.

The commonly published data on **molecular bond lengths** is shown in Figure 3b.

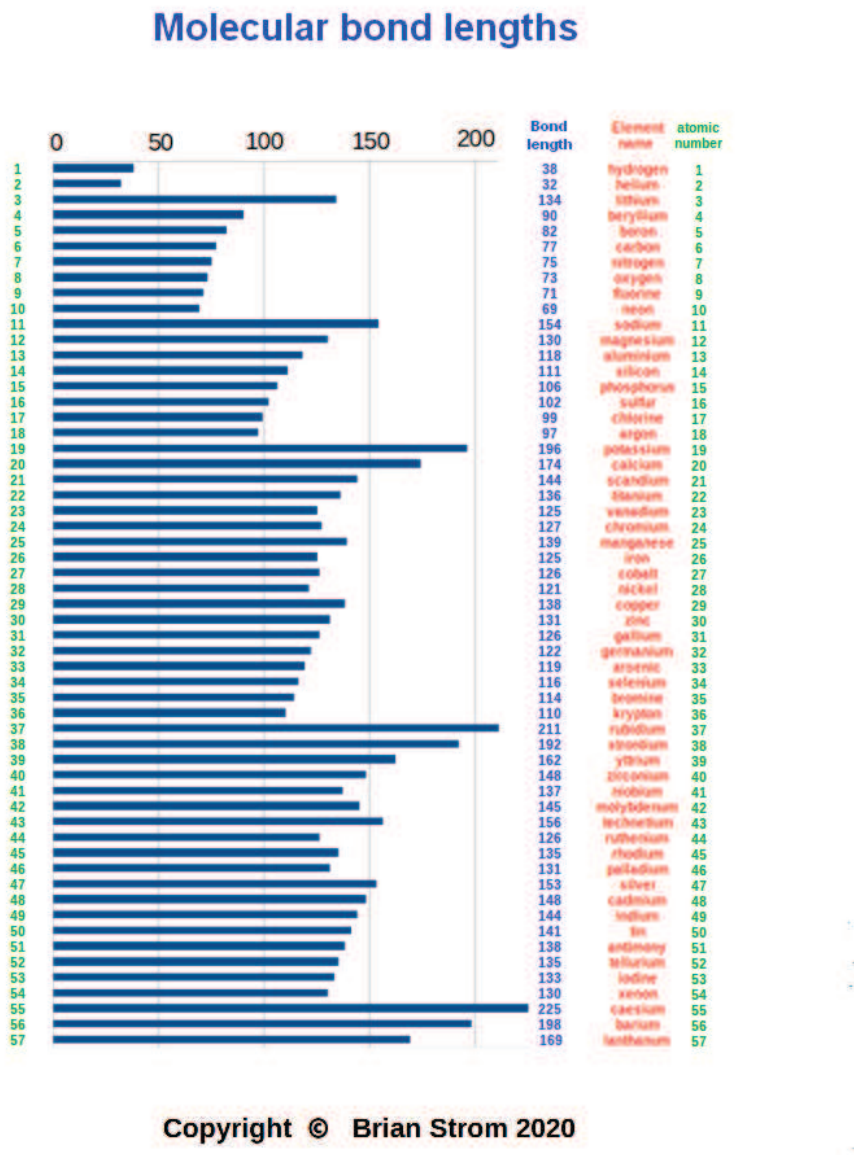

Figure 3b: Histogram of published Molecular bond lengths.

From this diagram, the AI notes that, as the number of nucleonic protons increases, the Potential Energy Wells get deeper and the molecular bond lengths become shorter. As the bond lengths become shorter, so the energy required to break the bond will become larger.

However, the AI observes another key factor which produces the step-change to larger molecular bond lengths for Lithium (3), Sodium (11) and Potassium (19).

From "AI Physics – Atomic Structure – Part 1" **[1]**, these elements are seen to gain an additional layer of electrons surrounding the nucleus. The increased size of the electron cluster results in larger atoms, longer molecular bond lengths, and lower molecular bond energies.

These two effects combine to give the molecular bond length profile shown in Figure 3b.

4. Multiple bond strengths and lengths:

Some elements have multiple bond lengths and energies, often loosely designated as single, double, or triple bonds. When comparing the molecular bond parameters of these atoms, **the number of nucleonic protons will be the same, and the depth of the adjacent Potential Energy Wells will be the same.**

If the Potential Energy Wells are the same then, presumably, it is the different configurations of protons in the atomic nuclei, and hence the different strengths of the Rotational Energy (magnetic) Fields, that determines the different lengths and energies of these molecular bonds.

For different allotropes, with different configurations of the nucleonic protons, the attractive force between the Rotational Energy Fields will be different. Hence the bond energies (and bond lengths) will vary, leading to the so-called single, double and triple bonds.

The AI has modelled the bond energies for the various allotropes of Carbon, Nitrogen and Oxygen atoms. For Carbon and Oxygen, with symmetrical nuclei, the bond energies are approximately in units of 1x, 2x and 3x. For Nitrogen, with 7 protons in the nucleus, the configuration of the protons cannot be symmetrical. This asymmetrical configurations of Nitrogen leads to bond energies in units of 1x, 3x and 6x approximately, as shown in Figure 4a:

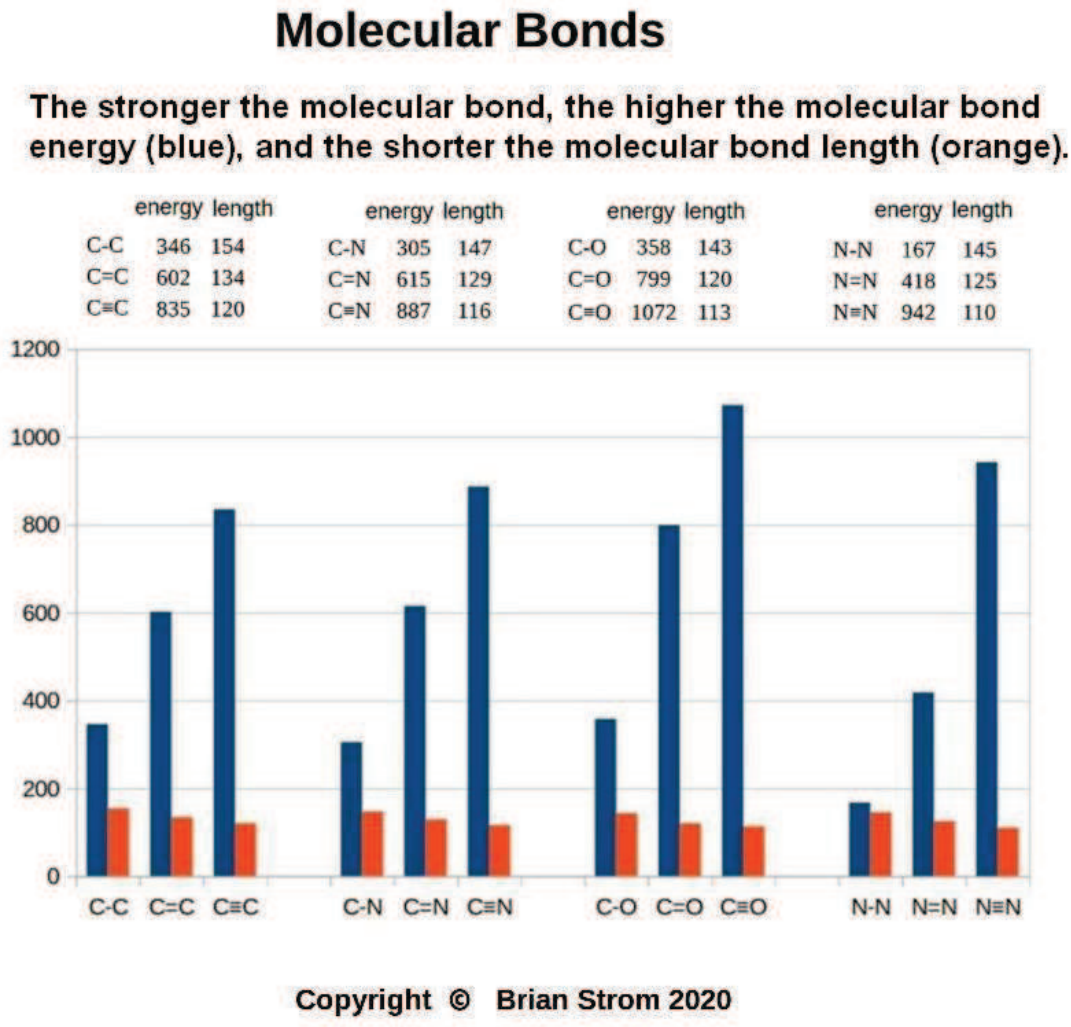

Figure 4a: Example of multiple bond lengths and energies

Figure 4b shows the composite diagram for the elements (from Lithium 3 to Iron 26) plus the common allotropes for Carbon, Nitrogen and Oxygen:

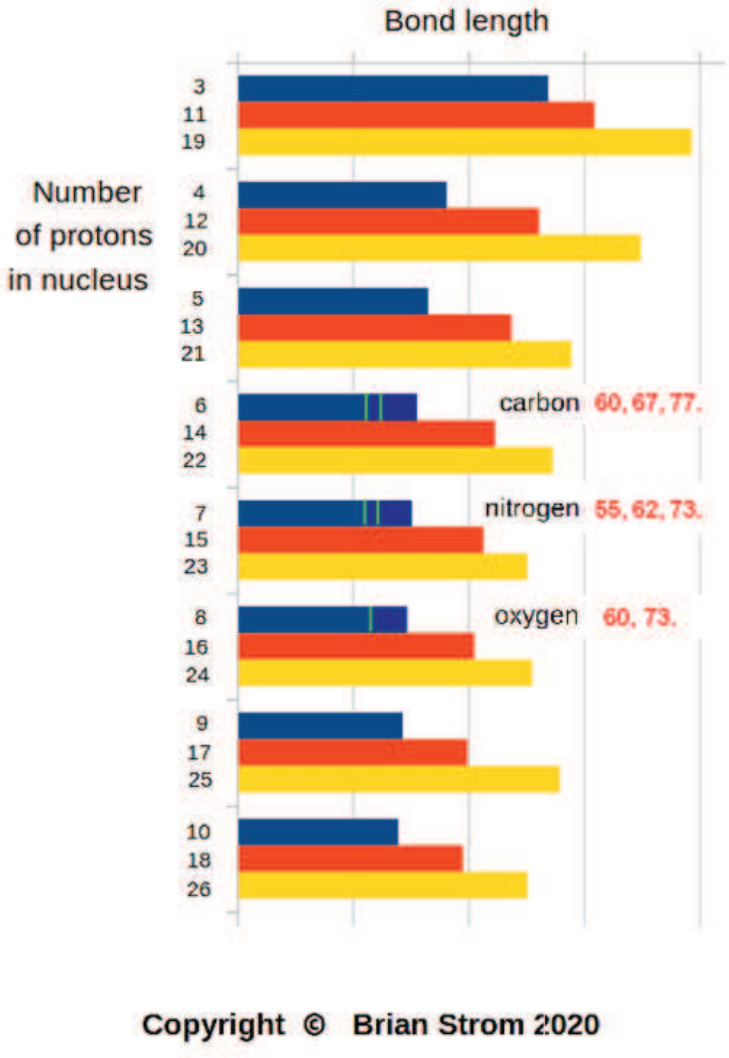

Figure 4b: Molecular bonds for elements and C, N, O allotropes.

5. The equilibrium position for molecules:

Atoms will tend to combine into molecules, and the combination of the Potential Energy Field, the Rotational Energy Field and the Displacement Energy Field will determine the resultant equilibrium position at the stable molecular bond length.

The system will stabilize when the net energy is at a minimum, where the deformed system will be in an equilibrium condition - see Figure 5a.

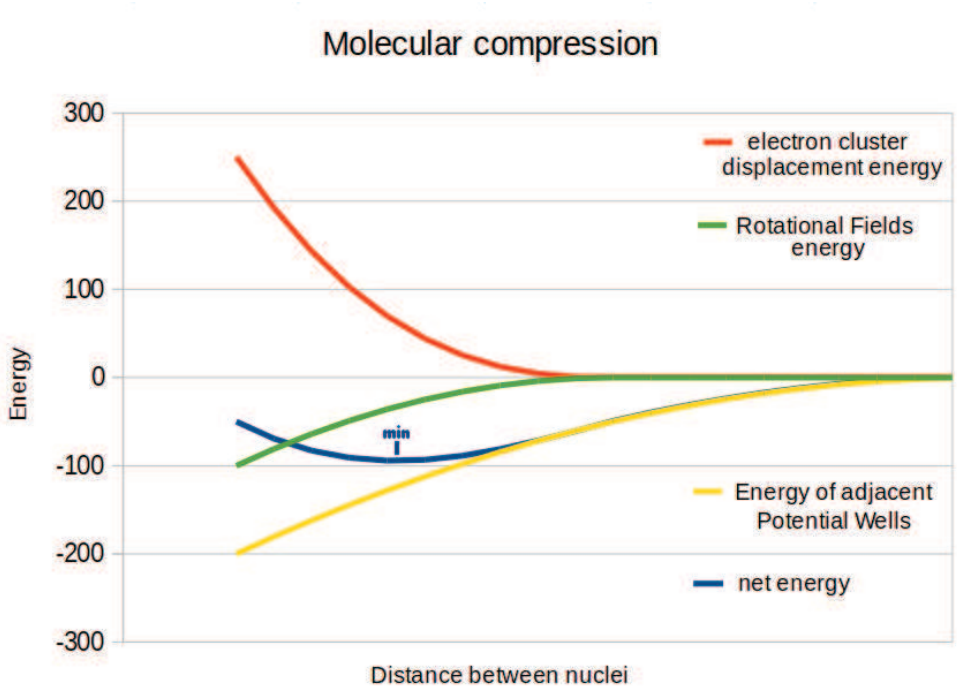

Figure 5a: Energy graph for molecules.

For two atoms combining to form a molecule: The Molecular Compression graph shows the reducing Potential Energy of the two attracting nuclei (yellow), and the increasing Potential Energy of the two, deformed electron clusters (orange).

The reducing Rotational (magnetic) Field energy (green) between the nuclei will depend on the configurations of the nucleonic protons.

The net Energy (blue) shows a minimum at the equilibrium position - when the molecule is stable. This position will define the molecular "bond length" between the two atoms.

Mathematically, the equation for equilibrium is shown in Figure 5b:

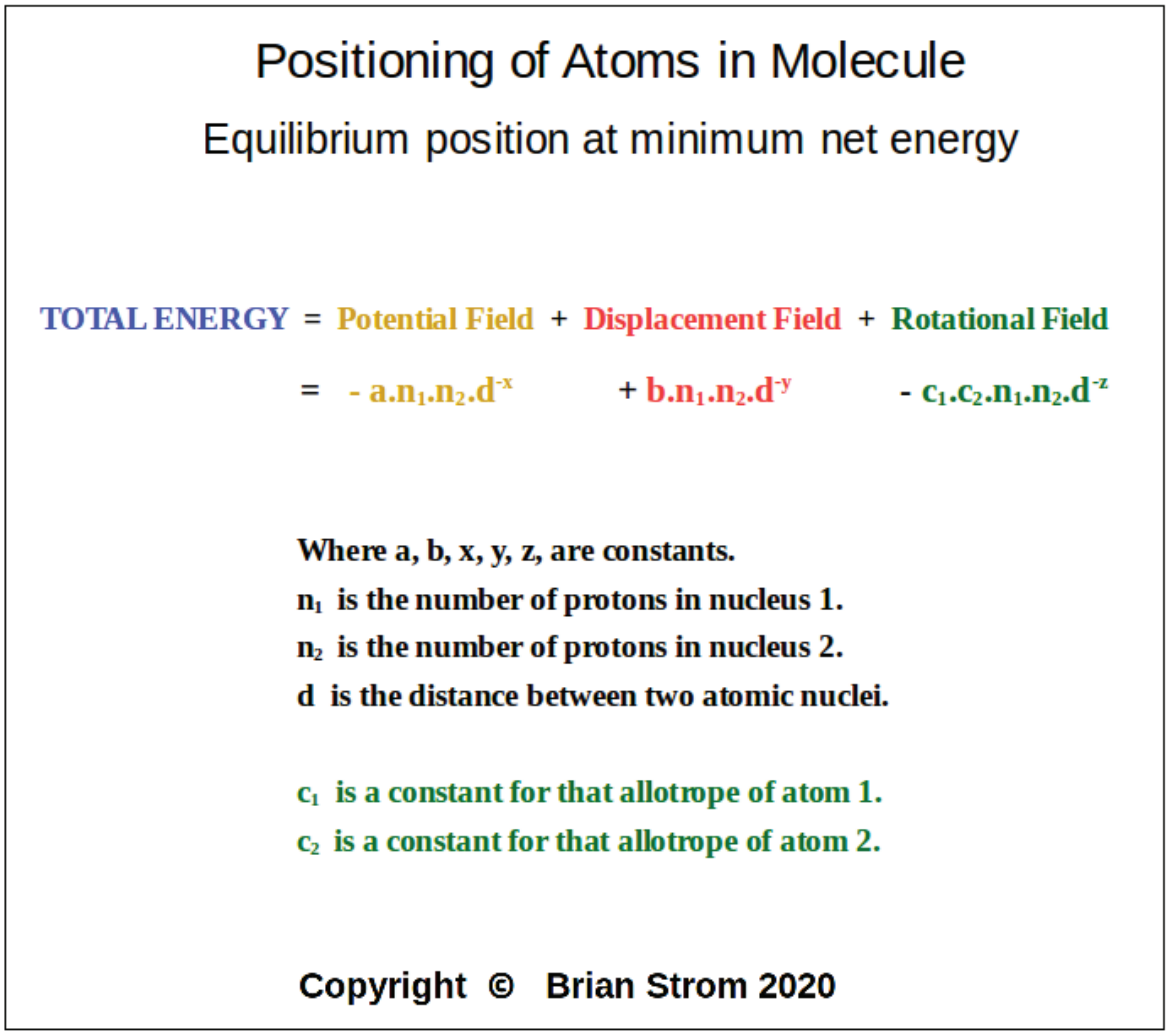

Figure 5b: Mathematical equation for molecular Energy Graph.

In summary:

The AI model shows how molecular atoms can stabilize in an equilibrium position at minimum total energy:

1. The number of protons in each nuclei will determine the depths of the Potential Energy Wells and therefore the attractive force between them.

2. The configurations of the protons in the nuclei will determine the attraction between the Rotational Energy Fields (magnetic fields) of the atomic nuclei.

3. The attractive forces of 1 & 2 above will be balanced by the oppositional forces required to displace and deform the electron clusters.

6. Other aspects of molecular bonds:

For heavier compounds, the Potential Energy Well surrounding the nuclei will be deeper, and the electron clusters surrounding the nuclei will be larger. Hence the molecular bond length to an adjacent atom will be longer. The molecular bond lengths can be seen to increase as a function of the number of nucleonic protons in each atom – see Figure 6a:

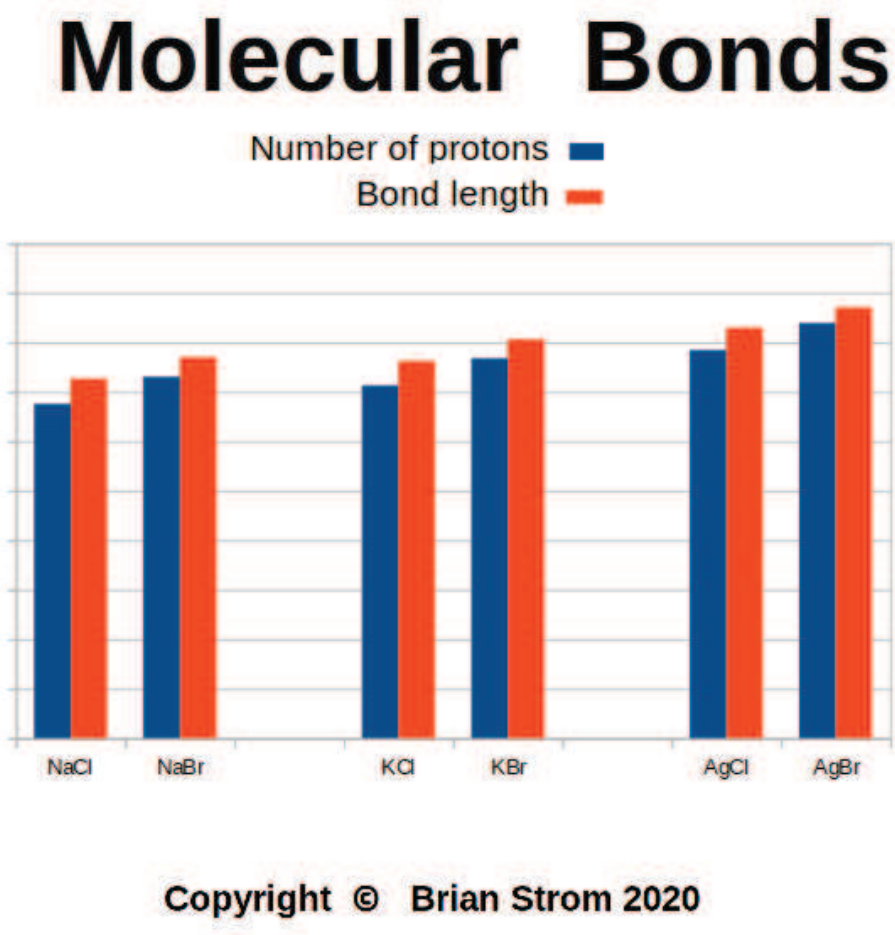

Figure 6a: Histogram of published molecular bond lengths and energies for heavier atoms.

The AI model has identified some other fundamental patterns in the Periodic Table. Here it links the symmetrical configurations of the protons in the nuclei of the Noble gases with the Boiling Points of the gases – see Figure 6b:

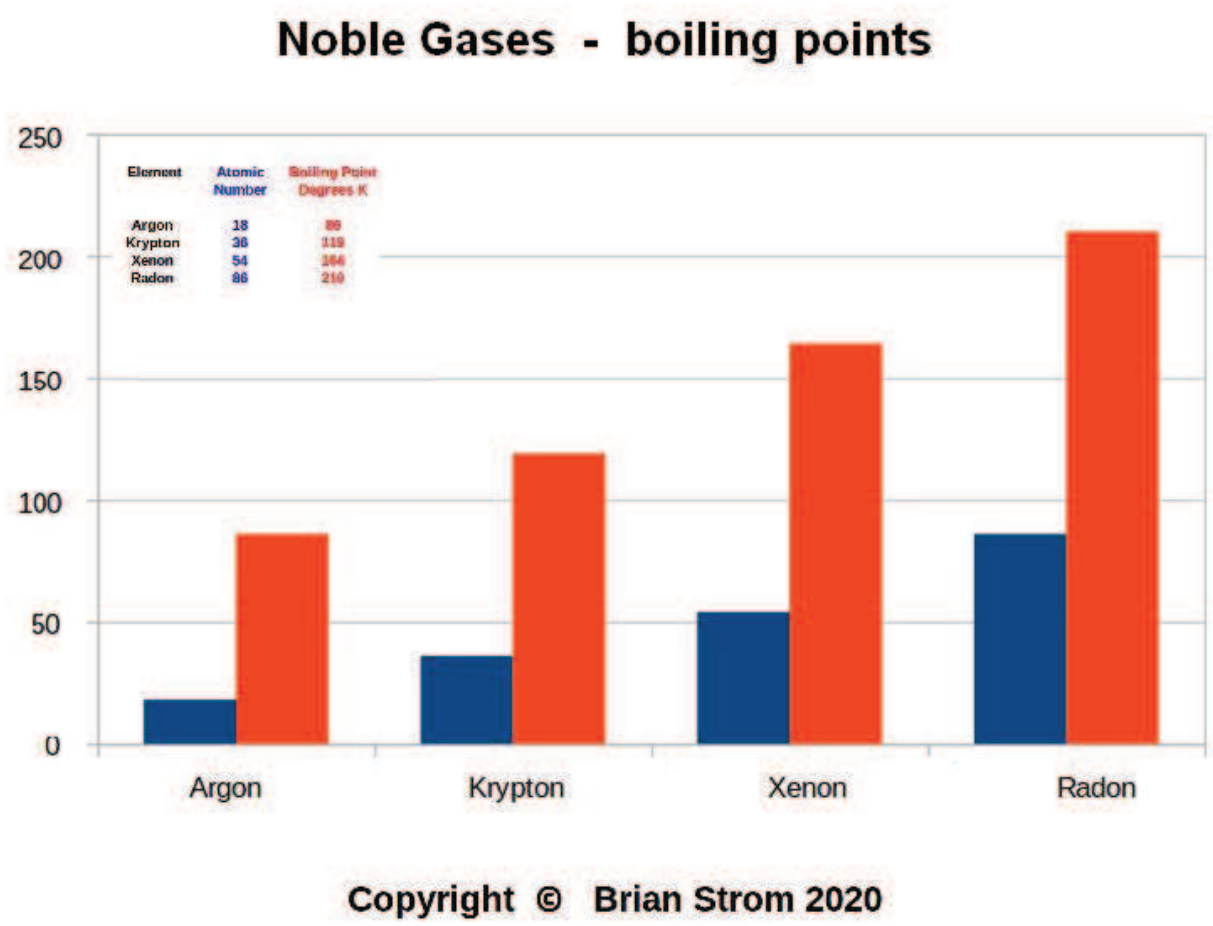

Figure 6b: Histogram of Atomic number and Boiling points for the Noble gases.

Another example of fundamental patterns in the Periodic Table – here the AI model shows the configurations of the protons in the nuclei of the light elements Beryllium, Boron and Carbon, and compares their Bond lengths and Melting points.

The more protons in a nucleus, the deeper the Potential Energy Well, and the larger the electron cluster.

Adjacent atoms are pulled together by the Potential Energy Wells and the attraction between the Rotational Energy (magnetic) Fields of the nuclei.

The greater the net attraction, the shorter the molecular bonds, and the more energy is required to break them. Hence, the melting point is higher – see Figure 6c:

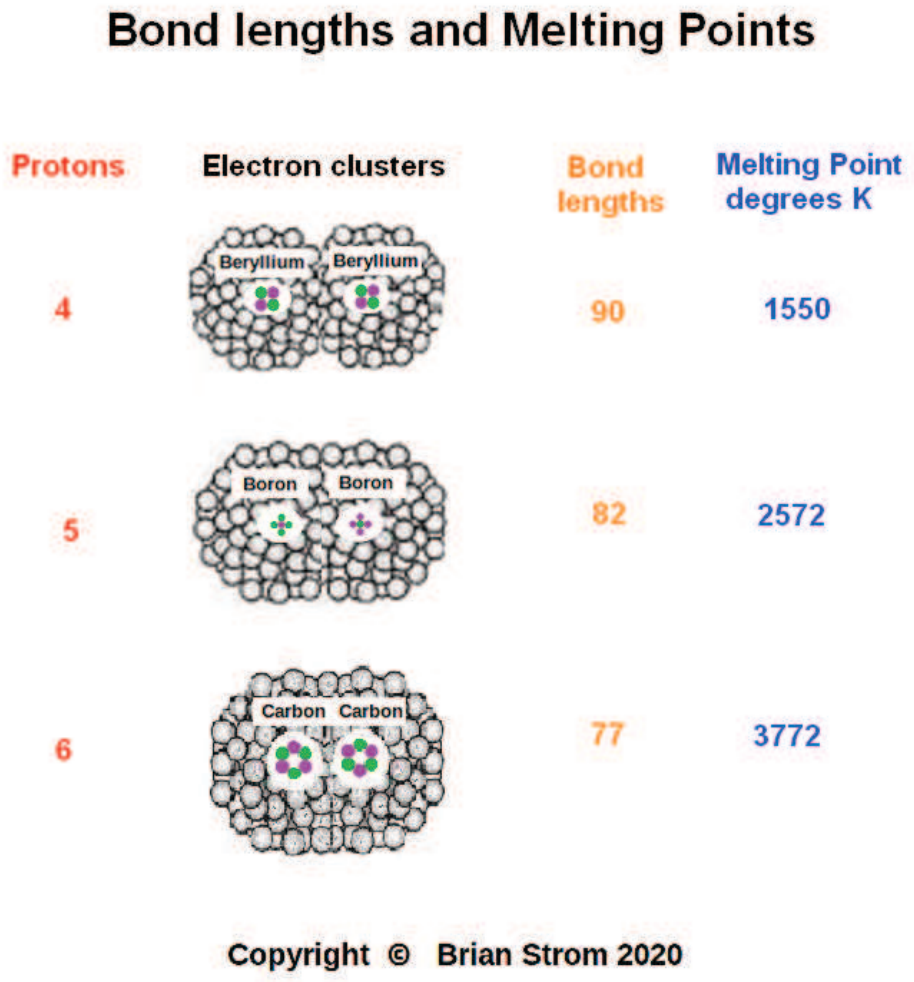

Figure 6c: Proton numbers, bond lengths and melting points.

The AI model is gradually uncovering more complex patterns within the periodic table of elements.

7. Configurations of protons in the atomic nuclei:

Once the electron clusters are deformed, the nuclei of the adjacent atoms will be closer together in the molecule, in a minimum energy position. The configuration will stablilize in this position and will not break without an input of energy.

Under normal conditions, other nearby atoms will not be able to overcome the energy barrier to interact with the molecule, unless they have high kinetic energy (high velocity) – see Figure 7a:

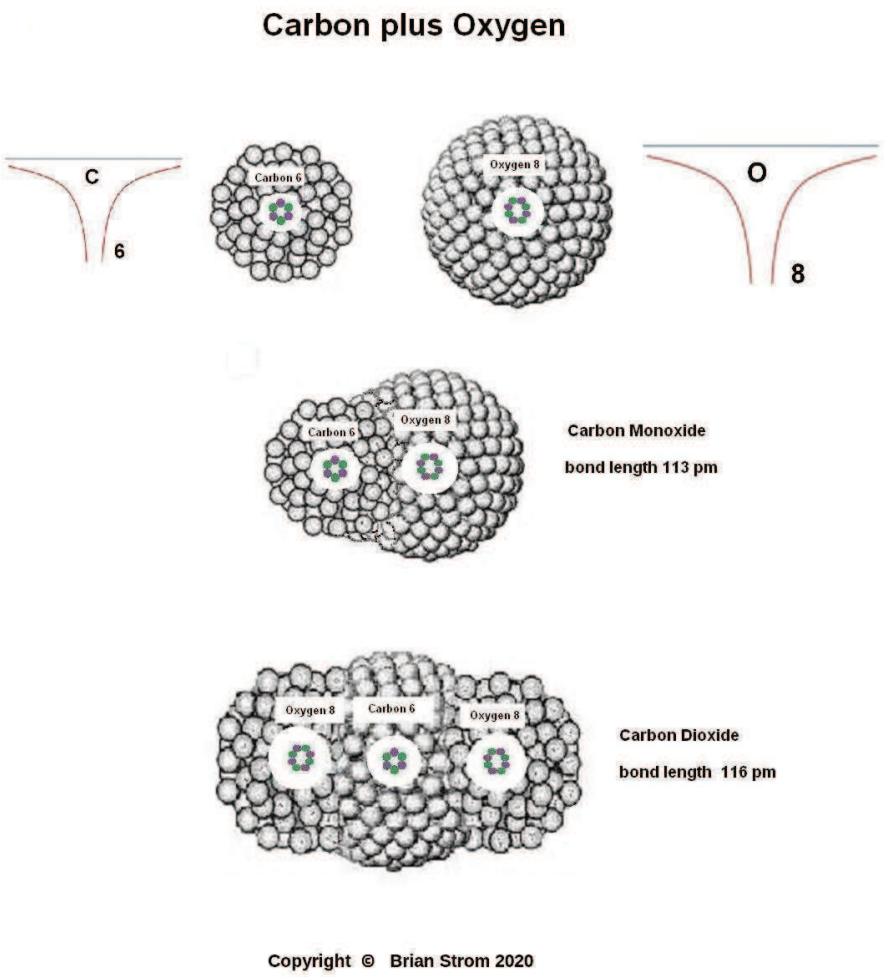

Figure 7a: Example of the combination of atoms: Carbon and Oxygen.

Carbon molecular bonds: Figure 7b gives a two-dimensional representation of the energy levels of Carbon atoms when they form single, double or triple bonds.

Different configurations of the protons in the nucleus will lead to different energies of attraction between the atomic nuclei. The stronger the nuclear attraction, the nearer the atoms will sit, and the more negative the Potential Energy will be.

The two energies of attraction will be balanced by the energy required to displace and deform the electron clusters around the Carbon nuclei:

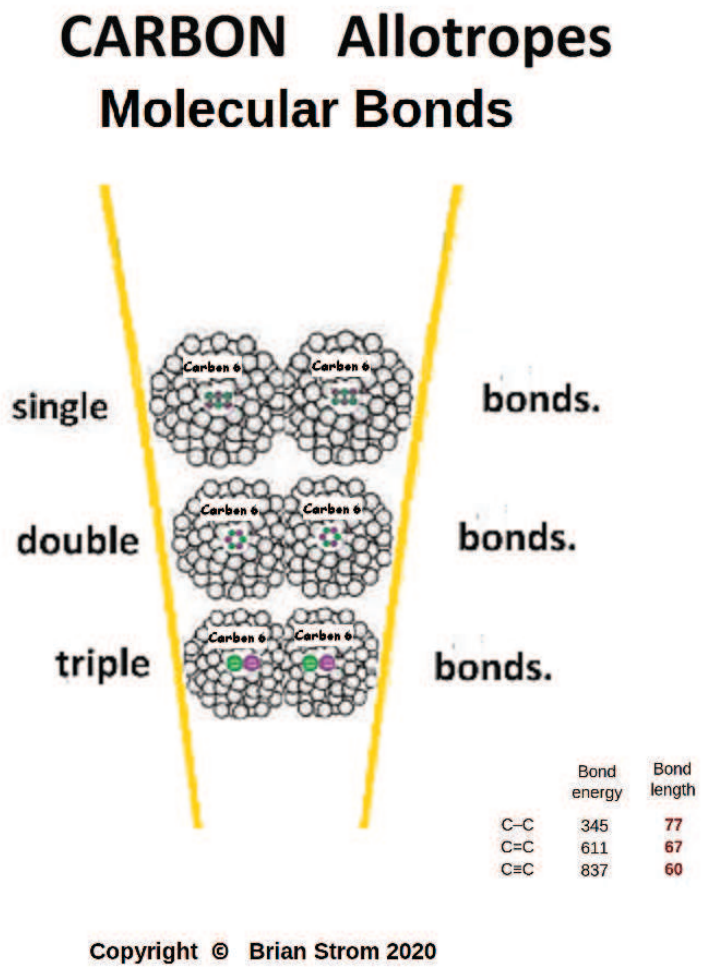

Figure 7b: Carbon bonds: 2-dimensional representation.

8. Lattice structure of allotropes and molecules:

Figure 8a shows the cascading tetrahedral configuration of atoms in the Diamond allotrope of Carbon, or in the molecules of Methane.

For Carbon, each nucleus has a 6-proton configuration. The top 2 nuclei (blue) have Rotational Energy (magnetic) Fields that are aligned and therefore attractive. The next 3 nuclei (red) have Rotational Energy Fields in the net reverse direction.

They will be attracted to the central red nucleus, but they will also repel each other. Hence they will spread evenly around the central red nucleus (120 degrees when viewed from above).

They will also be attracted to the red nuclei in the layer below. The pattern then alternates and repeats.

The equilibrium position is when real angles are approximately 109 degrees.

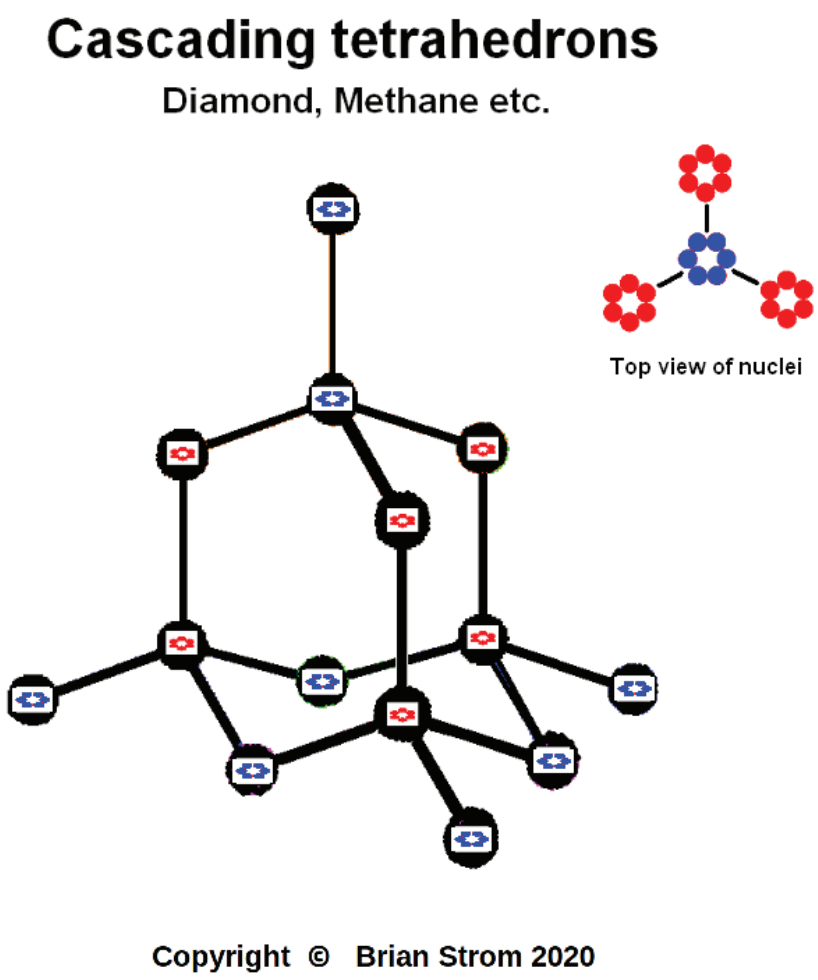

Figure 8a: The tetrahedral lattice structure.

Many compounds form angled molecules. The AI model is analysing the patterns in these molecular angles, and how the molecules then combine into lattice structures. As an example, Figure 8b shows the tetrahedral configuration of Silicon Dioxide:

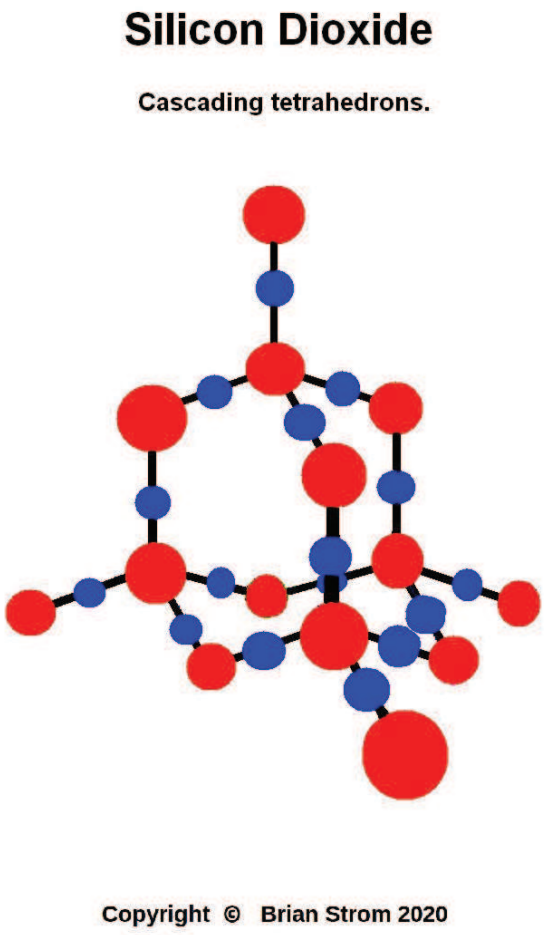

Figure 8b: How angled molecules form tetrahedral lattices.

9. Other examples of lattice structures:

Different allotropes can be formed by simply changing the lattice structure. This can occur by changing the environmental conditions – e.g. temperature, pressure, "magnetic field" - in the presence of a catalyst.

The different lattice structures can be expected to have different characteristics:
Diagram from: Kazuhiro Himoto.
Also a video: https://www.youtube.com/watch?v=R7drbuUXjA4

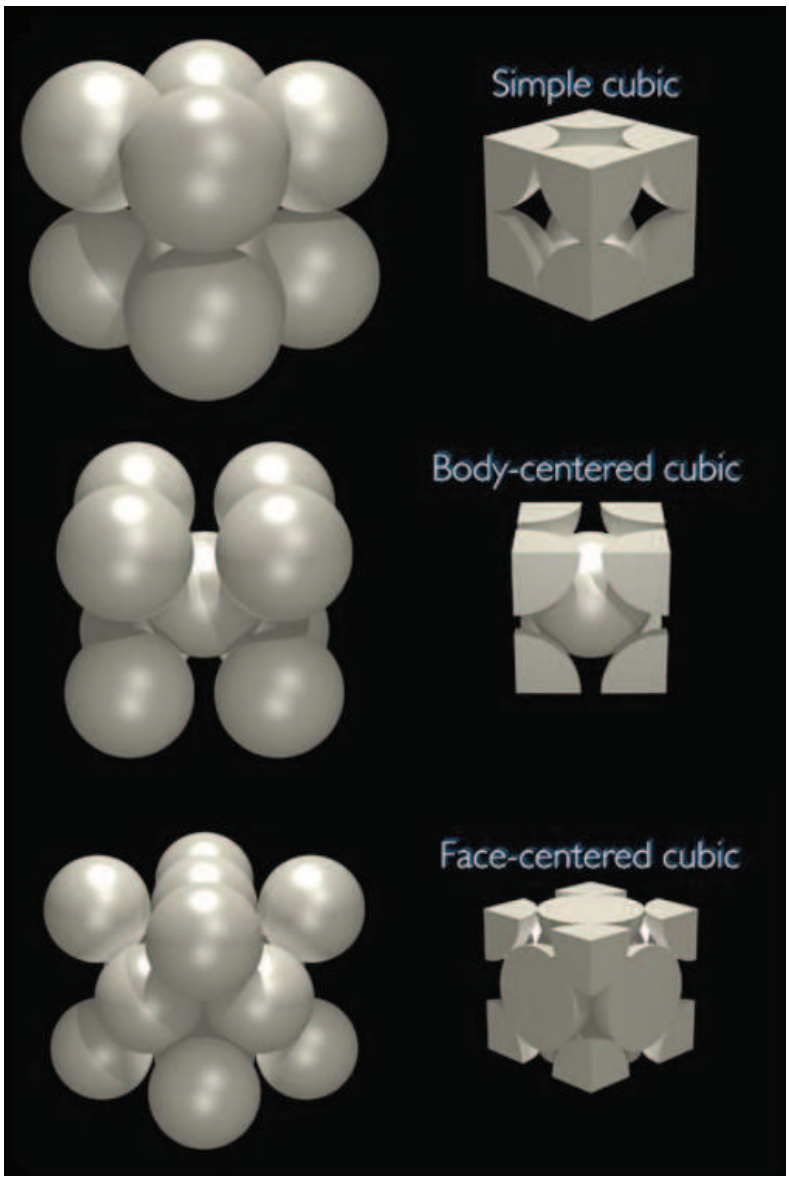

Figure 9a: Different lattice structures.

10. Analysis of molecules and allotropes in the AI model:

From the AI model, there are clear patterns in the formation of molecules, and some clear gaps where new allotropes and new compounds may be hidden.

The AI model is showing how allotropes are formed and how to change one allotrope into another to create brand new allotropes that do not yet exist. The external variables can be changed: e.g. temperature, pressure and "magnetic field".

A new allotrope may require the presence of a catalyst of the correct lattice structure, as when methane is used as a catalyst in the formation of synthetic diamonds. Starting parameters can also be changed by using Particle Accelerators and Zero Gravity (in Space Labs etc).

11. Representation of nucleonic protons by mini-magnets:

The characteristics of strong neodymium mini-magnets may provide some insight into the interactions of nucleonic protons.

Each mini-magnet has a Rotational Energy Field, just as each proton has a Rotational Energy Field - sometimes called a "spin field" or "magnetic field". The increments of "spin" are assumed to be constant, but there may be a spectrum of values, with only the "average" value being observed in experiments.

The mini-magnets may provide clues on how protons might be configured in the nucleus of each atom - usually assumed to be the lowest total energy configuration.
In small numbers, the mini-magnets tend to form rings, with the directions of Rotational Field vectors spread evenly around the ring.

Figure 11a shows some of the most stable configurations for the first 12 elements:

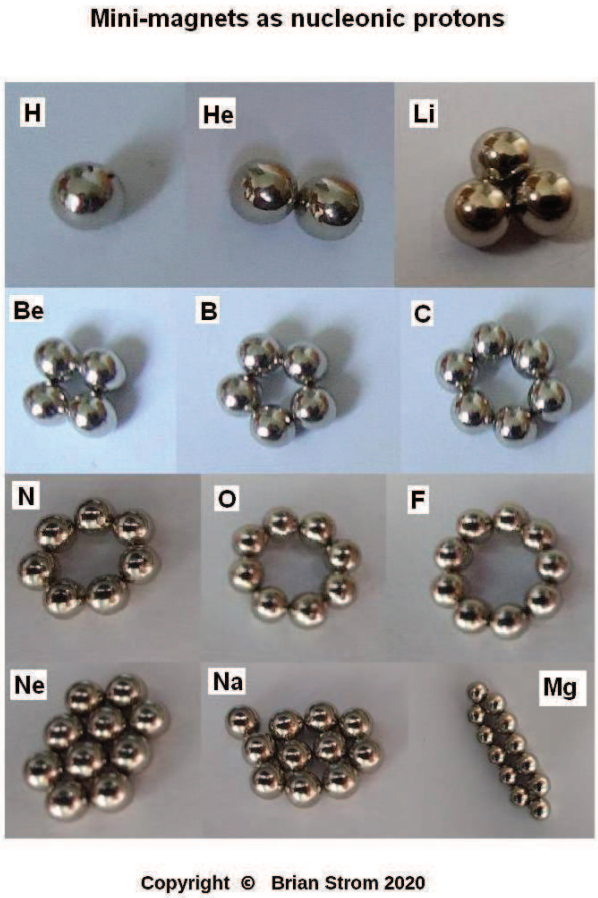

Figure 11a: Some mini-magnet configurations for the first 12 elements.

The Carbon nucleus is shown as 6 protons which stabilize in an hexagonal arrangement. For adjacent Carbon atoms, the atomic nuclei will attract one other - either weakly or strongly. The attraction between adjacent **layers** – as in Graphite - is quite weak.

For Nitrogen, Oxygen, Fluorine and Neon, the attraction between adjacent atoms gets steadily weaker - which could explain why they are all gaseous.

The nuclei of Sodium and Magnesium are larger than for Neon, and tend to be asymmetric resulting in larger electron clusters with an additional layer of electrons. These larger atoms have longer bond lengths and lower bond energies, resulting in atoms that are more reactive.

12. Alternative lattice structures:

The mini-magnets may be representative of how nucleonic protons - each with a surrounding Energy Field - might interact with each other. For Carbon atoms, each with 6 nucleonic protons in hexagonal configuration, the single and double bonds between the atoms could be configured in a number of ways, each with a different lattice structure – see Figures 12a and 12b:

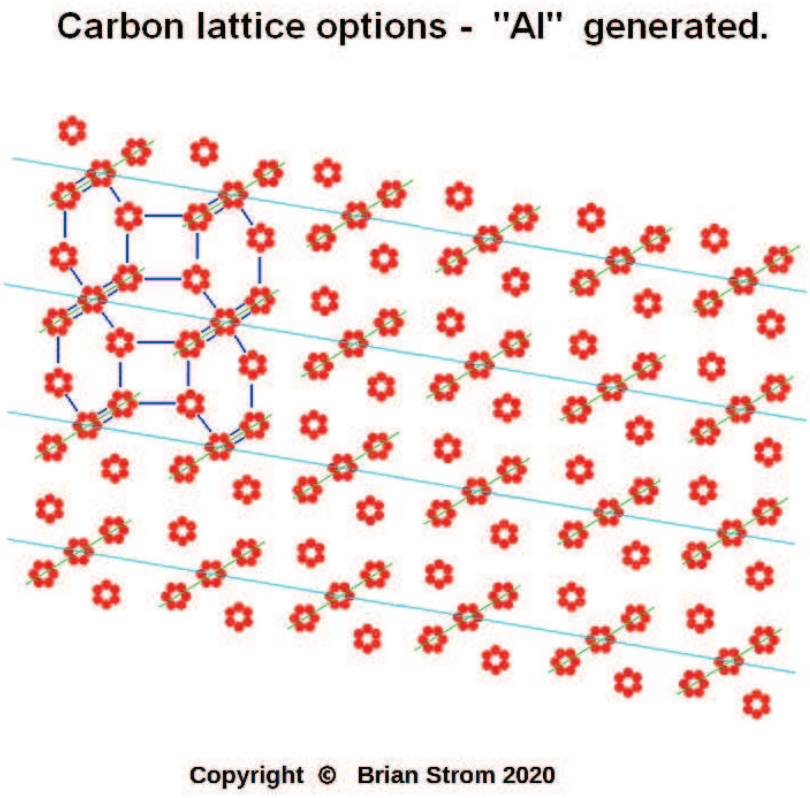

Figure 12a: AI-generated lattice for Carbon.

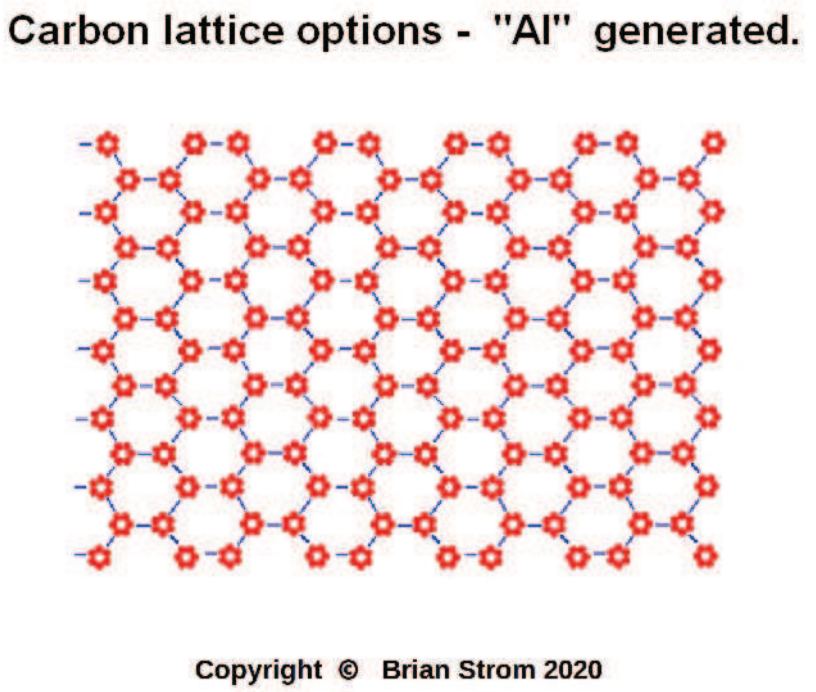

Figure 12b: Alternative lattice for Carbon - AI-generated.

This video shows how the nuclei of two “Carbon atoms” might attract one another in two different ways: https://youtu.be/5eWDww4JIx8
One has a weaker attraction - the single bond, and the other has a stronger attraction - the double bond. They may form two different allotropes of Carbon.

There are also AI-generated examples of how Beryllium atoms - each with 4 nucleonic protons - might be configured in a stable lattice. The multiple optional configurations of the 4 nucleonic protons suggest there may be new, as yet unknown, allotropes of Beryllium – see Figure 12c:

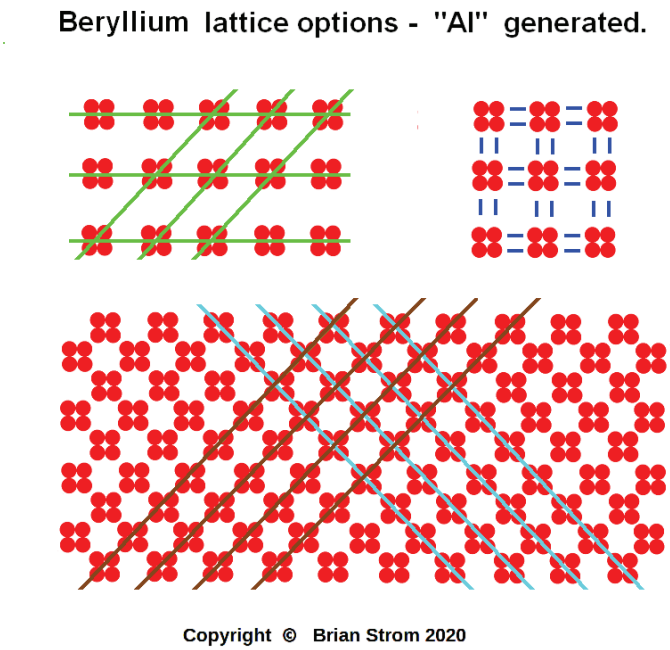

Figure 12c: AI-generated lattice structure for Beryllium.

13. Modelling of new lattice structures and new allotropes:

The AI Model has suggested a number of possibilities for new allotropes of the lighter elements.

New allotropes can be formed from different configurations of the nucleonic protons or from different lattice strucures formed under different temperature, pressure or energy field conditions.

There are proposed new forms of Carbon including “Graphene variants”. There is an allotrope of Lithium, which could offer new opportunities for batteries and for nuclear fusion.

There are exciting options for Beryllium and Boron. These light elements are generally under-represented in today’s world of chemistry and physics. New allotropes could reveal some startling characteristics.

The standard form of Manganese has molecular bond lengths that are anomolous - the bonds are longer than for neighboring elements in the Periodic Table. The AI model shows one option for the managanese nucleus as 5 stacks of 5 protons with a net spin 5/2. The shape of the Energy Field around the nucleus could explain the unusual triangular lattice geometry: https://www.isis.stfc.ac.uk/.../Solving-a-20-Year-Mystery...

Iron also has longer molecular bonds than might be expected. Both Manganese and Iron appear to be important in organic chemistry and photosynthesis. Investigations continue into the characteristics of these elements, and will be reported in a later paper.

14. Molecular combinations – from a different perspective:

Figure 14a shows the comparative Potential Energy Wells of the light elements.

From basic physics, we can see how the Potential Energy Wells of the elements can move together and merge, if they are near to each other. The atoms will be kept at a stable, equilibrium position by the balancing forces of the electron clusters surrounding the nuclei as they deform.

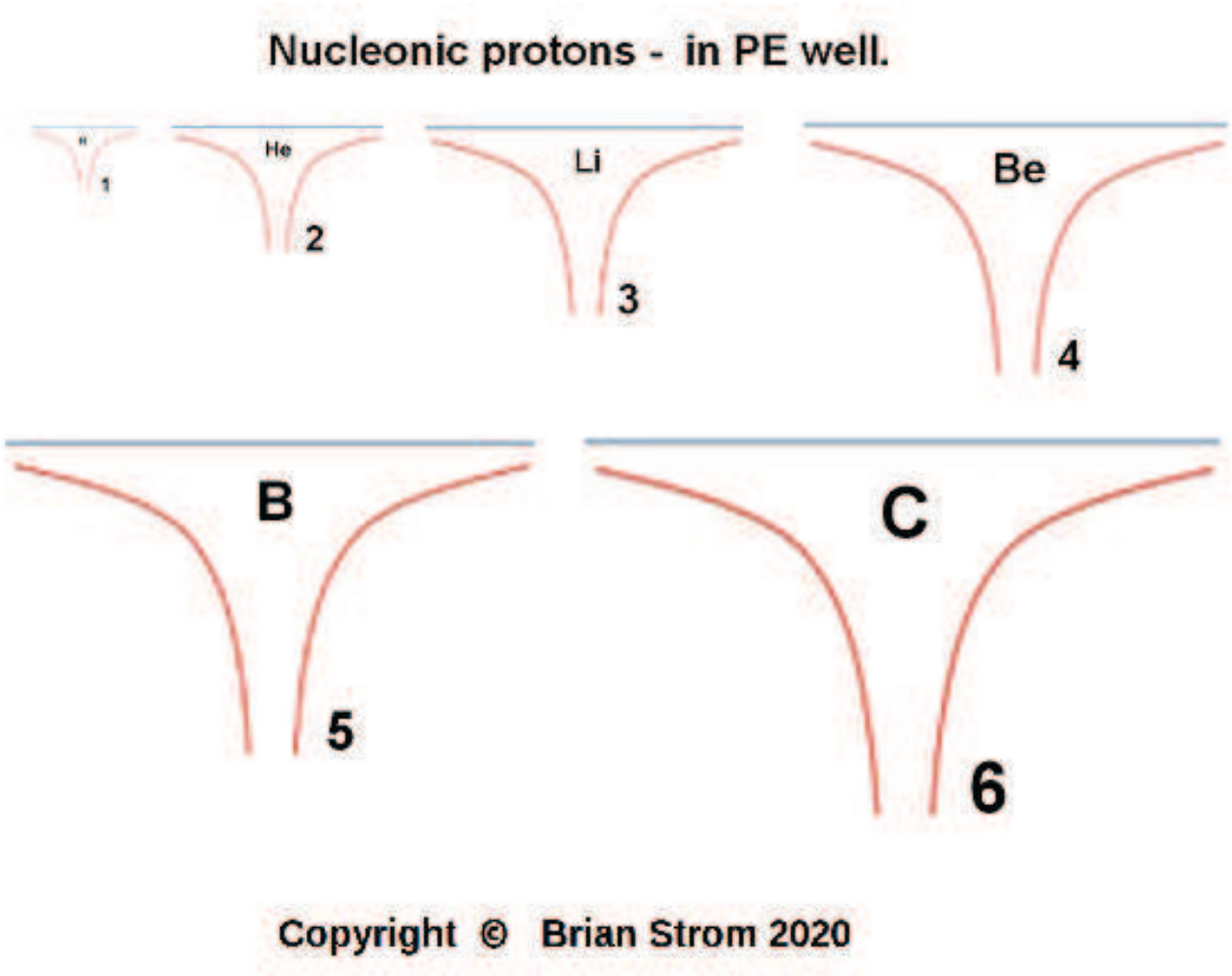

Figure 14a: The Potential Energy Wells of the light elements.

From Atomic Structure Theory, we can see how Carbon and Oxygen can combine - if there is some heat (energy) to start the reaction.
The heat will make the outer electrons "bubble", and the resulting energetic atoms will collide and combine, releasing more energy.

The Potential Energy Wells will attract, and the Rotational Energy Fields will attract, whilst the energy of displacement and deformation of the electron clusters will balance the energy equation - see Figure 14b:

In the presence of sufficient Oxygen atoms, the atoms will combine as Carbon Dioxide molecules. In the presence of limited numbers of Oxygen atoms, the atoms will combine as Carbon Monoxide molecules. The shorter final bond lengths for Carbon Monoxide indicates that more energy is released. Hence the dissociation energy for Carbon Monoxide is higher than for Carbon Dioxide.

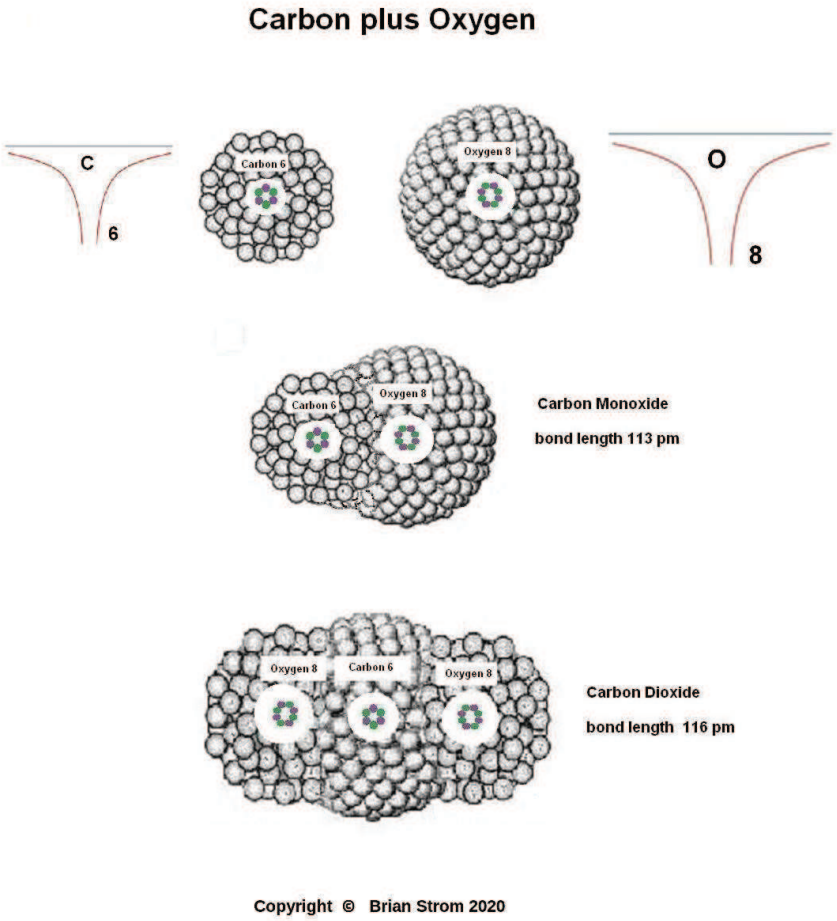

Figure 14b: How Carbon and Oxygen can combine.

15. The structure of Hydrocarbons – from a different perspective:

There are numerous combinations of Hydrogen and Carbon in the group of molecules called Hydrocarbons, which are formed when organic matter decays.

As an example, for the Ethylene molecule, the nuclei of the two Carbon atoms will attract each other, both by the attraction of the two Potential Energy Wells and by the attraction of their Rotational Energy (magnetic) Fields.

The Carbon atoms will attract each other strongly, forming short molecular bonds, displacing and deforming the two surrounding electron clusters.

Similarly, the nuclei of the four Hydrogen atoms will be attracted to the Carbon nuclei, though the attraction will be weaker, forming longer molecular bonds.

Once the nuclei and the electron clusters are displaced and deformed, the molecule becomes stabilized in this minimum energy configuration - see Figure 15a:

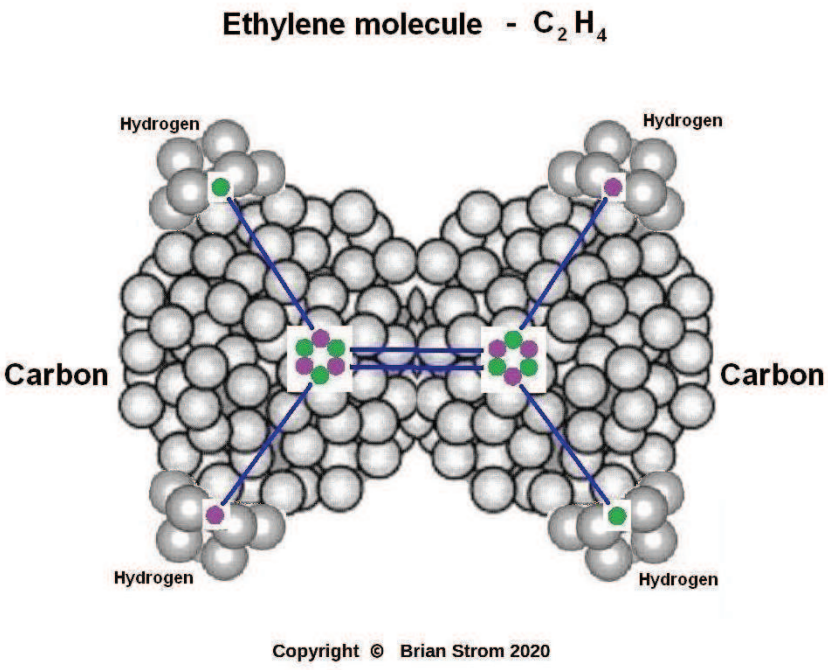

Figure 15a: The formation of an Ethylene molecule.

16. Burning Hydrocarbons – from a different perspective:

The Hydrogen atom is small. The single nucleonic proton means it has a shallow Potential Energy Well, and therefore has a small electron cluster filling the Potential Energy Well surrounding the nucleus.

The shallow Potential Energy Well has only a small attractive force to nearby atoms. Also, the Rotational Energy Field (magnetic field) of the single nucleonic proton has only a small attractive force to nearby nuclei.

It is relatively easy to break these weak hydrogen bonds by the addition of energy in the form of heat or photons.

If Hydrocarbons are “burnt” by the addition of Oxygen, the excess energy of the Hydrocarbon molecule can be released.

The stronger attractive force of the Oxygen atoms – with deeper Potential Energy Wells - forms Carbon Dioxide and Hydrogen Dioxide (water), with a comcomitant release of excess energy, which continues the cascade (exothermic) reaction.

Figure 16a shows the reaction when Methane molecules and nearby Oxygen molecules combine with help from an energy input in the form of a hot flame.

The flame will change the energy equilibrium and heat the electron clusters. This will cause the clusters to "bubble" and expand, which will push the Carbon, Hydrogen and Oxygen atoms apart.

Oxygen atoms, with their deeper Potential Energy wells, will attract Carbon atoms to form Carbon Dioxide.

Oxygen atoms will also attract the smaller Hydrogen atoms forming Water (Hydrogen Dioxide).

Excess energy will be released as heat, which will trigger a cascade of reactions in nearby molecules – a chain reaction.

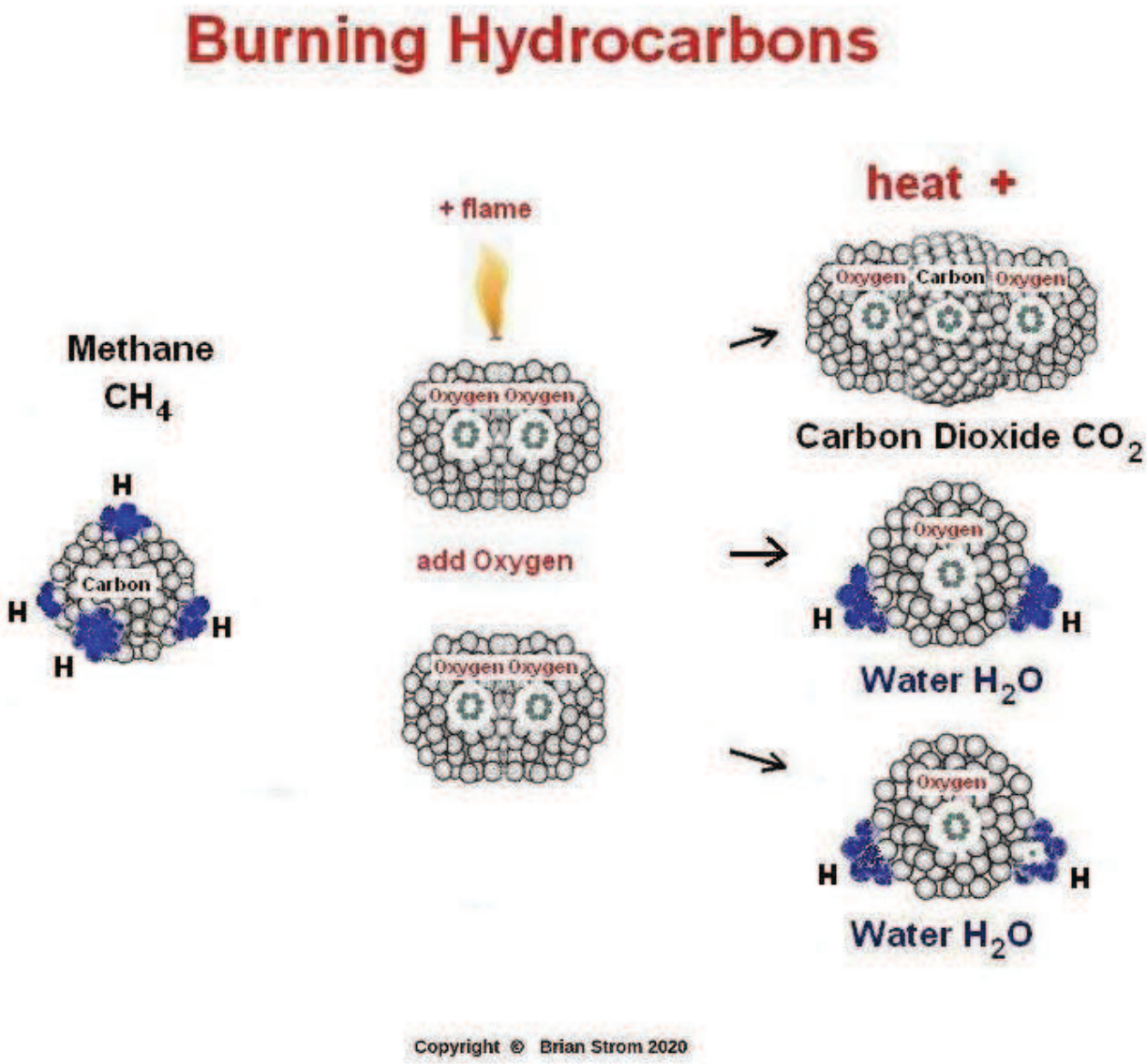

Figure 16a: The "burning" of a Methane molecule.

17. Photosynthesis – from a different perspective:

In the reverse direction, by adding energy – in the form of a photon of sunlight - to a combination of Water and Carbon Dioxide, can produce Carbohydrates and release Oxygen in the process known as Photosynthesis. Plants and trees then use the Carbohydrates to build new cell structures.

Exploring the process of Photosynthesis, from the perspective of Atomic Structure Theory and Molecular Structure Theory, may yield exciting new possibilities in the creation of artificial Chlorophyll to use in new forms of “Photosynthesis”. With the help of Atomic Structure Theory, can we develop "Artificial Photosynthesis" to reduce greenhouse gases and help the world's climate?

Figure 16a shows how photons from sunlight provide energy for Photosynthesis. Photons are absorbed by electrons surrounding the nuclei of the atoms in Carbon Dioxide and Water molecules. The excited electrons will cause the electron clusters to "bubble" and expand, which will push the atoms apart.

Some of the atoms will form Carbohydrates (sugar, starch), and the excess Oxygen will be released – see Figure 17a:

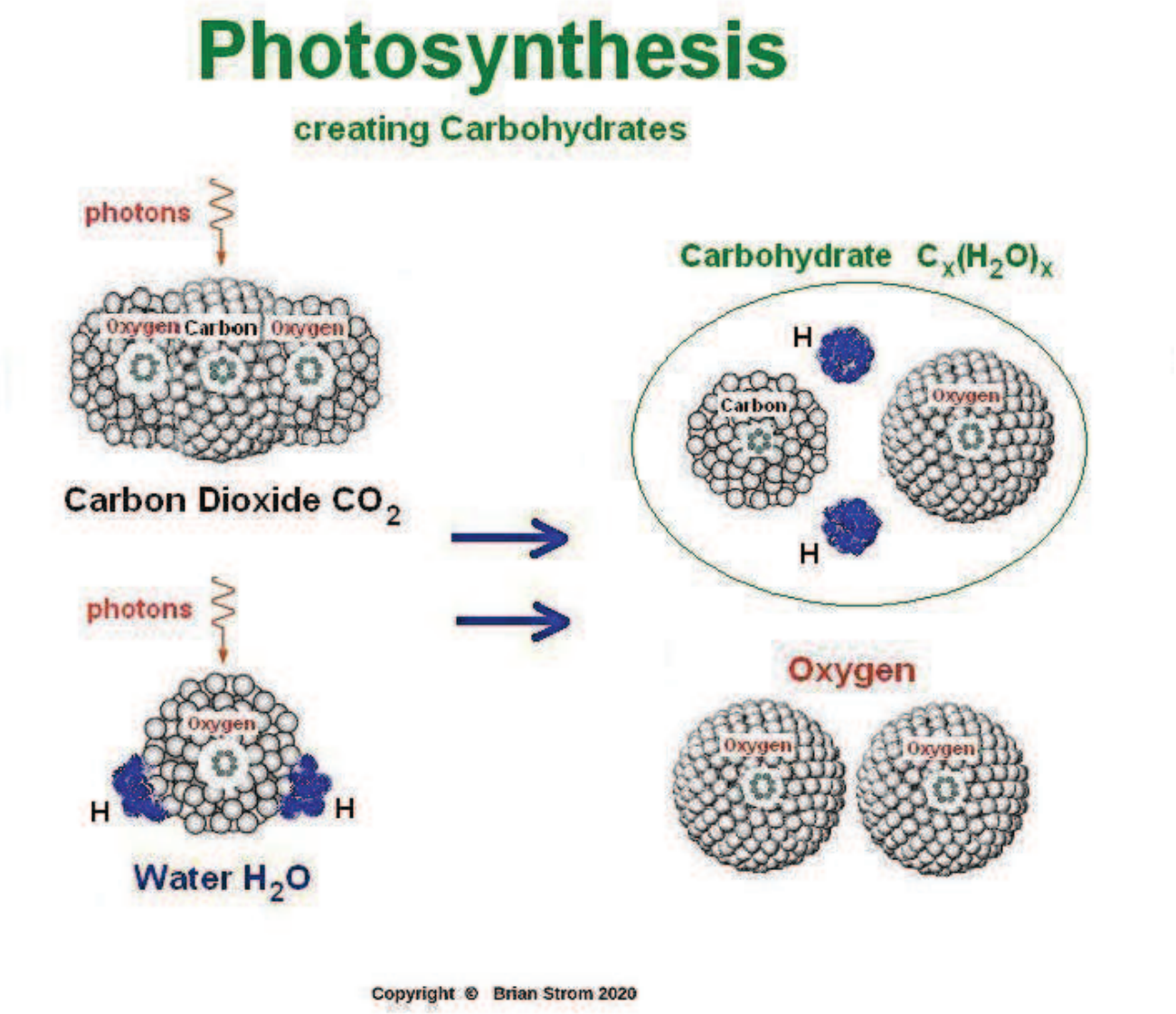

Figure 17a: Creating Carbohydrates in Photosynthesis.

By Kira Welter: 12 May 2020:
Scientists have been able to see, for the first time, how the electron cloud of a molecule swells in response to light. This is a prelude to the movement of atomic nuclei in the molecule that can lead to bond making and breaking. Examining the inner workings of chemistry in such detail opens up new possibilities for understanding and controlling chemical reactions.
The interaction between light and molecules plays a crucial role in processes such as photosynthesis and vision.
https://www.chemistryworld.com/.../first.../4011710.article
Original Paper: https://www.nature.com/articles/s41467-020-15680-4

18. Superconductivity – from a different perspective:

From Atomic Structure Theory, in the electron clusters surrounding nuclei, energetic electrons will bubble up and impede the flow of electron pairs that are travelling along an applied Potential Energy gradient. Hence the resistance to electron flow at normal temperatures and pressures.

In low-temperature superconductivity, the cooled electron clusters do not "bubble", so the flow of electron (Cooper) pairs is not impeded.
Similarly, in high-pressure superconductivity, the compressed electron clusters cannot "bubble", so the flow of electron (Cooper) pairs is not impeded – see Figure 18a:

https://www.quantamagazine.org/physicists-discover-first-room-temperature-superconductor-20201014/?utm_source=pocket-newtab-global-en-GB&fbclid=IwAR1lYr2Fy2h_lmZVNX8CZvQXhsNQUx4kYsf3yaq886c-LHrK8dzmCkRxoRc

(Original paper in Nature: https://www.nature.com/articles/s41586-020-2801-z)

With the help of Atomic Structure Theory, superconductivity and the Meissner effect are being re-visited. The aim is to develop better superconductors at higher temperatures and lower pressures.

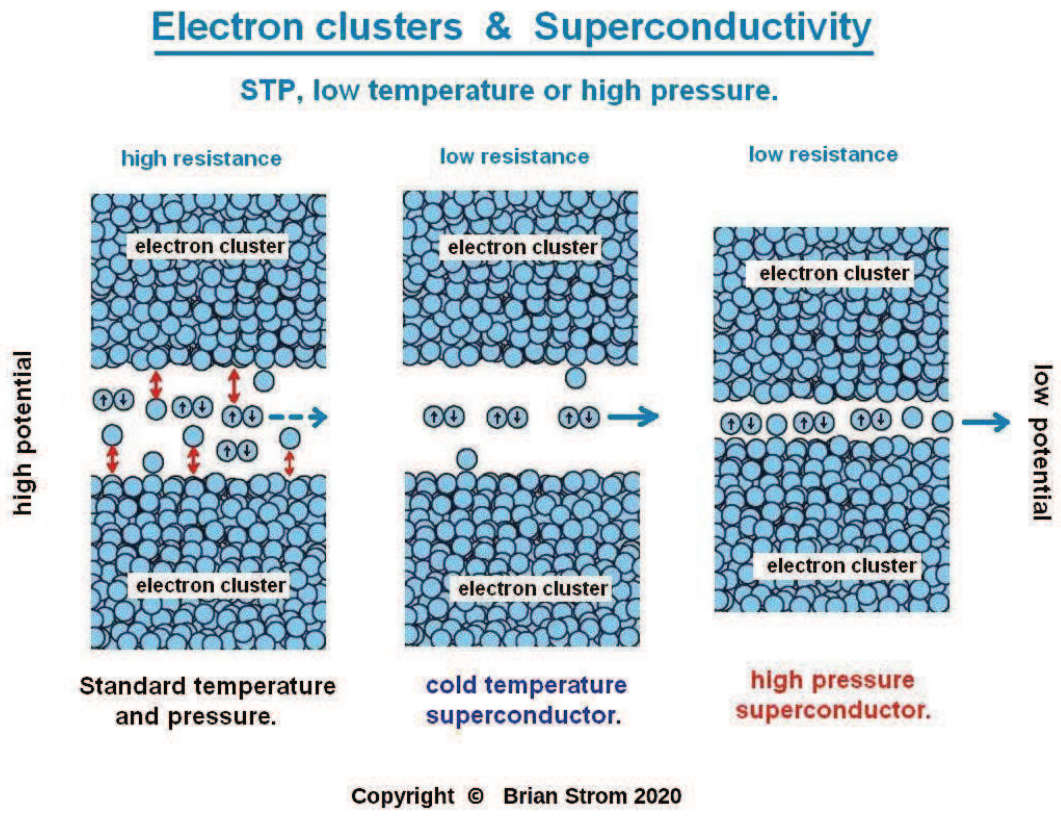

Figure 18a: Electron clusters and High Pressure Superconductivity.

19. DNA - from a different perspective:

With the help of Atomic Structure Theory, where electron clusters surround atomic nuclei, the structure of DNA can be re-interpreted.

DNA groups are simple combinations of hydrogen, carbon, nitrogen and oxygen atoms. Importantly, the groups are held together by weak hydrogen bonds. This creates a "fault-line" which can easily separate into two strands of DNA, which can then be replicated. This example shows Adenine and Thymine - see Figure 19a:

AI is already being used to analyze DNA. By using Machine Learning, it may be possible to discover new combinations of the basic elements which perform in similar, but different, ways to DNA. It may be possible to discover new forms of DNA, and new forms of life - Life 2.

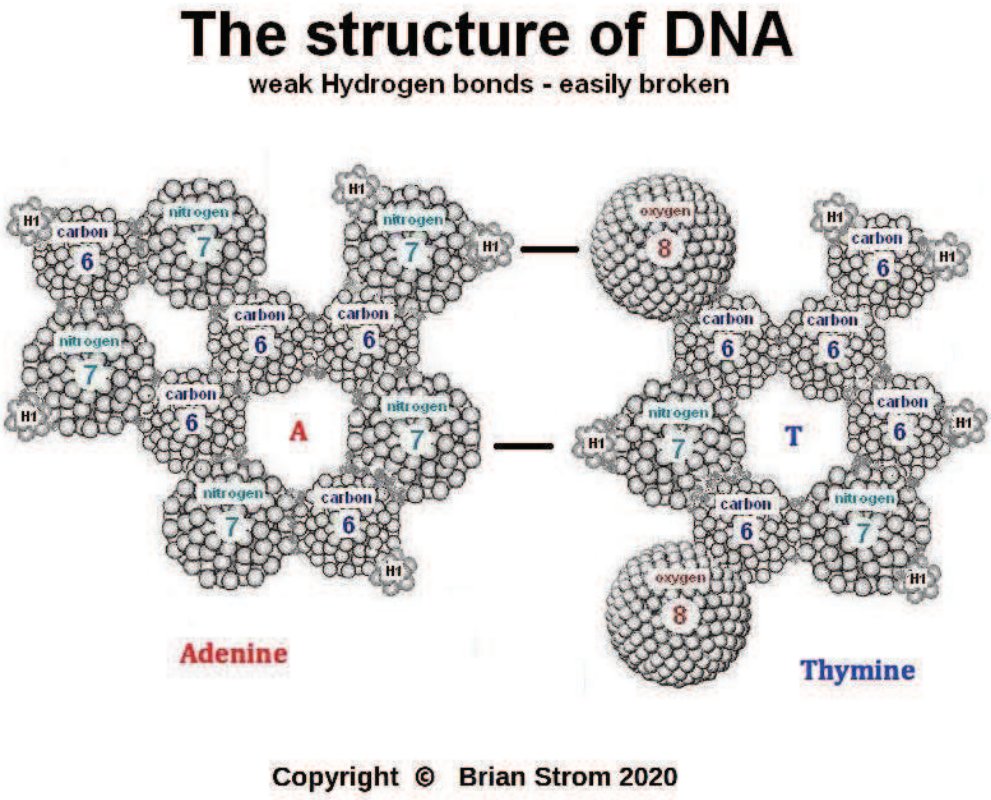

Figure 19a: Electron clusters and the DNA process.

20. Patterns in electron layers:

The AI model has uncovered patterns which correlate molecular bond lengths and ionization emission spectra. This aligns with Atomic Structure Theory, where atomic nuclei are surrounded by clusters of electrons.

As the number of nucleonic protons increases, so more layers are added to the cluster of electrons and the atomic radius is larger. These larger atoms will form molecules with longer molecular bond lengths.

The outer electrons, when excited, have shorter distances to fall when they return to their original energy levels, as calculated from the ionization emission spectra – see Atomic Structure Part 1 **[1]** .

The correlation of these two parameters, measured using two different methodologies, is "spooky", as someone once said.

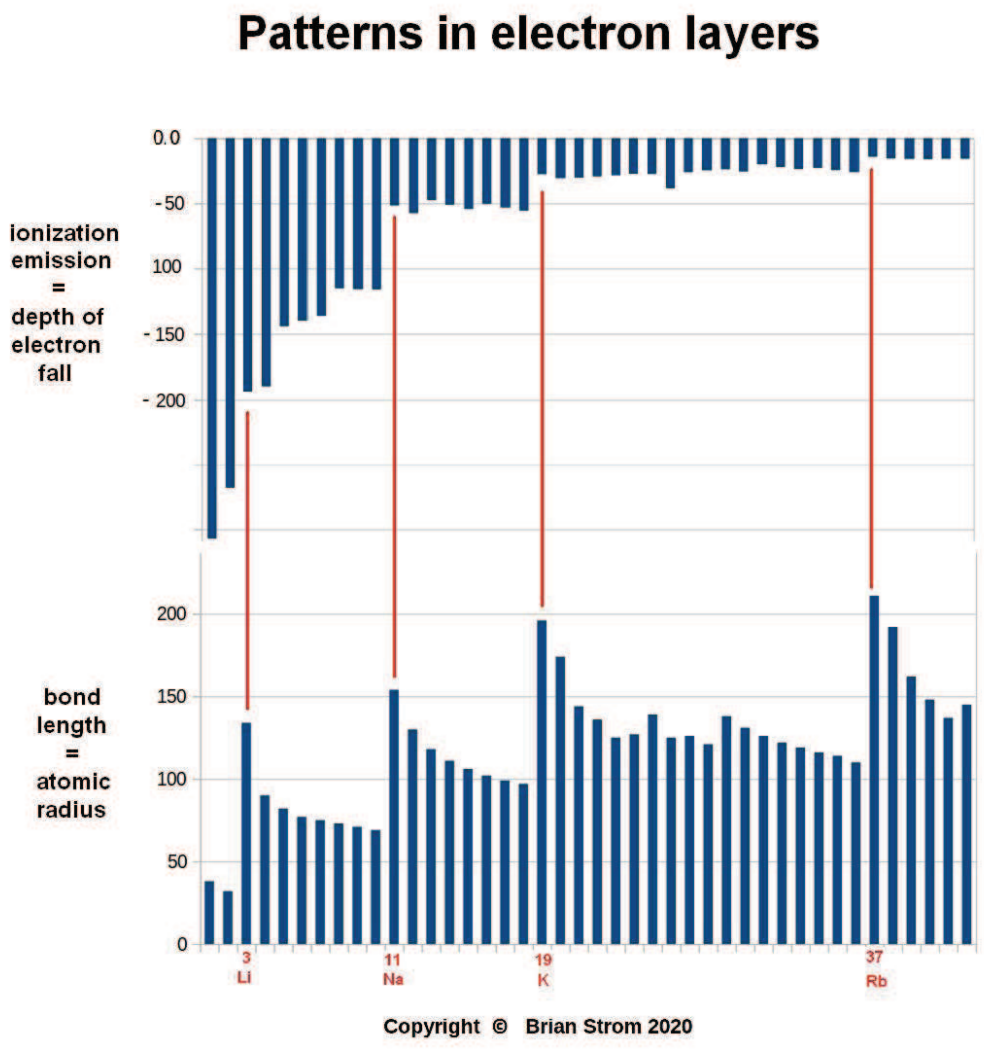

Figure 20a: Patterns in Electron layers.

21. Summary and Conclusions:

The combination of Atomic Structure Theory and Energy Field Theory enables a view of nature from a different starting-point and with a different perspective. The AI analysis and modelling is not based on electrons in magical orbits, nor electrons as probability wave functions. The Atomic Structure Theory proposes that atomic nuclei are surrounded by electron clusters. From this perspective, the study of the behavior and interactions of the atoms may yield exciting new ideas, and new possibilities.

Analysis of small atoms, those with low atomic number, shows how new allotropes may be formed with variations in temperature, pressure and rotational energy (magnetic) field. Carbon has a number of allotropes, but there may be more as yet undiscovered. Boron and Beryllium could be shaped into new forms, with unknown properties. Different forms of Lithium may transform battery development. New analysis of the behavior of Hydrogen and Helium could provide alternative avenues of research into the potential of fusion energy.

There are countless combinations of Hydrogen and Carbon in the Hydrocarbons and, with the addition of Oxygen, they can release excess energy as heat. In the reverse direction, there may be possibilities to create new forms of artificial Chlorophyll to use in controlled Photosynthesis whereby Carbon Dioxide can be split by photons (sunlight), in the presence of Water, to form Carbohydrates plus Oxygen. New forms of artificial chlorophyll could help solve the world's energy problems, and climate change problems.

Also, there are countless combinations of Hydrogen, Carbon, Nitrogen and Oxygen, which can form a host of new Organic compounds, and even new forms of RNA and DNA.

These theories may provide new insights into the changing phases of elements and molecules: For example, sulfur changing to a different allotrope as temperature changes, and water changing to ice. The theories may also provide new insights into the analysis of chemical reactions, the nature of superconductivity, and even alchemy!

The Brian Strom team, in Cambridge (MA), London (England) and Cambridge (England) are now concentrating on registering the Intellectual Property for their ideas, and exploring the commercial opportunities of the Atomic Structure Theory, the Energy Field Theory and the Molecular Structure Theory.

Most inquiries into our work come from Russia, China and Ukraine - where government funding supports investigations into alternative theories, and is not constrained by the Standard Model. Of course, anyone employed on Standard Model research in the US, Europe or Japan, cannot be seen to show interest in any non-SM theories. Hence, the people helping our team must remain anonymous, unless they

have already retired from main-stream science. These countries would just love to beat the West again in the space-race and in new science discoveries.

The AI analysis will continue in the search for more patterns and mathematical formulae that can describe the behavior of atoms, allotropes and molecules.

21. REFERENCES:

[1] Brian STROM. "AI" Physics – ATOMIC STRUCTURE – Part 1.

November 2018. https://vixra.org/abs/1811.0162

With the help of Artificial Intelligence (AI) and Deep Learning, the structure of the atom is computed from the results of established experiments on ionization energies and spectral emissions. The AI searches for trends and patterns in the ionization energy levels - when electrons are energized to escape from an atom. The AI first observes that the "depth" of the atomic Potential Energy Well is directly proportional to the number of protons in the nucleus, but is not dependent on the number of neutrons. The AI computes the energy levels for a "multi-layered ball" of electrons in a Potential Energy Well, and compares them to the ionization energy levels and electron depths. It identifies close similarities and proposes that electrons simply fill the three-dimensional atomic Potential Energy Well around the nucleus - loosely-packed for the lighter elements, and more tightly-packed for the heavier elements. The AI concludes that electrons are much larger than we presently imagine.

[2] Brian STROM. "AI" Physics – ATOMIC STRUCTURE – Part 2.

November 2019. https://vixra.org/abs/1911.0159

In this paper, Energy Field Theory is used to further analyze the nature of sub-atomic particles. Analysis of radio-isotope transitions leads to alternative explanations for the structure of the nucleus, the nature of the crystal lattice, and the nature of molecular structure.

[3] Brian STROM. "AI" Physics – ENERGY FIELDS – Part 1.

February 2019. https://vixra.org/abs/1902.0421

In this paper on AI Physics, Artificial Intelligence is used to analyse simple experiments on energy fields (presently referred to as magnetic and electromagnetic fields). The AI searches for trends and patterns in the behavior of energy fields and the interactions between energy fields. The AI first observes the similarities between energy fields surrounding conductors, solenoids, permanent magnets and rotating bodies (such as the Earth). It examines the interactions between various energy fields, proposes new experiments, and

predicts results. The AI concludes that energy fields will turn or move, if free to do so, to reduce the net field between them. From the behavior of permanent magnets, it is assumed that this movement will also reduce the total energy of the combined energy fields to a minimum.

[4] Brian STROM. "AI" Physics – ENERGY FIELDS – Part 2.

March 2019. https://vixra.org/abs/1903.0495

In this paper, AI is used to analyze the interactions between Potential energy fields, Orbital energy fields and Rotational energy fields, and to propose the nature of these interactions throughout the universe, from the galactic scale to the sub-atomic scale. These findings may provide an explanation for the so-called 5th force, an alternative explanation for the forces at the galactic level, and an alternative explanation for the forces at the sub-atomic level, including quantum gravity.

[5] Brian STROM. "AI" Physics – ENERGY FIELDS – Part 3.

June 2019. https://vixra.org/abs/1906.0492

In this paper, AI is used to develop advanced proposals for interactions between energy fields. The proposals are astonishing. These results may provide an explanation for passive-counter-rotation, super-conducting-levitation, an alternative approach to particle collider physics, an alternative explanation for the forces at the sub-atomic level, an alternative explanation for the 'magnetic' fields of the planets, an alternative explanation for the MOND theory of forces at the galactic level - the so-called 5th force, and a Patent Application for a Space Launch Vehicle.

[6] Brian STROM. "AI" Physics – MOLECULAR STRUCTURE – Part 1.

July 2020. https://vixra.org/abs/2007.0015

In earlier papers on Atomic Structure and Energy Fields, Artificial Intelligence (AI) was used to explore the structure of the atom, and the size of the electron, by analyzing the results of established experiments on ionization energies and spectral emissions. Radio-isotope transitions were analyzed to propose the nature of the nucleus and allotropes. In this paper, an AI model is used to propose the nature of the crystal lattice, and the nature of molecular structure.

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

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