“Back to Basics”

“A proposal for a Structured Atom Model”

and

“The Importance of Transmutations in Hydrogen Loaded Metals”

J.E. Kaal (edo) BSc

Index

- Introduction
- Solvay conference 1933: The neutron is discovered
- Fundamental Physics in the Structured Atom Model (SAM) (The “new neutron” as basic building block for the nucleus / new physics?)
- Solvay conference 1970: Symmetry Properties of Nuclei
- Geometry in the Structured Atom Model (SAM)
- The importance of Anomalies in Hydrogen Loaded Metals
- What SAM can show now and where we are going
- Conclusions and recommendations

Introduction

- By going through some basic information in a historical context the Structured Atom Model will be presented in an attempt to contribute to our collective search.
- What is presented here today does not subscribe to QM postulations, this model is built from the ground up and not yet complete.
- The strong correlations and simplicity of the model offer a good base to continue on this collective task to bring LENR to the world.

Introduction

- By going through some basic information in a historical context the Structured Atom Model will be presented in an attempt to contribute to our collective search.
- What is presented here today does not subscribe to QM postulations, this model is built from the ground up and not yet complete.
- The strong correlations and simplicity of the model offer a good base to continue on this collective task to bring LENR to the world.

Solvay conference 1933: The neutron is discovered

- Solvay conference 1933 Brussels, Belgium
- The (free) neutron was recently discovered and given a place in physics
- Defined as a fundamental particle
- As a result, QM prevailed instead of an electro-static proton-electron model, which was abandoned
- Had huge implications for physics

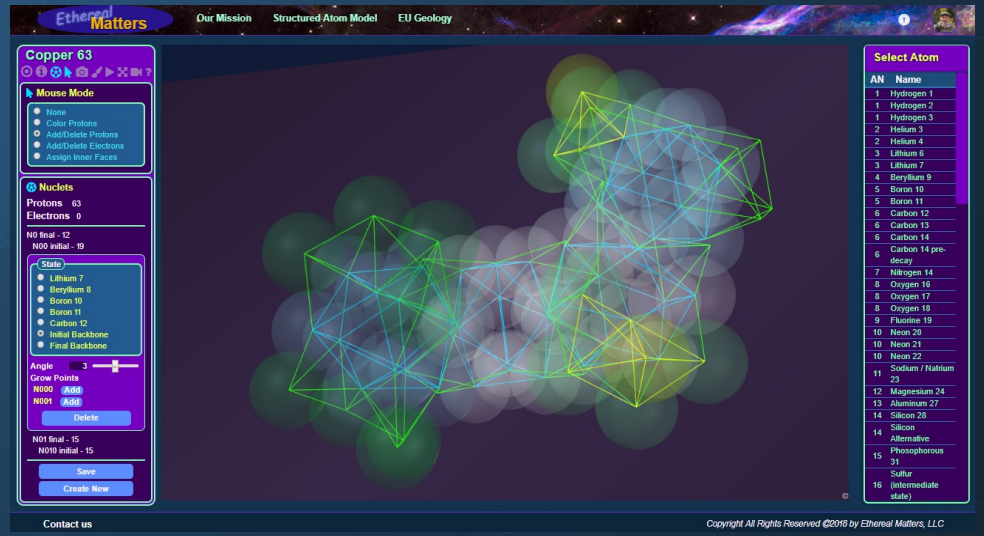
Counter arguments or issues with the current model(s)

- Neutron decays into its constituents, a proton and an electron
- No model can explain how a nucleus can stay together without a postulated force, i.e. the “strong force”
- Four elementary forces are needed
- Lack of understanding and agreement in general

The Structured Atom Model (SAM) (In a Nutshell)

- We have a duality which we call a proton-electron pair with the electrostatic force acting between them.
- This force is the causal mechanism for the principle of densest packing that creates geometric shapes based on the platonic solids.
- These geometric shapes in a specific ordered sequence and number, create all the elements.
- SAM shows the observed nature and properties of the atom and explains the reason why the nucleus of the atom is positively charged, why the outer electrons "stay at range" from the nucleus and why elements in general grow by two nucleons.

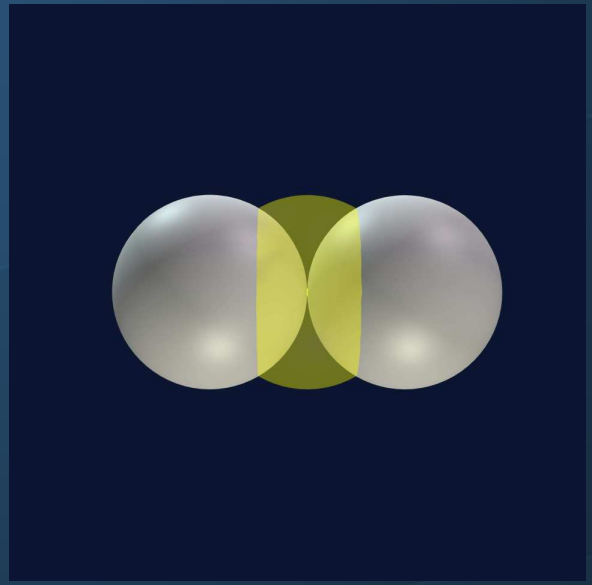
The Structured Atom Model in a nutshell



Fundamental Physics in the Structured Atom Model (SAM)

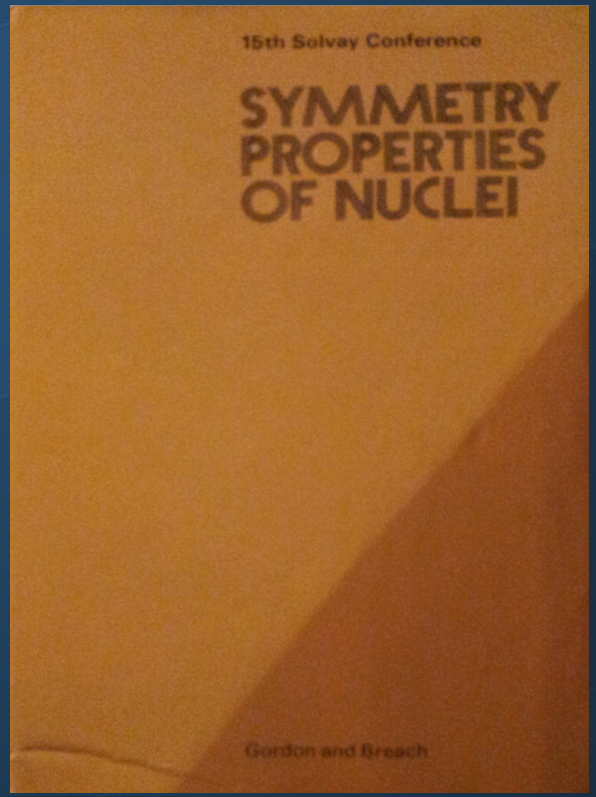
- New neutron principle (Deuterium is key) the first element with a “stable neutron” inside the nucleus
- Densest packing concept. The nucleus is attracted towards a common center *(per nuclet / geometric clustering)*
- Proton-electron concept (classical mechanics). Electrons are not considered a particle but a charge.
- One force, the electrostatic force and as a result an EM force (not fully understood yet)
- Static model, no movement without cause

Deuteron



Solvay conference 1970: Symmetry Properties of Nuclei

- In 1970 Solvay conference – Symmetry Properties of Nuclei
- The known models were compared in order to find the structure of the nucleus
- Many topics were covered and models compared
- Rotational motion
- Models for clustering structures
- Alpha particle model was 'dominant'
- No real “solution” as to how the nucleus is organized



Evidence for a Proton electron Atom

- Carl Johnson's paper “Nuclear Physics may be Fairly Simple”
- Math based on the precise NIST atomic mass numbers for a proton-electron model.

Start with a Tritium atom	End with an Helium-3 atom
P N N in nucleus (1.007 276 466 879 AMU + 1.008 664 915 88 AMU + 1.008 664 915 88 AMU) or a total of **3.024 606 298 639 AMU**	P P N in nucleus (1.007 276 466 879 AMU + 1.007 276 466 879 AMU + 1.008 664 915 88 AMU) or a total of **3.023 217 849 638 AMU**
two Electrons are inside those Neutrons and two Neutron Self-Binding Energy (0.00083946 AMU + 0.00083946 AMU) or **0.001 678 92 AMU**	one Electron is inside that Neutron and one Neutron Self-Binding Energy **0.000 839 46 AMU**
One Electron is orbiting **0.000 548 579 909 070 AMU** This all totals up to 3.026 833 798 548 AMU. **But that is wrong according to NIST for Tritium!**	Two Electrons are orbiting **0.000 548 579 909 070 AMU + 0.000 548 579 909 070 AMU.** The Decay also emits radiation **(0.000 019 957 8 AMU).** **This all totals up to 3.025 174 427 256 AMU.** **But that is wrong according to NIST for He-3!**

Look at this rather simple actual Energy Auditing of this Tritium decay.

$^{3}H_{1}$ (Tritium)	$^{3}He_{2}$ (Helium-3)
one proton, two neutrons, and one orbiting electron	two protons, one neutron and two orbiting electrons
describing the neutrons as separate protons and electrons:	
three protons and two nuclear electrons and one orbiting electron	three protons and one nuclear electron and two orbiting electrons
The total NIST atomic mass of the entire atoms	
3.0160492779 AMU	**3.0160293201 AMU**
	radiation energy emitted by the decay **0.0000199578 AMU**
total start 3.0160492779 AMU	**total end 3.0160492779 AMU**

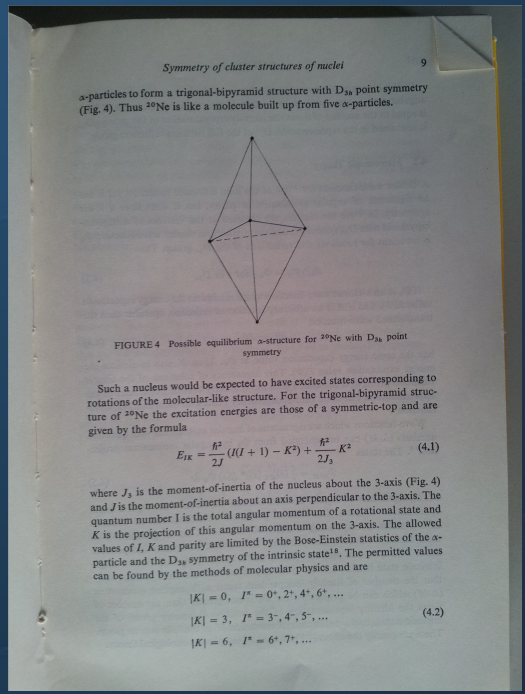
This beta-decay creates external radiation of 0.0185906 MeV or 0.0000199578 AMU. The NIST data for this beta-decay is that it emits radiation of 0.0185906 MeV.

- It also reflects through graphs that there must be a structure to the nucleus.
- Source: http://mb-soft.com/public4/nuclei7.html

Problems with the Alpha Particle Model

- The alpha particle model is still popular for good reasons (calculus is close to observed values and alpha particles released from heavy nuclei)
- However it cannot be correct
- During the Solvay conference it was discussed how the heavier elements would be made up of alpha particles (tetrahedrons / helium nuclei).
- An example is Neon which would be 5 alpha groupings.
- Beryllium 8 however decays, which indicates that groupings of alpha particles are not stable at all.
- A logical model for the PTE was never conceived

Picture: Solvay proceedings depicting how Neon is thought to be constructed with alpha particles



Symmetry of cluster structures of nuclei 9

α-particles to form a trigonal-bipyramid structure with D_{3h} point symmetry (Fig. 4). Thus ^{20}Ne is like a molecule built up from five α-particles.

FIGURE 4 Possible equilibrium α-structure for ^{20}Ne with D_{3h} point symmetry

Such a nucleus would be expected to have excited states corresponding to rotations of the molecular-like structure. For the trigonal-bipyramid structure of ^{20}Ne the excitation energies are those of a symmetric-top and are given by the formula

$$E_{IK} = \frac{\hbar^2}{2J}(I(I+1) - K^2) + \frac{\hbar^2}{2J_3}K^2 \qquad (4.1)$$

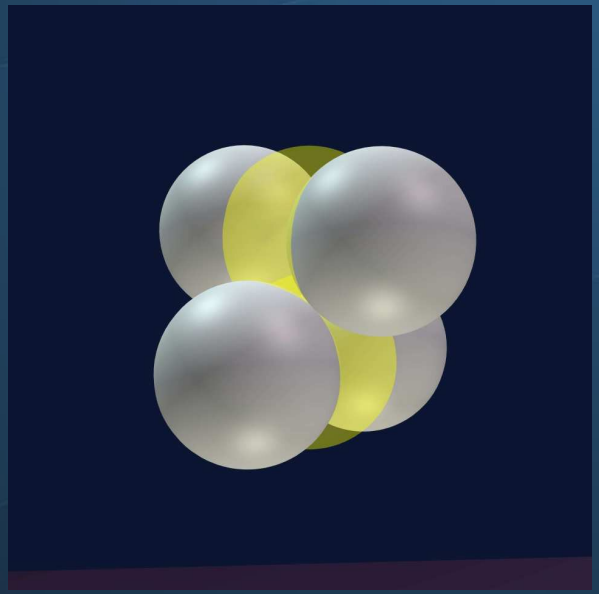
where J_3 is the moment-of-inertia of the nucleus about the 3-axis (Fig. 4) and J is the moment-of-inertia about an axis perpendicular to the 3-axis. The quantum number I is the total angular momentum of a rotational state and K is the projection of this angular momentum on the 3-axis. The allowed values of I, K and parity are limited by the Bose-Einstein statistics of the α-particle and the D_{3h} symmetry of the intrinsic state[18]. The permitted values can be found by the methods of molecular physics and are

$$\begin{aligned} |K| &= 0, \quad I^\pi = 0^+, 2^+, 4^+, 6^+, \ldots \\ |K| &= 3, \quad I^\pi = 3^-, 4^-, 5^-, \ldots \\ |K| &= 6, \quad I^\pi = 6^+, 7^+, \ldots \end{aligned} \qquad (4.2)$$

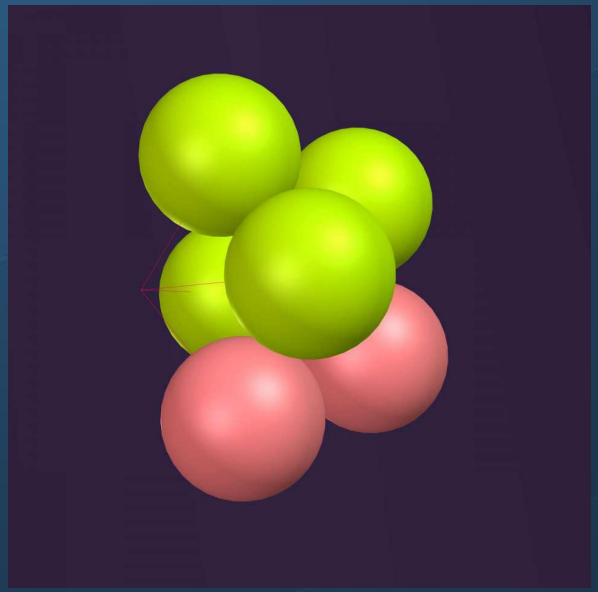
Geometry in the Structured Atom Model (SAM)

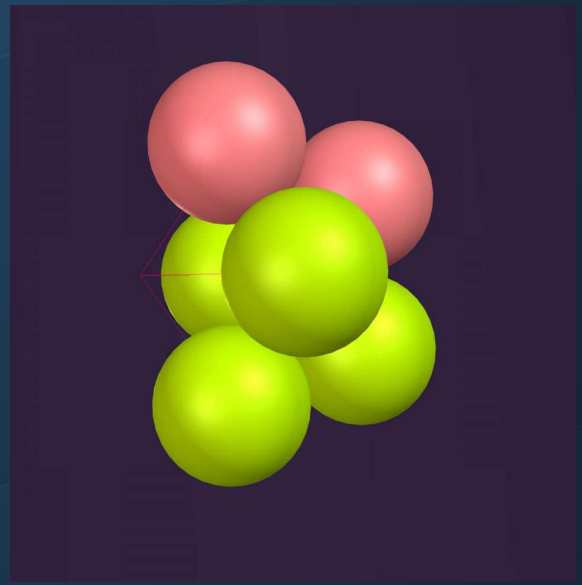
Integrated tetrahedrons (alpha particle)

- 4 particles make 1 tetrahedron

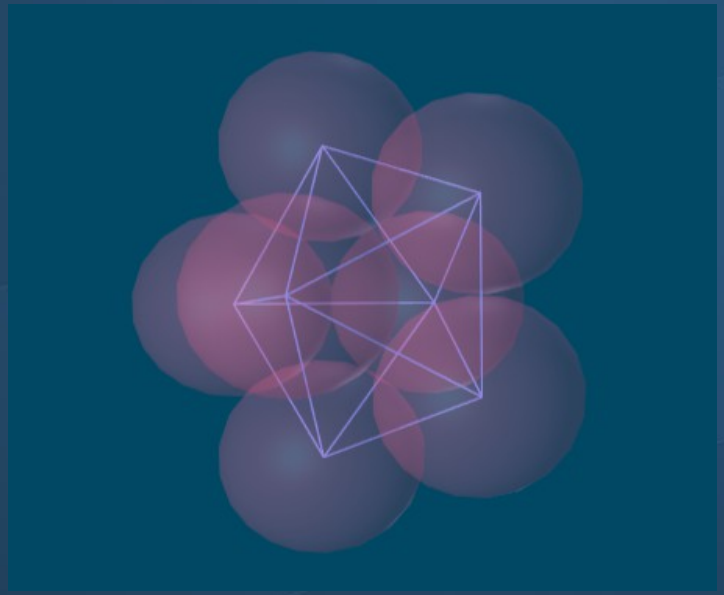


- 6 nuclei make Lithium 6 with three integrated tetrahedrons



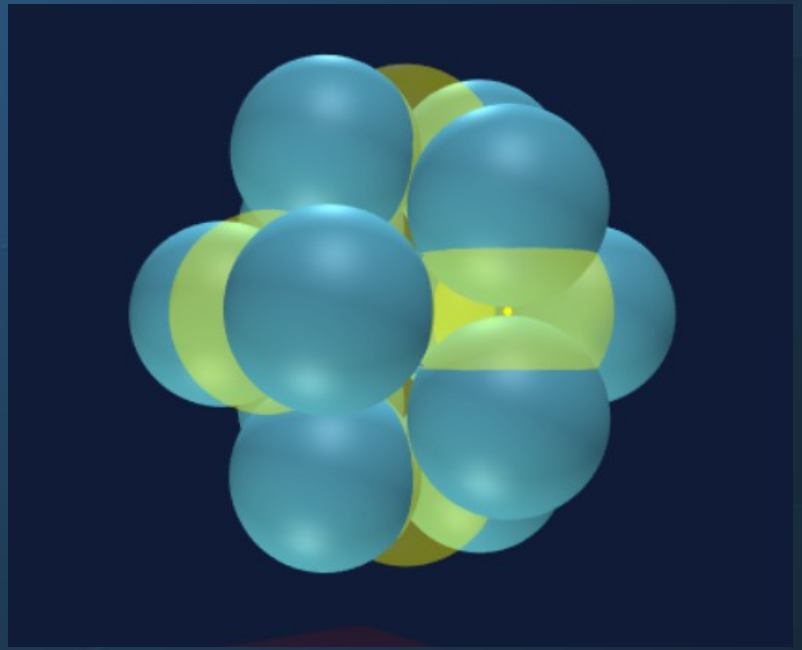


Geometry in the Structured Atom Model (SAM)



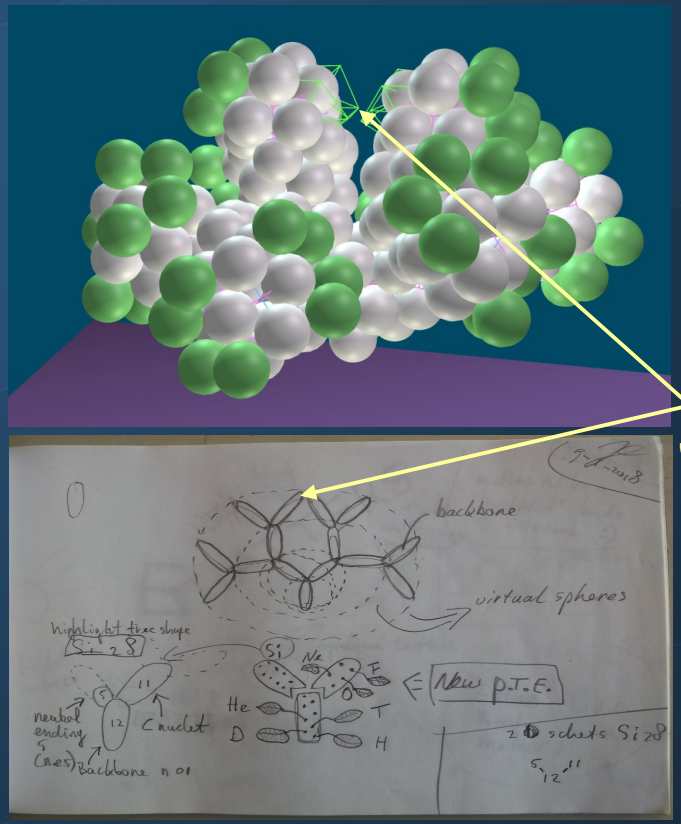
7 nuclei make Lithium 7 which morphs slightly from (5) perfect tetrahedrons into a Pentagonal Bi-pyramid.

12 nuclei make the icosahedron which is equated with Carbon and the major repeating structure in the nucleus for larger elements

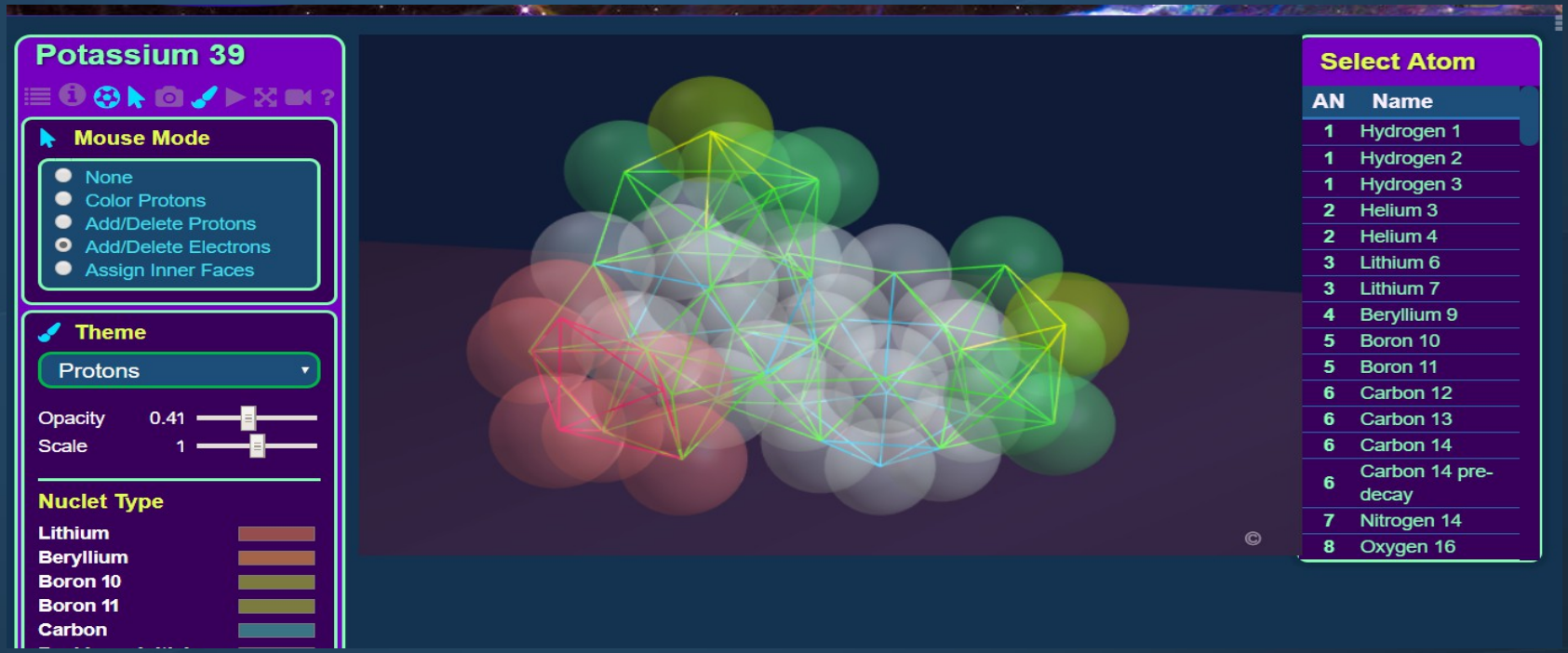


The Shape of the Larger Elements

- The nucleus shows polarity
- Nuclets – The nucleus is constructed from (repeating) recognizable geometric groupings
- The (active) nuclets in combination with the larger structure (backbone) results in the properties of elements
- Each element is like a growth fragment of the 'tree'



Potassium (39) in the Atomizer-Builder

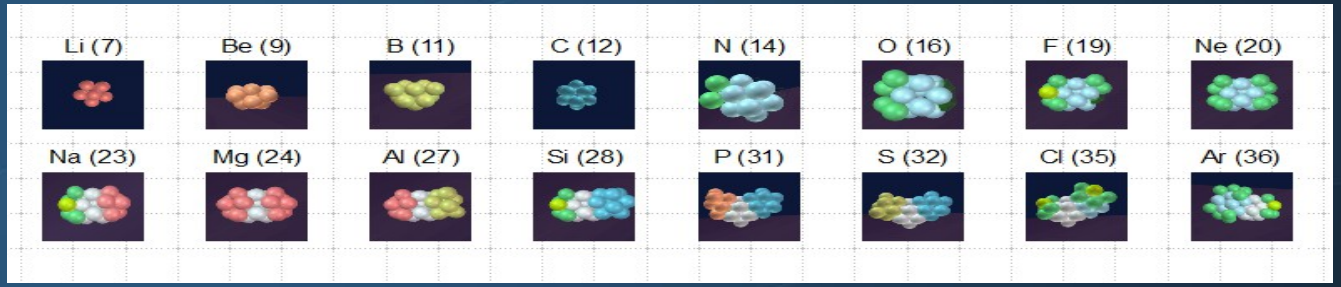


For more information and background visit the page
https://etherealmatters.org/sam

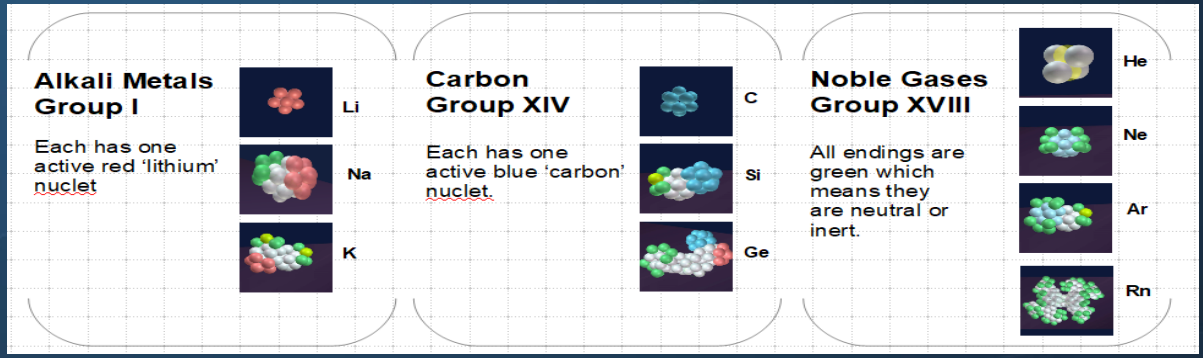
SAM Linked to the Properties of the Elements

Cycle of 8 +1 +2 +3 +4/-4 -3 -2 -1 0

The periods

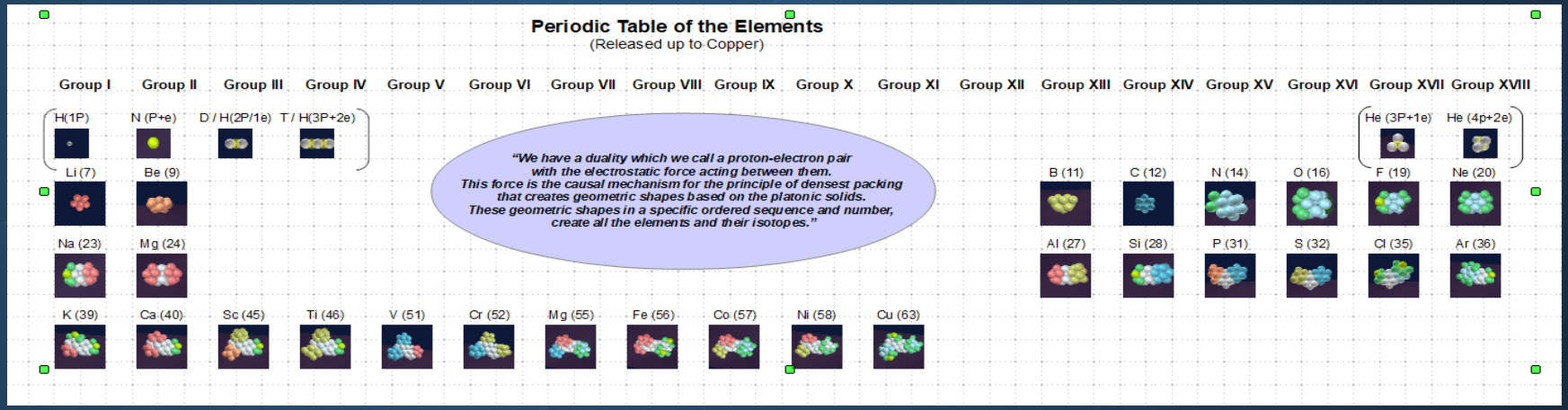


Groups



Correct correlation with the elements in number(s), including the ability to show the "neutrons and protons" precisely for all isotopes. About 50 % of the elements realized so far, including several isotopes

The First 29 Elements Created by SAM

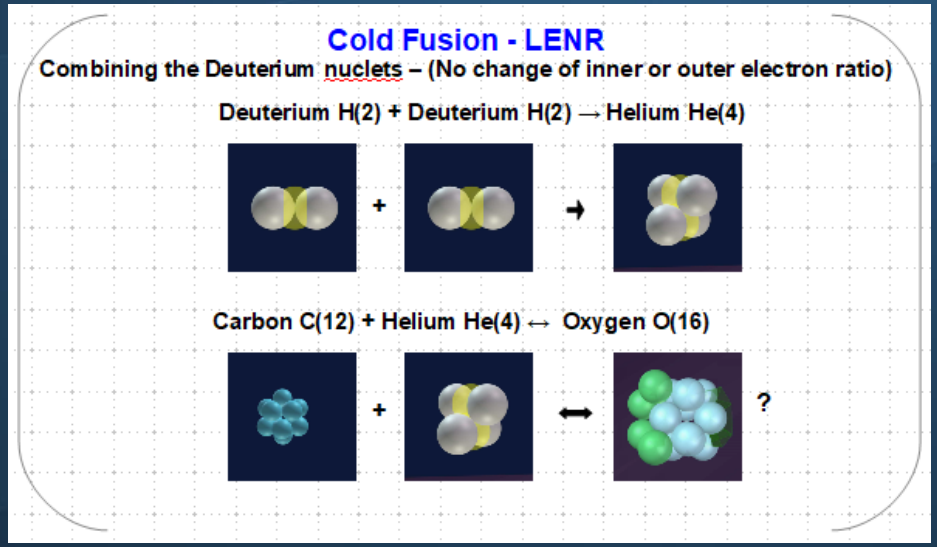


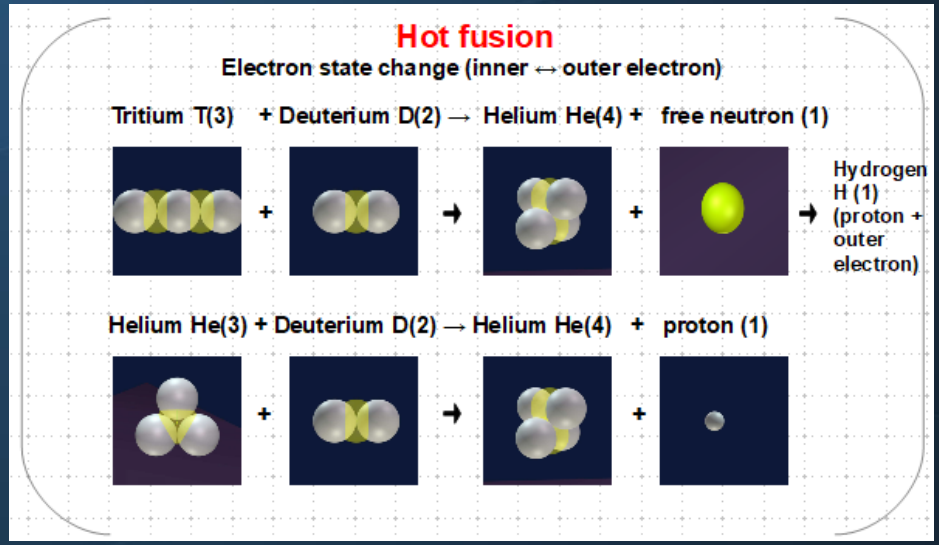
For more information and background visit the page
https://etherealmatters.org/sam

Nuclear Reactions in SAM

SAM predicts these fusion reactions to be common and can show each and every isotope that is involved with these reactions (modeling software)

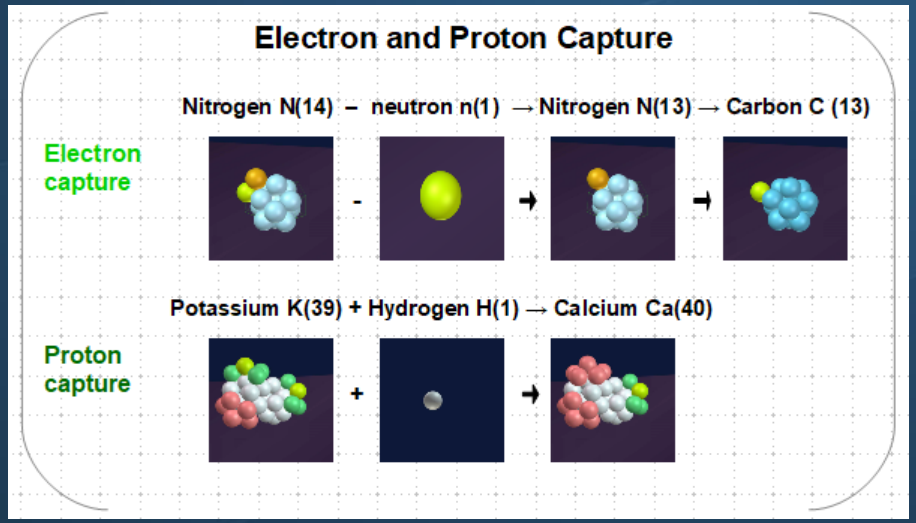
We are developing software that allows users to re-create any isotope of any element.



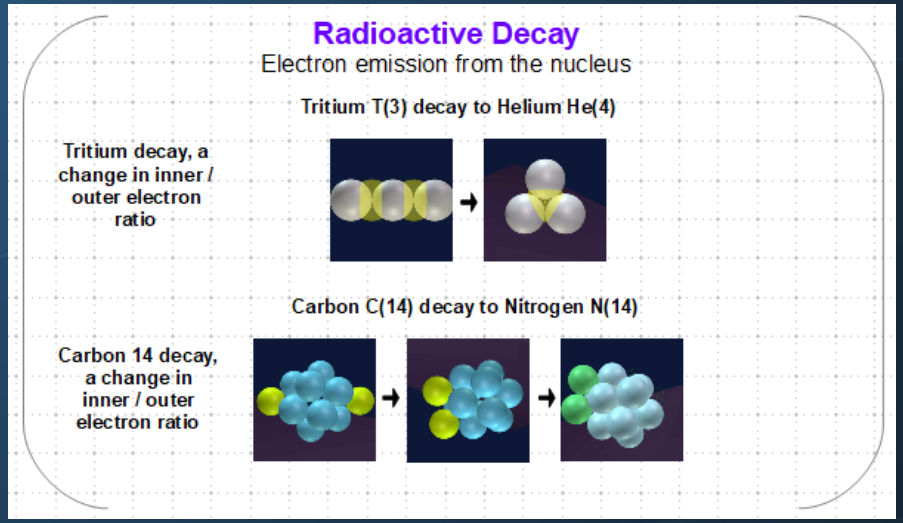


Nuclear Reactions in SAM

Neutron and proton position are precise and logical



Insight in nuclear processes made much simpler to understand (teaching tools)



Tooling and Schooling

- *The Ethereal Matters website is focused on bringing scientists together to discuss, scrutinize and advance the Structured Atom Model. We provide interactive web-based software tools which demonstrate the theory in 3D for research and educational purposes.*
- *https://etherealmatters.org/sam*
- ***The Atom Builder** is an interactive 3D web program which enables researchers to model the nucleus according to the SAM*
- ***The Atom Viewer** displays the atoms created with the Atom Builder*
- *Future tooling: PTE, Fusor (nuclear reactions) and tools for education*

- SAM lends itself very well for education purposes
- It has simple rules and logic
- 3D modelling makes it much easier to form an understanding of atomic structure and mechanisms
- The SAM is a structural, not a mathematical theory – the basic theory is simple, intuitive and well-suited for educational purposes. Being able to build the nucleus with magnets, hold it in your hands, and marvel at its beauty brings the fun back to chemistry!

summary of the Structured Atom Model (SAM)

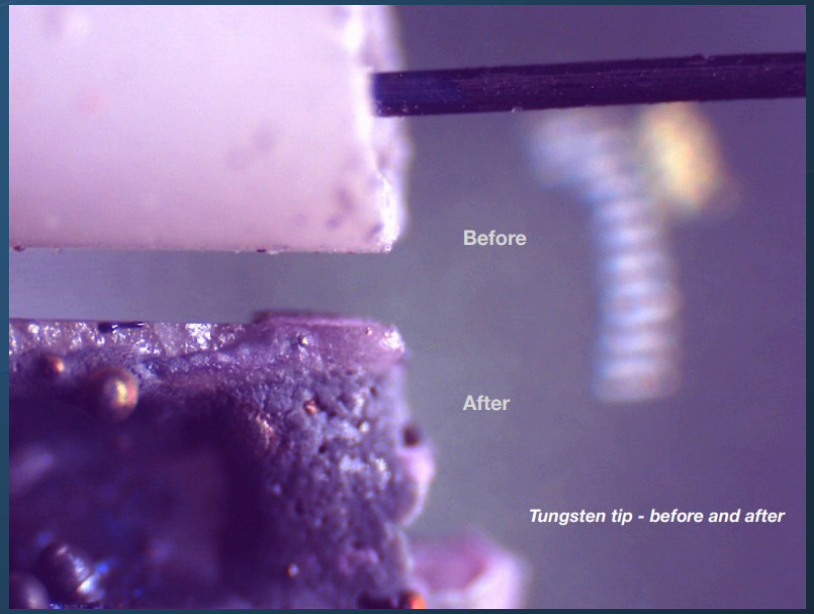
- SAM has evolved on the alpha particle idea (three recognizable geometric groupings)
- We discovered that only the alpha particle/helium nucleus has the shape of a tetrahedron
- The real basic particle according to SAM is the Deuterium/Deuteron or “new neutron” which is a nuclear electron bound to its two neighboring protons
- The (free) neutron is re-defined as a proton-electron pair in a temporary state
- SAM's focus is to explain how the nucleus is organized and how the resulting structure is reflected in the Periodic Table
- SAM has strong correlations in the structure with the known properties of the elements. The strongest one being a logical and causal relation of the repeating geometric structures with the “valence number”
- Preliminary research shows structure reflects the nuclear spin
- The logic of the PTE is fully reflected in the structure, or perhaps the other way around

Research Topics for SAM

- Binding energy calculations based on the structure
- Correlations with the properties of the elements related to the structure of the nucleus. (Valence, Ionization energies, Emission/absorption lines)
- Determine location and behavior of nuclear electrons
- Research how nuclear structure determines the outer electron orbitals and therefore chemistry
- Identify structure of remaining elements
- 29 completed, 30+ more under development
- Determine how nuclear structure dictates nuclear spin
- Identify potential LENR reactions
- Explore possible missing elements

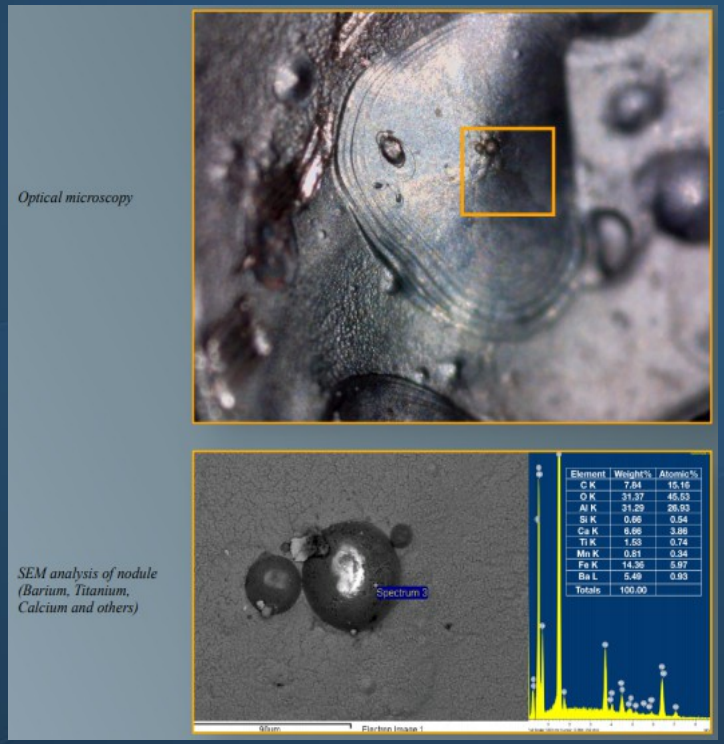
Importance of Metal Transmutations

- It matters greatly which element and which isotope (of metal) is used, and what is used to attach to the metal, i.e. Hydrogen or Deuterium.
  The combination of these specific elements dictates the specific outcome.
- Therefore there is a need for specific isotopic data before, and after, a LENR reaction process.
- Deuterium especially would fit very nicely onto the nucleus (metal) and increase one element; i.e Ni → Cu



Source: SAFIRE project
https://safireproject.com

Importance of Metal Transmutations



Source: SAFIRE project
https://safireproject.com

- A theoretical model that accurately and precisely predicts these reactions is worth considering
- A theoretical model needs to be verified so that information can be extrapolated, meaning if and when a specific LENR reaction would be confirmed, verified and repeated as predicted then these results can predict other (more appreciated) reactions as well.
- Regardless of being endo- or exothermic in these reactions and experiments, the theoretical model can then predict precisely which isotope / reaction to use in what kind of setup in order to get the desired reaction.
- Leading to energy production or the creation of specific elements and/or isotopes for the global market. (viz. Synthestech - Russia)

Where we are today

- Too many models to name
- Citing Dr. Norman Cook who compared the various models of the atomic nucleus that exist.

  “Aspects of each model have led to verifiable predictions and explain some portion of the experimental data, but “unification” of nuclear theory within any one model has not been achieved. A rather unsatisfactory “diversity of opinion” has thus been the status quo in theoretical nuclear physics for more than five decades”

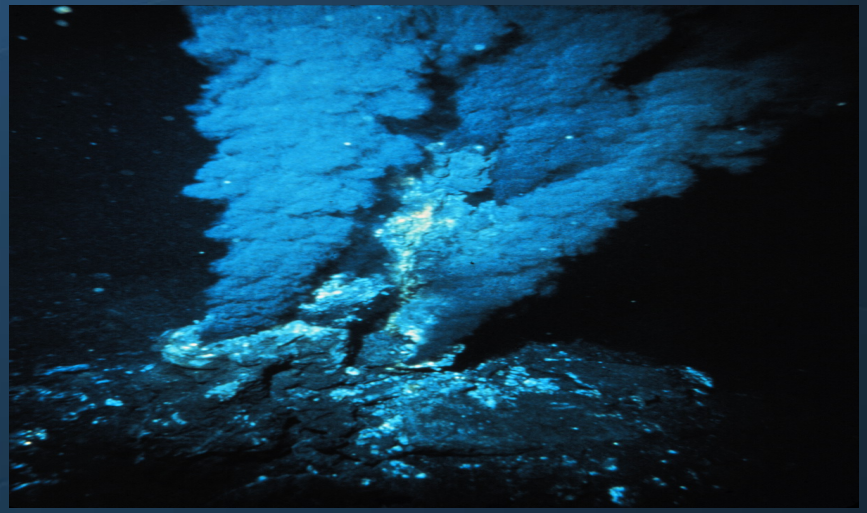
  Source: “Models of the Atomic Nucleus” - Second Edition

Conclusion

- No one in 100 years has solved the problem for the structure of the nucleus, even though it obviously must be there!
- The reason for this is that the neutron is used as a fundamental particle with certain properties.
- Re-defining the neutron as a connection of a nuclear electron with its proton neighbors into a balanced state, offers new insight and a new atomic model

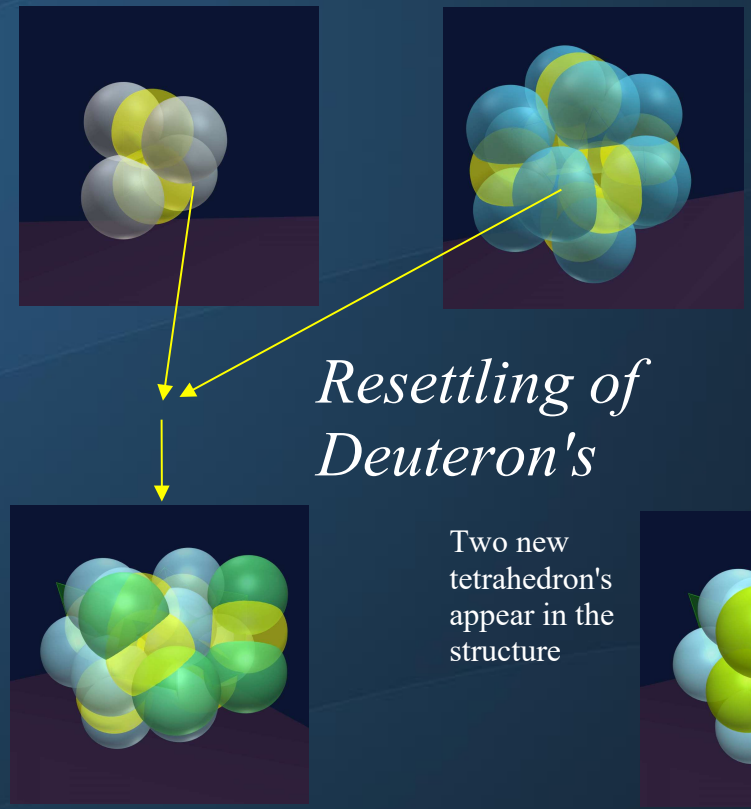
Transmutations in Nature

- Presentation on this topic at the EU2018 in England
- Nature provides many hints of transmutations
- L. Kervran – biological transmutation such as $K_{39} + H \rightarrow Ca_{40}$
- Magma creation at the MOHO zone (+/- 35 km deep). Enigmatic heat source/mechanism
- Abundant Sulfur creation from volcanic vents and fissures (black smokers) $O_{16} + O_{16} \rightarrow S_{32}$
- Lightning produces neutrons (and gamma rays)
- Many more examples
- Relation to the abundance of the elements



LENR and SAM

- We have created an atomic model that reflects a plausible structure of the nucleus.
- Structure dictates the fundamental properties of the atom and of specific elements.
- This includes a shell-like outer electron structure and an explanation of valence numbers, isotope (in)stability etc.
- We believe that the inner electron model is the correct one, but it needs more refinement, giving us the insight to understand (cold) fusion processes.



Conclusions & Recommendations

- Understanding the anomalies in “Hydrogen loaded metals” is of crucial importance to understand how LENR functions
- Our current models are insufficient
- Theory and experiment need to work together “*need two legs to stand on!*”
- The predictions of any theoretical model and the practical results of specific isotopic data from experiments should be compared and verified

To Conclude

- We as in Scientists, Physicists, Experimentalists, Theorist and Chemists and Electric Engineers all need to come together in the challenge to redo our collective homework, leading to a better understood model for the atom and fundamental physics.
- By focusing on transmutations (fusion) that are observed in Hydrogen Loaded Metals we can confirm or discard a theoretical model and only a correct atomic model with predictive capabilities will lead to a real breakthrough.
- It is my hope that by showing this new model based on new thinking that it is possible to do science without using Quantum Mechanics or rather based on different Physics concepts whereby the “duality” principle and the re-definition of the neutron is key.
- By no means is this meant to even claim to have the answer to everything, we are trying to follow this road ourselves in order to try and find more answers. And a promising and exiting one it has been!
- We need to go back to basics....

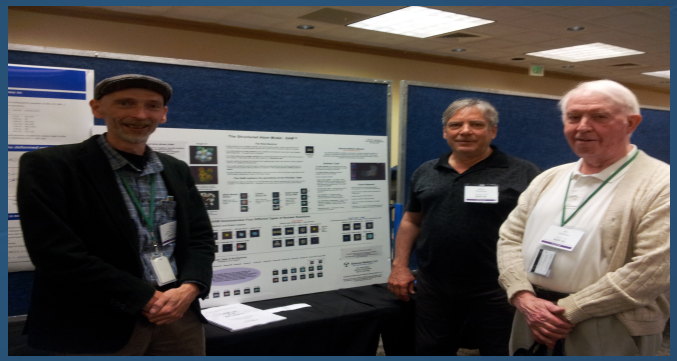
Thank You on Behalf of the Team

The team:

Edo Kaal

James Sorensen

Jan Emming



https://etherealmatters.org/sa

With special thanks to!

The organizing committee,

William Collis, Claudio Pace, Simona Santi &

Richard Moore

And to all the others out there who helped in their own way