

Proposed Link between the Periodic Table and the Standard Model

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Abstract

The patterns of stable quantum states in the Periodic Table are inverted and extended to infinity in both directions to accommodate spatial variation relative to the nucleus. The upper end leads to a cut off point for white matter. The lower end represents quantum states in plasma. At 10^{-15} m to 10^{-20} m the interaction between weak strong and gravity forces results in suitable boundary conditions for the production of elementary particles. Chemical classification of the elements requires convergence of chemical properties and quantum states. By defining GROUP NUMBER as the maximum number of electrons in any one shell, Hydrogen and Helium are moved to the first set of $2(1)^2$ states first proposed by Janet. The atomic numbers are adjusted and mass number removed as it is an average of isotopes of each element produced in every supernova. This produces the: *Roberts Janet Nuclear Periodic Table* which proposes two zero states, a cut off and start point, of the electric field in attractive then repulsive modes. By symmetry of these fields energy states emerge in plasma with the counter intuitive property that the nearer the nucleus the greater the number of energy states. Fusion results and the consequential recycling implies a more rapid collapse than supernovae given sufficient energy density that could create an as yet unobserved interaction at 10^{-50} m to 10^{-65} m between the strong and gravity forces. String theory and extra dimensions may be required to explain such mechanisms and multiverses.

Keywords: Periodic table; Isotopes; Spectral energy; Quantum number

Introduction

Currently it appears there is no holistic overview for the production of atoms in the Periodic Table from the three generations of quarks and the Higgs field of the Standard Model on a scale in nature.

Method

The link between the Periodic Table and the Standard Model has emerged recently in the form of the Roberts-Janet Nuclear Periodic Table (Figure 1).

The spectral energy levels of individual elements have been inverted to represent increasing distance from the nucleus. These represent the energy states of condensed matter from supernova explosions and have two vertical columns shown on the right hand side of the table.

The factor of 2 is the Pauli Exclusion Principle and the numbers inside the squares are the principal quantum numbers. An extra $2(1)^2$ has been added to continue the pattern as proposed by Janet. This is occupied by Hydrogen and Helium outside the Group System as hydrogen does not contain the same chemical properties as Group 1 or 2 and helium contains no p state electrons. This is the 1s state as shown in the table and is Period 1.

The Group System emerges when there is a convergence between quantum energy states and chemical properties. This begins with the next $2(1)^2$ state creating Period 2. Subsequent periods correspond to successive s states.

Group number is now defined as the maximum number of electrons in each period. The integers inside the squared brackets indicate where in the energy cycle the s, p, d, f states begin and how group number accommodates consecutive atomic numbers. For illustration purposes the table has been extended to $2(6)^2$.

However nuclear instability and energy considerations may produce a cut off much nearer to the present 118 rather than the 292 shown in the table. Much experimental work remains to be done in this area.

The zero states represent the change over from the electric field in attractive mode to that of repulsive mode. The interpretation now follows a seminal pathway. As the definition of 2^0 being 1 implied negative power 2^{-1} , 2^{-2} representing reciprocals so the vertical columns representing negative quantum numbers extend into the region when the electric field is in repulsive mode.

However as seen in the table this being the mirror image of the attractive field produces the counter intuitive property that the nearer the nucleus the more energy states there are. A reservoir of energy states is created in the plasma prior to fusion – an enormous energy storage device within the electric field as the protons become compressed by gravity unable to escape because of their mass.

The $2(0)^2$ levels in the left hand vertical column represents a cut-off point of no further stable quantum states in condensed matter. Tunnelling and electron capture occur before this so the electron does not reach an infinite negative potential. The $2(0)^2$ level in the right hand column represents an infinite separation between two protons prior to compression via gravity with sufficient mass to create plasma and the reservoir energy states in the lower half of the table.

At 10^{-18} m to 10^{-20} m the weak interaction is triggered changing an up quark into a down quark. The free quarks become cloaked by the strong force whose range at 10^{-15} m is 1000 times greater than that of the weak force resulting in neutrons. Isotopes of hydrogen lead to the creation of a helium nucleus. Provided sufficient energy is available elements are produced up to iron before the star collapses producing

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Received July 03, 2017; Accepted July 18, 2017; Published July 28, 2017

Citation: Roberts JO (2017) Proposed Link between the Periodic Table and the Standard Model. J Material Sci Eng 6: 356. doi: [10.4172/2169-0022.1000356](https://doi.org/10.4172/2169-0022.1000356)

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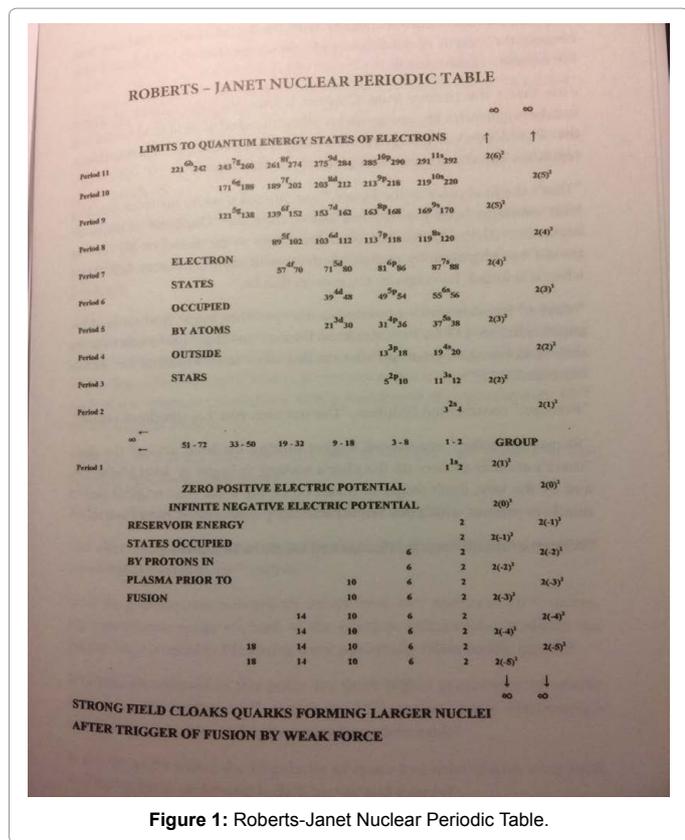


Figure 1: Roberts-Janet Nuclear Periodic Table.

pulsars neutron stars and black holes whilst ejecting simultaneously atomic nuclei and neutrons. These result in heavier elements above iron in the Periodic Table.

Because of the dynamic nature of the explosion each supernova has its own signature of products, similar elements because of the quantum nature of the atomic number but different ratios of isotopes because of the differing fluxes of neutrons in each explosion.

The Roberts-Janet Nuclear Periodic Table [1] implies a universal mechanism by which matter is condensed. It does not contain mass number as this is an average of isotopes of each element produced in every supernova. The Periodic Table is therefore a unique condensation of matter from the supernova that produces the elements in the Solar System and surrounding region.

Registration of the Roberts-Janet Nuclear Periodic Table with the International Union of Pure and Applied Chemistry is recommended so it sits alongside the Periodic Table as the general solution for all Periodic Tables from every supernova [2].

Conclusion

Continuing the seminal pathway from the value of 2^0 led to negative powers, logarithms and the square root of -1. This produced complex numbers, the Argand diagram and the rotation of 180^0 in the complex

plane as multiplication by -1. Adding in all the Maxwell field equations, relativity and Schrodinger's wave functions resulted in gauge theory giving rise to particles carrying energy, charge and mass. By including the Higgs field and the Eightfold Way the current Standard Model is reached awaiting the gravity particle though the wave has now been detected.

What the Roberts-Janet Nuclear Periodic Table suggests are boundary conditions for how the energy structure of the electric field may impinge on the weak strong gravity and other fields to produce elementary particles. At higher energies the weak and electric fields merge as may the strong gravity and other fields do likewise. String Theory, particle mixing and other dimensions may be able to merge quantum mechanics relativity and create other invariants. Collaboration and mathematical modelling between particle physics, astrophysics and cosmology may produce a holistic mathematical framework which could explain the range of half-life decay as the ejected atoms decay to their stable states.

Following the consequential recycling of material from supernovae there may come a point where the plasma contains sufficient heavy nuclei to create such high energy density that the collapse is so rapid it produces an interaction between the strong gravity and possible other forces at between 10^{-50} m and 10^{-65} m.

This could result in a big bang avoiding singularities and producing a set of multiverses within an ever expanding universe. The consequences could be higher generation quarks and/or dark matter and energy. At this point does gravity change from attractive to repulsive mode as with the electric field?

The Higgs Boson at $125.6 \text{ GeV}/c^2$ being greater than 110 units implies there is not a single closed universe. Less than 140 units implies multiverses where the laws of physics are the same. No timescale is placed on the frequency of such big bangs at present until the distribution of white matter and dark matter within the known universe together with the interaction of material from other multiverses is established.

References

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