Structural wave-packet tessellation of the periodic table and atomic constitution in real $R^3 \times SO(3)$ configuration space

E Trell$^1$, G Akpojotor$^2$, S Edeagu$^{3,4}$ and A Animalu$^{4,5}$

$^1$Faculty of Health Sciences, University of Linköping, Se-581 83 Linköping, Sweden
$^2$Dept. of Physics, Delta State University, Abraka 331001, Nigeria
$^3$International Centre Basic Research, 20 Limpopo St, FHA Maitama, Abuja, Nigeria
$^4$Dept. of Electronic Engineering, University of Nigeria, Nsukka 41001, Nigeria
$^5$Dept. of Physics and Astronomy, University of Nigeria, Nsukka 41001, Nigeria

erik.trell@liu.se

Abstract. We describe a structural wave-packet layout in real solid state $R^3\times SO(3)$ configuration space of the SU(3) Lie algebra. Its infinitesimal 'straight line of length equaling zero' partial derivative root vectors hybridize with the parallelepiped outline of the $R^3$ frame into a cyclically expanding isometric vector matrix organization of a continuous one octahedron/two tetrahedrons helical trajectory of SO(3) symmetry. Thus enclosed by its dual scaffold it faithfully outlines the atomic constitution and the periodic table when following the systematic close-packing of its Euclidean space chaperon.

1. Introduction

Erwin Schrödinger devised the Wellenpaket concept in 1926 to encapsulate solutions to his wave equation, relating to elementary particles and especially the electron and its atomic orbits [1,2]. It sought to unify the wave-particle duality of the Copenhagen interpretation of quantum mechanics [3,4] and revived the prospect of non-locality and determinacy at the ground, and was in that regard categorically opposed by the proponents of the discontinuous, local and in-deterministic nature of the purely probabilistic elements and events of the original quantum mechanical formulations. In especial the co-inventor in 1925 of matrix mechanics, Werner Heisenberg in 1935 [3] asserted that "one will have to be content that neither the experimental results nor consideration of principle give one grounds to believe that the future description of nature will let itself to be fitted into the narrow classical formulation of a real and casual description of objective processes in space and time”, because “the wave function expresses a necessary and fundamental wave-particle duality...the inner workings of atomic and subatomic processes are necessarily and essentially inaccessible to direct observation, because the act of observing them would greatly affect them.” Nonetheless, in another paper he accepted that “das Ergebnis kann in matematischen Scheme der Quantenmechanik...eindeutisch repräsentiert werden, etwa durch ein Wellenpaket von Schrödingerschen Wellen in Konfigurationsraum oder durch einen Strahl in Hilbertschen Raum [4]; but only with the qualification that the local and indeterminacy “character of quantum mechanics is very tightly bound to the formal circumstance that its mathematical framework of wavefunctions operates in multidimensional configuration space, not ordinary space” [3].

However, it opens for a “framework” whose proceedings relate to a “configuration space” for if so a random evolution, yet essentially maintaining continuity and causality by that condition. And there are
now a number of classically reconcilable stochastic models that operate by reciprocal cross-breeds of hidden variables or wave decoherences or Fourier series or knots or strings enveloped in and out of corresponding configuration spaces, and spurring an anticipation that "the possibility of a realistic derivation of quantum mechanics is simply too compelling to abandon...The large and growing number of suggestive connections between classical stochastic models and an assortment of quantum phenomena especially in classical electromagnetism are simply too powerful a set of clues to ignore" [5]. Then there is no more classical or basic framework than the ordinary geometrical Euclidean universe fulfilled by the real solid state configuration space $R^3\times SO(3)$ [6], where the ground $R^3$ frame is the Cartesian coordinate system and $SO(3)$ governs the commensurable elements and events therein. Three parameters from $R^3$ and three from $SO(3)$ with together six degrees of freedom thus hybridize a physical wave-packet compound as a unit interval of a coherent structural worldline.

2. Methods and results
At the infinitesimal level this stepwise composition outlines a reciprocal trigonometric function, namely, in the present case, the SU(3) and subgroups Lie algebra [7,8]; and more particularly their real geometric automorphisms in which the $R^3$ scaffold naturally appears as a unit cube, or 'CuBit'. Physically projecting the analytical neighborhood of the respective Lie algebra it may further modulate itself into isomorphic parallelepipeds and/or relativistically or otherwise skewed layout, setting a virtual $R^3\times SO(3)$ wavepacket incubation and mechanics stage which actually blueprints the entire elementary particle spectroscopy [9-20]. And also in a static block embodiment it has interesting, in especial mathematical uses as a whole-number counting frame bead with straightforward abacus bearings and solutions to Fermat’s last theorem by cumulatively tessellating the infinite Diophantine Equation Universe both according to classical Sumerian building principles as adopted and adapted by Euclid [9,16,17], and in a likewise infinitely ascending Pascal binomial expansion order [18].

The $SO(3)$ moiety of the system has a double identity as its in ground state spherical eigenelement as well as algorithm of its own volume-preserving spheroidal, that is, in QCD sense, gauge- and symmetry-invariant transactions and transformations, which in effect enable an exact and exhaustive reproduction of the entire elementary particle spectroscopy including charge, channels, states, angular momenta and masses [9-20]. The present report focuses on the joint $R^3\times SO(3)$ geodesics according to the full differential equation scope of the original Lie algebras, which generally iterate their universal partial derivative "geodetic curves of length equaling zero" to "transform two spaces into each other", and more specifically in the SU(3) case how the "Plücker line geometry can be transferred into a sphere geometry" by trigonometrically "transforming space r’s straight lines into space R’s...spheres’ rectilinear generatrices’ (= infinitesimal generators in today’s terminology), where "x, y, z are perceived as parameters and...dx, dy, dz as direction cosines" (Figure 1) [7,8,21].

![Figure 1](after Gilmore) a) The mapping $\phi$ maps a neighborhood of an infinitesimal point or b) "straight line whose length equals zero" to the neighborhood of in the SU(3) case a sphere.

The so absolutely sharp transition of the respective geometries’ infinitesimal generators can thus be uniquely effectuated by the corresponding root space diagrams of their commutation relations. In SU(3) this is $A_2$, which has to be doubled to switch from the complex number field to the ordinary three-dimensional structure of $R^3$. It is accomplished by a real geometry coset decomposition of SU(3), that interlinks to the infinitesimal generator root vector space of the sphere directly spanned by the duplicated
A2 diagram, whose neutral isospin vectors coincide with the Cartesian x and z axes but whose charged $t$ isospin axes set up a hexagonal lattice with unit side continuing in the surrounding as space-filling regular tetra- and octahedrons. It is a template for both inward nucleon [19,20], surface muon [9-20] and external baryon and meson [Ib.] transformations, whereas the electron (and positron) geodesics are generated by a coherent continuation of the charged $t$ isospin vectors as will be focused on in the following. Figure 2 gives an overview of the game plan and its pieces.

**Figure 2.** a) Duplicated A2 diagram knits a hexagonal SO(3) infinitesimal generator lattice in and out of the unit sphere, globally distributed and linking (and transformation-guiding) in space-filling parallelepiped $R^3$ geometry-aligned reference enclosures, right e) and f).

And figure 3 summarizes how the charged $t$ isospin root vectors can be linked to a coherent triple helix in a continuous cloverleaf ‘singlet coil’ sequence of 12 unit steps – equally many as the edges of the cube – into the only other space-filling regular solid convolution, namely, a complex of one octahedron and two tetrahedrons (Figure 3a). It is a consistent phase transition which in iteration forms an important nanotechnology structure, i.e. an ordinary space frame (Figure 3b), alias octahedron-tetrahedron, or octet truss whose modular building blocks and their assembly can thus be realized from the ground of material organization [9,10,20,22-25].

**Figure 3.** a) Linking of coherent charged $t$ isospin root vectors, forming between them an outwards connected lattice, which from a chosen outset, here at the octahedron equator, b) iterates to an octet truss space frame of isotropic vector matrix constitution.

It is what Buckminster Fuller called ”an isotropic vector matrix (IVM)…with everywhere-the-same energy conditions” [26]. Instantly spanned as a simultaneous filigree all over the field [Ib.], it will
crystallize like when ice freezes from multiple infinitesimal origins as an at once isotropically distributed infinite universal inflation [9,10,20]. To that end the space frame is built section-wise in cyclically expanding self-similar perpetuation of its applied construction module, and buttressed by central pivots, which is a coincidence with the present lattice since “viewed mathematically, as a generic pattern” they “correspond to the centers of spheres of equal radius”[26] and thus occupy regular matrix sites in a recurring organization to evenly contribute to a seamless filling of the space. Of course, the entire mesh fills the space per se but to do it uniformly in an all-over sequentially escalating meandering course there must be a self-similar modular build that can adapt to gear in at periodic interaction levels.

Figure 4 shows one space-filling motif zigzagging about a unit pivot gap which the octahedron-tetrahedron train may be directed into by an open-ended course of the 12-step coil (Figure 4a). It is the truncated octahedron, which in the continuous plotting here in palindromic Bohr orbital model periods (Figure 4 b) is seen to come back after $152 \times 12 = 1824$ unit steps to its IMV module hub $180^\circ$ turned and one step translated so that in setting out for the next, oppositely bent lap also the hub is one step translated (Fig 4a). This moves the hub one step so that for the 1836 steps of the module thus tallies one step of the hub which allows a calculation of the respective inertia $= 1/1836$ (Figure 4b), which is precisely the electron/proton mass ratio [9,10]. Identifying the ground IVM modules here with the electrons/positrons is in agreement with scientific observations of their two-fold cast as “wave functions or transition matrix elements” [27], and with their actual weaving of our outward world and interactions.

\[
\text{Mass} = \frac{938.28}{(12 \times (152 + 1))] = 0.514 \text{ MeV}
\]

**Figure 4.** a) The 12-step tetrahedron-octahedron ‘singlet’ coils can be linked to a three-dimensional filling of a truncated octahedron in a continuous Zitterbewegung path, coming out with Fermion $\frac{1}{2}$-spin $180^\circ$ not rotated but oppositely directed to the entrance after b) $152 \times 12 = 1824$ unit steps. One singlet translation is thereby needed to get into the next lap, adding up to $1824 + 12 = 1836$ steps.

**Figure 5.** a) 12-step space frame singlet coils (“grains of nature”) [26] are mirror-distributed in both vertically and horizontally coherent parallelepiped wave packets, b) which can be tied together as in Figure 4a to a zigzagging piling in a $2 + 8 + 18 + 32 + 32 + 32 + 18 + 8 + 2 = 152$-step coherent sequence into a trapezoid stack module of palindromic Bohr orbital distribution.
However, the further layering of the truncated octahedrons along the path is intricate. In that regard, a more straightforward tessellation alternative is summarized in Figure 5 [9,10,28]. It is seen that the 12-step electron singlet coils both vertically and horizontally form a coherent mirror-duplicated train with parallelepiped envelope (Figure 5a) which packs a trapezoid module of \(2+8+18+32+32+32+18+8+2\) unit bricks (Figure 5b), possible to combine and tessellate by itself.

Figure 6 summarizes how these modules can further pave the space by joining together either with a closed center (not shown) and, as shown, leaving a central unit cubic gap which, in turn, provides a pivot in the further close-packing. It forms a bottom plate with flat base and to complement it, as shown in Figure 7, with a flat roof, enabling vertical stowing, too, a reciprocal complement is needed and can be mobilized out of space by nilpotency [29] as the sum zero residuum in the combined module that together fills space in all directions including the thickness of its layering that the vertical piling supplies. The extra step given by equal number of wavepackets in both parts of the individual modules allows them to link with each other (not shown) but prohibits space-filling tessellation (Figure 7e). In the absence of the extra step, however, this can be carried out as by the toy model of Figure 8 in one version with an open central unit hub of neutron angular momentum and one with closed center devoid of both charge and torque as in the Einstein-Bose Condensation state.

Figure 6. a) Photo and b) graph of four modules gathered to rhombic bottom plate with central gap and in further spacefilling aggregation leaving unit corner defects. Colors refer to the noble gases

To enable full crystallization with all the dynamic properties, too, of real matter, Figure 9 illustrates a spacefilling way that in terms of charge, angular momentum and inertia corresponds to the Helium atom. The further tiling from the elementary particle to the atomic scale is indicated in Figure 10a, where the infinitesimal module self-templates its design hierarchically and can increase its volume ten thousand-fold within less than ten cycles and thus bridge the size gap. But it would be unable to go into other than its own pattern there, however, so something happened to form our present structured world. This was, and is, the still ongoing nucleosynthesis era when due to cataclysmic perturbation events accumulating from initially small ripples in the primordial plasma, the stacking process turns backwards (Figure 10b) [7,8], so as to figuratively squeeze the atomic dyestuff out of tube again to recombine upon the frontal plane canvas; the initial Protium, or \(^1\text{H}\), which proceeds transversally, forming a chain by taking a single vector step at the end, lifting (or, in the inverse projection, lowering) the electron wave one level (Figure 11b).
The dominant element in the process is Hydrogen and Figure 11 summarizes this basic nucleosynthesis phase as replicated in the model.

Figure 7. a-c) Side view of successive packing of compound module to flat roof, enabling (in this projecting) dense vertical piling. d) Top view of formation of compound module with 152 cuBits in both lid and ground part and showing that the central hub gap is transferred in the center, and that a static space-filling packing between neighbors is feasible but in practice means obliteration. e) Identical contour between ground and lid part with in both a 153 parallelepiped load is reached by an extra step but even with marginal rearrangement of this in the combined module it cannot find room in the tessellation because of congestion in the corners.

Figure 8. Toy model series of the bottom plate and reciprocal roof cap combined to the module and the approximation and union of four of these to two versions of space-filling (Figure 7d) rhombic block of which none can lodge the extra step but one has a central unit gap analogous to the neutron around which a section-wise non-rotationally spiraling elevation is feasible.
Figure 9. a) The 152-bit bottom plate can also be formed by two adjacent corner halves of the module, and b) with the diagonal moiety forms a cross-section which is almost-quadratic in shape and can be tiled via the corners. c) When an extra step to 153 modules is made, the cross-section is fully rectangular and instantly tileable. d) Filling the lid part means adding 5 bricks to the extra step plus two columns of 6 each, and corresponding contour change of the compound module. e,f) With the diagonal counterpart a parallelepiped block with central pivot and corner protrusions is formed that moves the module two oblique and two angular momentum infinitesimal displacement steps.

This step is in the plane of the electron but oppositely inclined so as to outline the Proton, whose inertia/mass will accordingly come out as 1836 times larger than the Electron’s (Figure 4 a). Apart from this constant gradient, the $^1$H trajectory is flat and unable to bend. The primordial plasma would be distributed in longitudinal layers which would initially be collimated, but small ripples and fluctuations would grow and eventually there would be clashes escalating to cataclysmic collisions and compressions between unipliable bundles thus forced either to break up their constituents or transform them. In the first case their lattice edges would be scattered, and the single isovector pieces corresponding to neutrinos would go into endless straight lines of hence zero mass, and there would be one type with orthogonal orientation when coming from the R$^2$ and one with diagonal when coming from the SO(3) source. And when two or more consecutive isovector steps are joined, there would be a zigzagging, likewise endless path and hence matching the photon.

In some instances, however, when two $^1$H intercept one of them could be flipped to $^3$H (Figure 11c,d) while the other recoils as a positron and a neutrino. And when a $^3$H gets a new torque from a confronting Protium, they may together twist into Helium, which is also the $\alpha$ particle. (Figure 11e). It is seen that Helium has two perpendicular angular momentum turns along the unit walls of the central hub which suggests that these are neutrons which are thus unit vector quantities, too, filling their own slot of space in which they can proceed in a rectilinear square wave geodesics singly or pairwise twining themselves round each other so that the torque is neutralized and clusters can be formed; potentially reaching stellar size.
Figure 10. a) Horizontal plane diagram of first three cycles of stacking and combinations of parallelepiped IVM modules with transferred central hub vacancy and b) dismantling extrusion squeeze exerted by condensation impact in the nucleosynthesis era.

Figure 11. a) Protium, $^1\text{H}$, is the dominant element in the primordial gas. It has charge $+1$ but b) no torque since it tessellates by the variety without central hub in one-layer strata only. c) To get into the nucleosynthesis process there is a flip by neighbor pressure so that d) the $^2\text{H}$ module gets a torque and thus e) the forming of Helium as the first step of the nucleosynthesis ladder is initiated.
From Figure 12 it is further seen that when Helium multiplies either to fill space or to build up larger atoms it is lifted by two diagonal infinitesimal displacement steps and accordingly contains two protons and two neutrons. In Figure 12b a graphical representation is given of how the “light in a box” [30] wave packets of the noble gases are assembled – and reassembled in the nucleosynthesis process. The flanking $\alpha$ particle clusters cover the eight atoms between Helium and Neon and Neon and Argon (Figure 12a) and the 32 between Xenon and Radon, and Radon and Oganesson (Figure 12c). The $\alpha$ particle consists of two half-turn Hydrogen atoms and so has unit spin which means that all Noble gases (in principal form) are Bosons. The same applies to all atoms which are multiples of the $\alpha$ particle, and in between them every second atom is a Fermion instead because of lodging a terminal half-spin Hydrogen, which can then be designated as the $\beta$ particle.

Figure 12. a) Four Helium/$\alpha$ particles = eight Hydrogen/$\beta$ particles tesselate both the space and the atoms between Helium and Neon and Neon and Argon. b) Lateral projection of noble gas extrusion from bottom module in same order as the singlet wave packets and terraces are arranged therein (dotted are internal layers). It is seen that the atomic periods, each terminated by a noble gas are filled obliquely like a conifer. There is spare room for a 16 $\alpha/32\beta$ period beyond Oganesson. c) Sixteen Helium/$\alpha$ particles = thirty-two Hydrogen/$\beta$ particles tesselate both the space and the atoms between Xenon and Radon and Radon and Oganesson, and beyond Oganesson.

Again, one must note the extensive correspondences between the model/module and reality. It is remarkable as well that the entire periodic table and its elements may be reconstructed (and deconstructed) by two building blocks alone. This will next continue by the atoms in the L shell and how they may fill space by themselves (Figure 13).
Figure 13. The atoms in the L shell and their oxidation states. From Carbon a schematic drawing is supplemented. Colours refer to those of the Noble gases in the scintillation tube.

Already in the L shell one notes that other assemblies of the blocks, with different oxidation state, are feasible, e.g. in Carbon. This will be exemplified in some of the M shell atoms in Figure 14.
Figure 14. The atoms in the M shell. As in Figure 13.
One starts to discern the stochastic, i.e., random yet deterministic conditions at hand in which a widening range of isotopes occur with higher atom number. While the stable ones are space-filling, the unstable would have gaps and vacancies that for longer or shorter periods can be compensated dynamically and/or by extra neutrons and other events, but in the end decay to stable states in a radiation including photons and neutrinos and the $\beta$ and $\alpha$ particles that built them up. It is a permutation table where the dice are thrown by the number and thrust of the wave packets smashed out of the IVM modules to crystallize in the various feasible forms that the transversal plane canvas offers. Figure 15 suggests a game plan that is by its systematic loading arranged in the 18 columns and 7 rows but without the gaps and additional shelves of the standard periodic table.

**Figure 15.** a) Loading of the stablest noble gas forms up to Xenon. b) Continuing tabular loading of the noble gases up to Oganesson, suggesting that there may be even heavier elements.

This lining up of the elements does not bring Radon or Flerovium and Oganesson to the end of a block, however, and there are other ways of clustering of which an eccentrically growing parallelepiped variety reaching to Krypton and Xenon is shown in Figure 16.

**Figure 16.** a) Two other loading varieties of Krypton. b) Continuing from Krypton to Xenon by same consecutive laying of $\beta$ particle bricks.

In that way both Krypton and Xenon can be brought to an ultimate corner and have a halogen in the preceding position and an alkali in the next. Also, the marginal adding of the $\beta$ bricks would increase the number of binding sites towards the midst of a period, and decrease them towards both ends. Changes...
in the arrangement of the $\beta$ cells would allow a diversity of oxidation states, as will be evident from the following schematic graphs of varieties of the first members in the M series.

**Figure 17.** Examples of first nine elements in the M period.
It is seen that the marginal $\beta$ particles may be single, each offering a positive oxygenation site but by different placement may cover each other to neutral $\alpha$ particles or even, as in Manganese, create a gap with negative oxygenation state. The ability to replicate space-filling chemical compounds is a vital reality testing of the whole model, and in the case of Hydrogen and other simple bonds they are clear without further comments from practically all previous figures. In Figure 18 more examples are given of some larger molecules and their space-filling. It is to be noted that there are no drawings of the bonds because the atoms connect directly and the apparent impression of interspaces is that in every interaction moment only one infinitesimal point area of the larger surface is engaged, which is also the case in atomic spectroscopy and gives the individual signature of each element and its isotopes.

Figure 18. Some chemical compounds and their space-filling.

3. Discussion

The present model of the periodic system emulates a direct “surface growth…mechanism of crystallization” as has been revealed at Silicate-1 ion subnanometer-scale resolution by in situ atomic force microscopy imaging$^{31}$, and revealed “step heights, terrace widths, and other surface features” accumulating in layers horizontally and upwards under “realistic growth conditions”$^{32}$ with a central diagonal orientation in an ordinary Euclidean space frame strikingly akin to the $R^3 \times SO(3)$ symmetry applied here. No rotation is involved but an accretion of linear precursor stages, which is also in correspondence with the application of Lie’s partial derivative “straight line whose length equals zero”$^{[7,8]}$ as the sole element of the real structural mold. In that respect it is thus different from the standard model which builds upon rotation and transmutation of quarks under the SU(3) rules whilst in Lie’s original work on the continuous groups and algebras he noted that “in that we restrict ourselves to the linear transformations of $r$, we find between the corresponding transformations of $R$: all movements (translation movement, rotation-movement, and the helicoidal movement), semblability transformations, transformation by reciprocal radii, parallel transformations…etc”$^{[1b.]}$. Then, instead of quarks the three hexagonal space axes of which one commutes with the orthogonal in the horizontal plane (Figure 2a) serves as the fabric of the system where the SU(3) and subgroups operations are otherwise commensurate.

A strong case can be made for the infinitesimal straight line as the sufficient and necessary ground element of physical substance. Aristotle originally postulated that “whatever possesses dimensionality is body”, which dictum Cartesius articulated as “the extension in length, width, and depth which constitutes the space occupied by a body, is exactly the same as that which constitutes the
body...consequently, there cannot exist a space separate from body, since all spatial extension simply is body” [33]. This edict entails the complete filling of a physical space as well as a mathematical field by extension’s own unique eigenvector element which Lie, who in the foreword of his thesis declared that it “stands in an intimate dependence on philosophical reflections upon the nature of Cartesian geometry”, found to be the infinitesimal straight line [7,8]; both as a mechanistic matter of fact and in a deeper exegesis as the categorical contrast to nothing at all [9,10,17].

Time has come to revive the ancient cosmographies reverberating through all cultures of the universally generating phase transition between straight and round and the fundamental regular solids and their symmetries and formative unit line element, as they subsist in original terms from times immemorial in the “African perspective on the theory of everything....based on cube-hexagon hyperspace/torus geometry in which space-time quantization into a lattice is achieved according to modern solid state physics and hadronic mechanics of extended (string-like) elementary particles...(with)...complementary duality of leptons and baryons” [9,10,17,22-25,28]. Going back to the future, they are in effect an updating of the by now veteran quantum mechanical formulations of the Copenhagen School [3,4], whose “sole lens of…the loose set of assumptions Niels Bohr and his colleagues developed to make sense of the strange quantum phenomena they discovered in the 1920s and 1930s...transformed into a pervasive censorship that stifled any opposition” [34] for nearly a century. This momentous statement is quoted from Science and expresses a rising concern that “exclusionary rights may affect research” negatively [35], for instance, by hindering alternative outlooks.

We wish to point out, however, that we have met no opposition so far, which is partly due to the early stage of our investigation but also that the “geometric Lie algebra” [9) plan lends itself equally well to a quantum mechanical rendition as the standard quark-gluon model. The advantage is the possibility of visualization that makes it suitable for far-reaching structural study and animation. And while our charting of the periodic system has so far only reached to the M and N shell, we feel that the system holds the whole way and as recapitulated in Figure 19 even further. Pulses of squared α particle clusters are hammered out from the module anvil between the noble gases, and to be a perfect

![Figure 19. Hammering out squared α particle clusters between the noble gases. There is place for one more 4² cluster behind Oganesson.](image-url)
noble gas without bonding sites these blocks must be fulfilled to the utmost corner, while isotopes may go into other clusters and be chemically active for their life time. It is a stochastic situation that matches the real conditions. So, it would seem that the atomic panorama can be comprehensively and significantly mimicked by the present model that is a continuation of previous fruitful research of the elementary particle spectroscopy [9-20,22-25,28] which with the rendering of also the proton and neutron as unit line elements in pivotal positions (Figure 2e) has allowed delving into the “hidden valley” [36] of “hot nuclear matter” [37], too, and finding the events and “echoes” [Ib.] of charm and bottom, the tau, the gauge vector bosons, charmonium and other resonances there; as an effect often of chasing the elusive jets rather than catching them [9,15,17,19,20,328].

It would be worthwhile therefor to consider the entire system as a real machinery whose binary periodic table generator offers an atomic assembly line counterpart of the ribosome ”translational apparatus” in organic protein synthesis. This is a double-deck ‘molecular machine’ that via a funnel in its cap feeds the collected amino acids by the single-strand, clover-leaf enfolded, transfer RNA conveyor belt to the splicing in the ribosome’s catalytic nozzle from where the protein chain is then extruded to its subsequent folding. The analogies, from input to output, are there and open up an alluring virgin land for fresh and joyful exploration.

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