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Original linear Lie algebra directly solves Standard Model and Periodic System

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Abstract. The original geometric Lie algebra is linear, digital and differential, and in an internal part exactly and exhaustively realizes the Standard Model of the elementary particles by serial lattice transformations of its orthogonal versus spherical infinitesimal generators. In an external part by the line congruence extension and expansion of their reciprocal network through, primeval and astrophysical stages it further leads to an equally exact and exhaustive realization of the Periodic System of the atoms and molecules and their crystal structure, compositions and images as well as online interactive computer system bits and algorithms.

Keywords: Alphabit, Aufbau, Betabit, computer program, crystallization, differential, digital, elementary particles, geometric, Lie algebra, linear, line congruence, Periodic System, Standard Model

Introduction. The Standard Model remains the ultimate analog equation system of the proliferating elementary particles, while the original Lie algebra applies its sole particle element: “the straight line of length equal to zero” [1, 2] into a digital transformation lattice of the infinitesimal generators of its geometry. First disclosed in two dimensions as “eine gestreifte...algebraische Fläche” [3] it was shown how this could be folded and connected in further planes and angles into the composition of a linear ‘vector’ space (Figure 1) but more fundamental since spanned by its infinitesimal generators themselves instead of their tail-of-the-dog resultants.

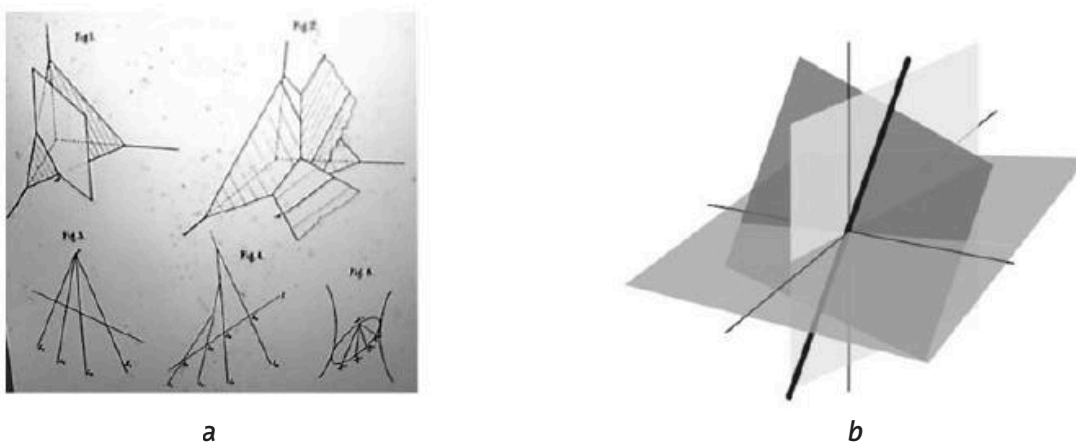


Fig. 1. *Gestreifte Flächen* of ordered linear algebra and plane geometry “*Imaginäre Curven*” by straight lines of length equaling zero (distance between adjacent coordinate points) (a). Note equivalent organization as in a present-day unordered linear vector space (b)

Methods and materials; results. This “Imaginär-Curven” system [3] reaches beyond the Standard Model by extending its network over the crystallization of the Periodic Table [4]. Here lies the gamechanging nature of Lie’s linear algebra, not in relation to his time but to the present-day abstraction into an immaterial ‘vector’ space. But to Lie the line was not a mathematical idea but a real “Ding” [3] and thus a concrete construction element starting and acting from the infinitesimal level to build the Cartesian/Euclidean space, piece by piece “as a partial differential equation itself” in the “form $f(x, y, z, dx, dy, dz) = 0$ ” [1, 2]. This is thus the space formula for which, quoting Lie, “Descartes produces a quantity system x, y, z ...” he has among the unlimited manifolds of possible co-ordinate systems chosen a definite one...” “one realizes that the straight lines that meet a given condition may be used as the element of a geometry of the space, which gives a faithful representation of the algebra of three variables”. However, by itself the space is static but “if here x, y, z are perceived as parameters...” “each point in the space is associated with a cone, namely, the collection of tangents to those complex-curves that go through the point in question...” “to the curves c of the space r , thus unambiguously correspond the curves C of a definite curve-complex in R ...” “the two spaces are mapped into each other...” “in such a way that to r ’s points correspond in R the imaginary straight lines whose length equals zero.” There is thus a “transition from a point to a straight line...” “of length equal to zero as element” [1, 2], because points have no extension but a Lie algebra neighborhood of the dx , dy , and dz enclosing it as the distance in each direction between adjacent points.

Lie’s discovery that “the Plücker line-geometry can be transformed into a sphere geometry” then both founded spherical geometry and provided the mutual reciprocal space between them, and this “particularly remarkable transformation”, unfolds separately or together between the “infinitely small...sphere’s rectilinear generatrices” and those of the “Cartesian Geometry quantity system” as mutually parameters and “complex-cones” of each other [1, 2]. Thus the linear algebra is made, digitally and differentially, by itself. “Die Streifen” in the visionary Darstellung des Imaginären in der Geometrie [3] are such infinitesimal straight lines in and between “algebraische Flächen” but in complex space where, however, any “complexe Gleichung löst sich in zwei reelle auf” [3] which, “arrange themselves pairwise as reciprocals” [1, 2] “in der Geometrie der Liniencongruenzen” [3].

Now, we have what we need to start working. We know that we have the dx , dy , and dz infinitesimal generators (and their tangential spherical geometry counterparts) to apply digitally step by step by themselves as partial derivatives in their own differential equations. It is thus not a secondary linear “vector” space of whatever but a primary linear infinitesimal generator space, of themselves, which is a radical, indeed game-changing difference.

Focussing on the three-dimensionall spacefilling in the two mutually reciprocal spaces both separately and in “complex-cone” integration, “Fig. 2 surveys the line congruence clutions.

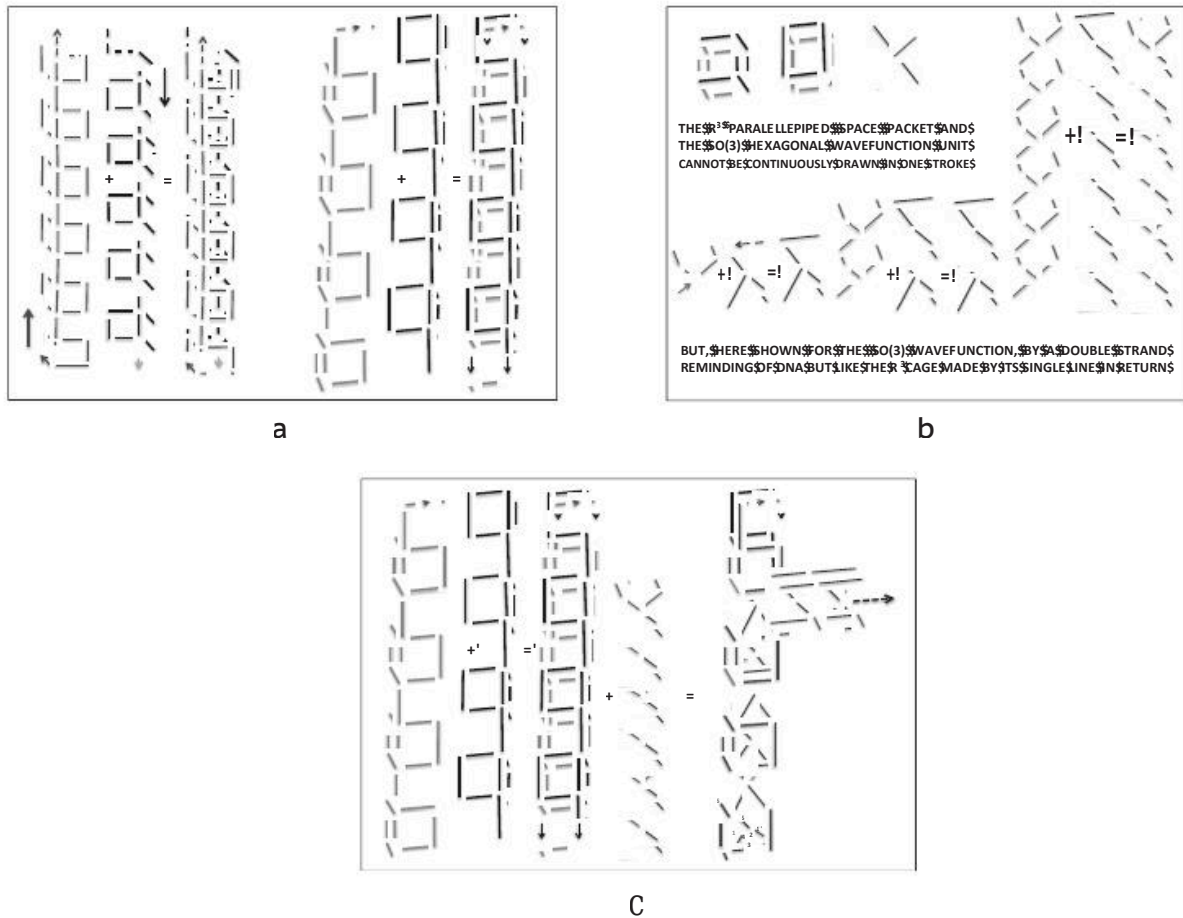


Fig. 2. $\pm(dz + dy - dz - dy + dx + dy - dx + dy)$ formula of line congruence filling of a) orthogonal Cartesian 'packet space', b) hexagonal spherical 'wave space' and c) reciprocal 'wave-packet' space'

The lines are infinitely thin and in reality "touch" [1, 2] both internally and externally but still don't overcross since geometrically separate. The 'packets' touch along their whole sides, while the 'waves' touch only in their corners with a correspondingly more concentrated intensity. May this explain the difference between gravity and electromagnetism? Among other interesting things to reflect on is whether the 'quarks' could simply comprise the dx, dy, dz infinitesimal coordinate system?

Figure 3 then outlines the further natural history of the line congruences according to Figure 2 introduced mainly by halves in early Universe in almost isotropic microwave background form.

Now this was a most rudimentary and also arguable summary of an entire cosmological History, but in Figure 4 we just continue the bricklaying, judging validity and success by the objective results.

The above telegramstyle legend is admittedly a bit cryptic but it is hoped that a further figure exposition of period 2 and 3 may lead to a gradual comprehension of the stuff.

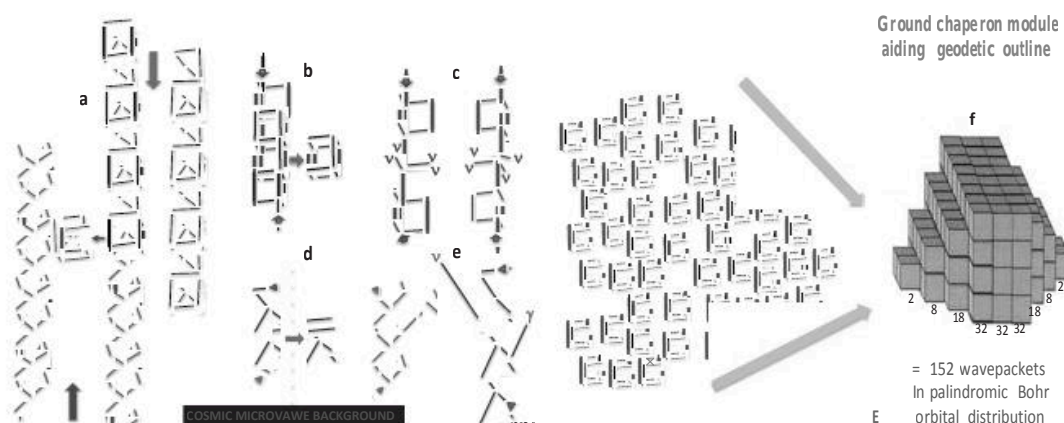


Fig. 3 a–e) Different line congruence geodetic curves in early universe with examples of rare confrontations there and their outcomes in a) combined parameter/main-tangent hybrids, and b, c) separate parameter and d, e) cone-complex arrays. It is shown how ipsilateral confrontation causes annihilation to straight neutrino and zigzag photon linear sequences, while contralateral superposition generates congruent parallelepiped outlines of matching a) wave-packets, and b) spaceframe, and d–e) wavefunction vortices. f) There are small fluctuations in this blend leading under billions of years to stellar formations and ultimate cataclysms in the extreme condensation of which the synthetic processes virtually explode, too, to pile up in the exhaust and in order to avoid jamming from the start must find the best space-filling further layering, which is the Bohr *Aufbau* system [4–6] in a reciprocal line congruence top and here displayed bottom part. It is shown for a wave-packet crowd but likewise applies to the space and wave pieces

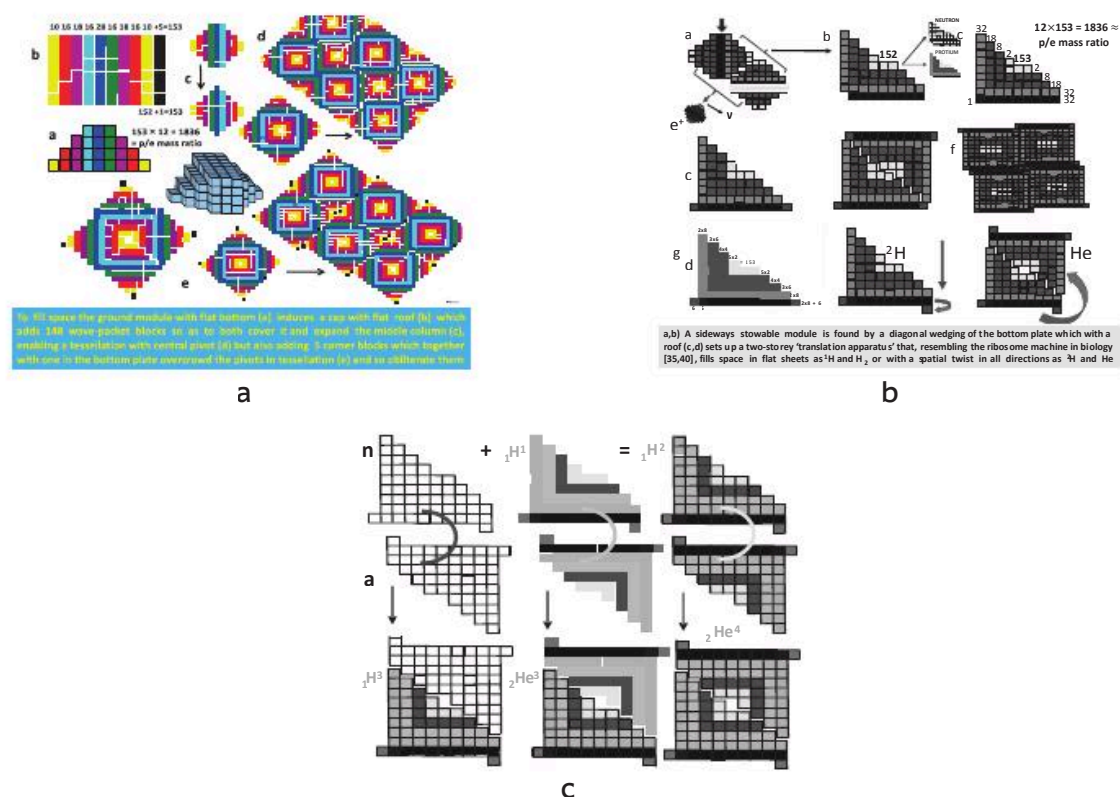


Fig. 4. a) Frontal and horizontal cross-section views of Module with directly layerable flat-roofed upper half and flat-bottomed lower half, each containing 153 wave-packet bricks with 12 lines in each = $1853 = p/e$ mass ratio. b) However, this module is congestive but an equivalent lateral variety is dynamic and in its first period's steps reproduces the Hydrogen — Helium relations further explained in c) together with Peripheral Neutron/spacelattice — (actually) Electron/wavenet atom composition.

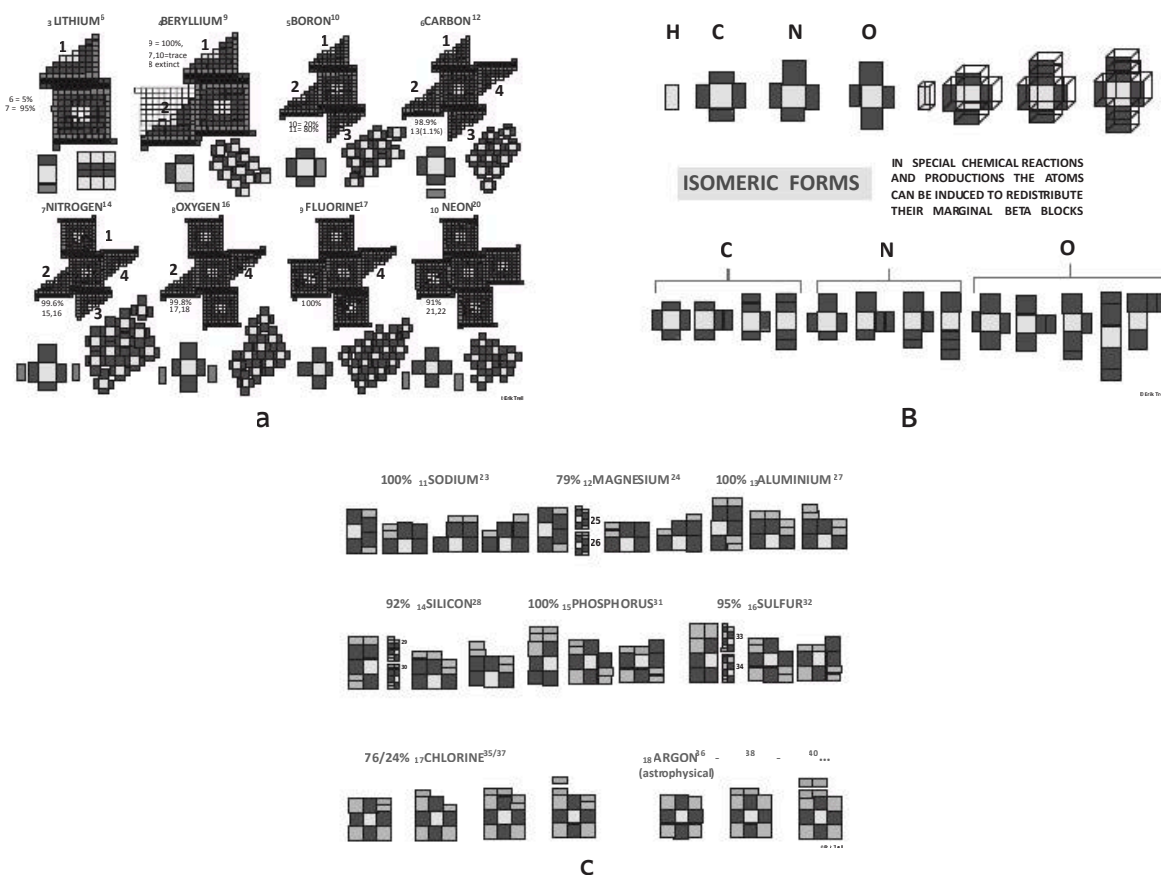


Fig. 5. a) Second period. Note simplified space-filling square Lego-type representation with isotopes by Neutron excess indicated, and mid-symmetric form of Carbon, Nitrogen and Oxygen, b) which together with Hydrogen form organic chemistry's building set, while c) from third period a square form with help of Neutron excess is applied by marginal accretion in successive layers.

The modules are crystal seeds and to grow into atoms they first tile into up to 10000 times wider integral surfaces, and then rise via origin shaft to new layers till billion times larger atom (Figure 6, left) and can start its interactions. Next some Carbon aggregates are shown followed by basic hydrides.

So now we can continue by figures alone, first of a few organic states (Colors are those of the noble gas in respective period), where we also see examples of the present art of their chemical models.

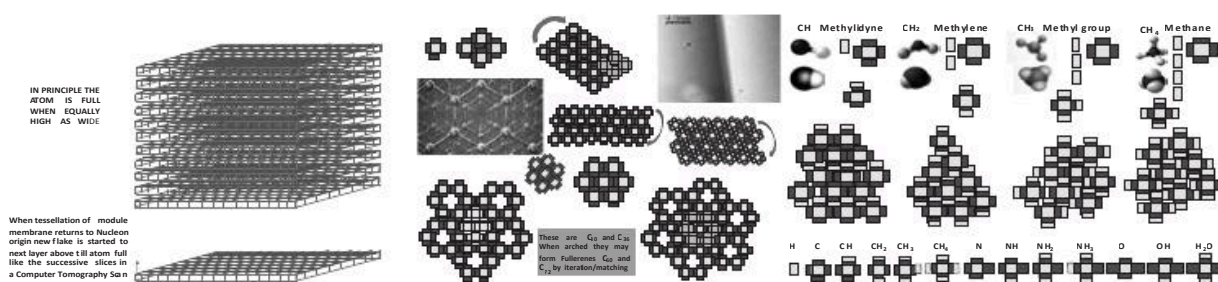
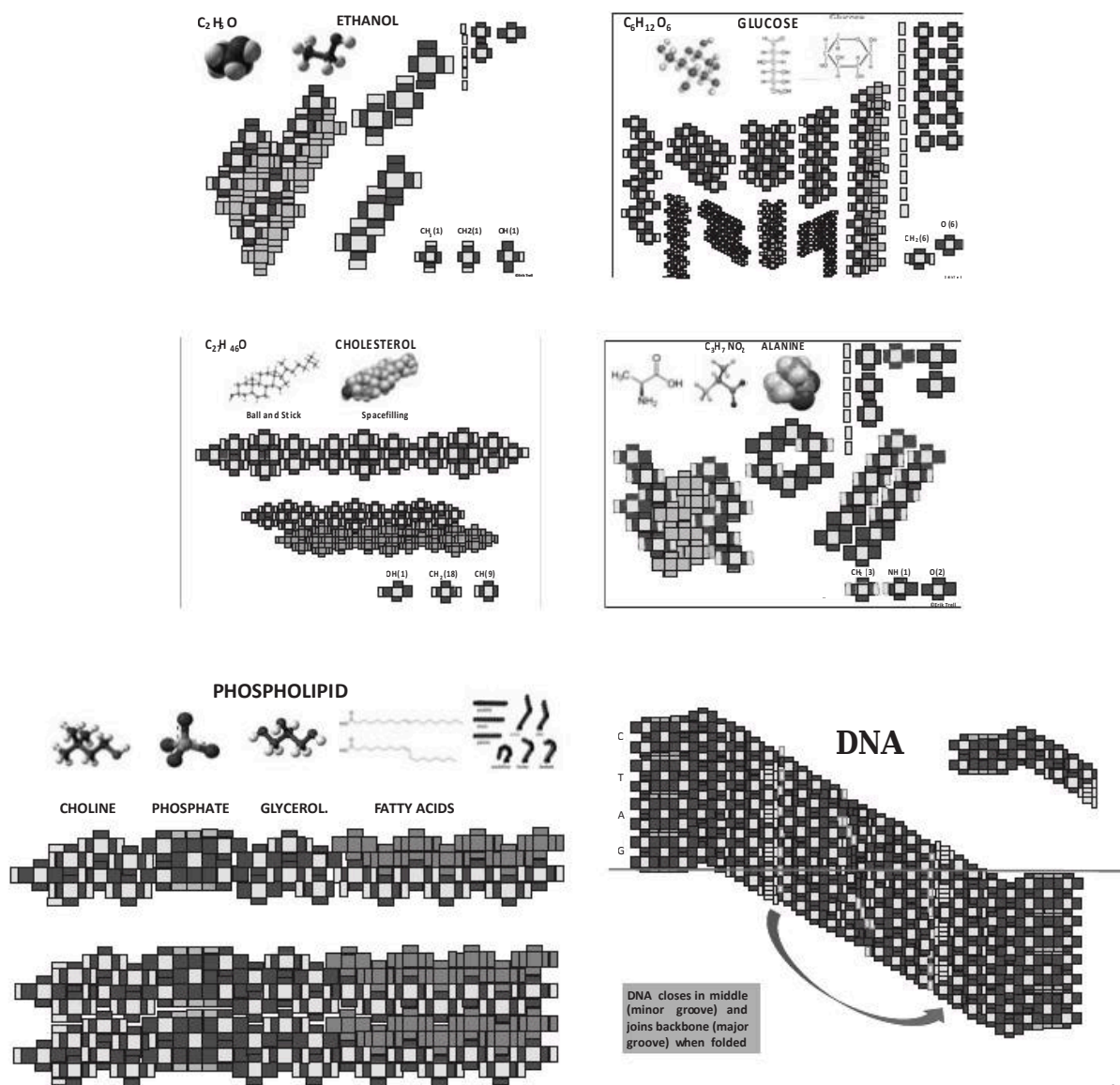
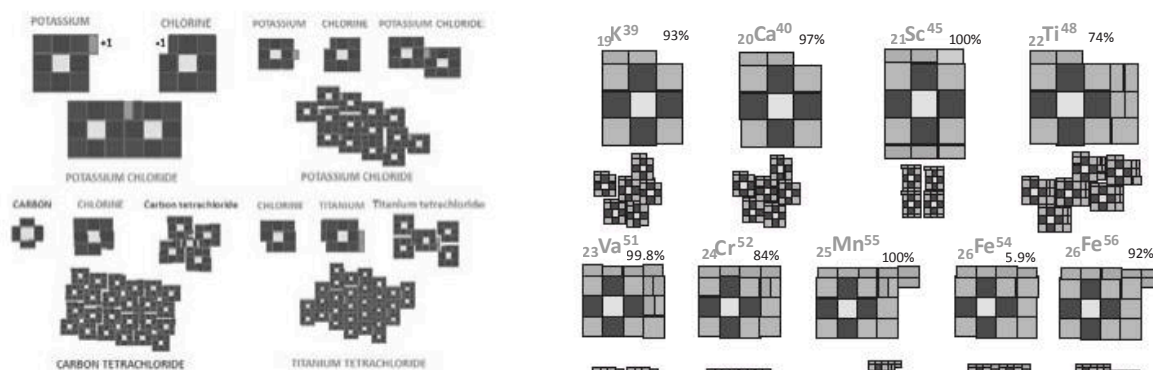


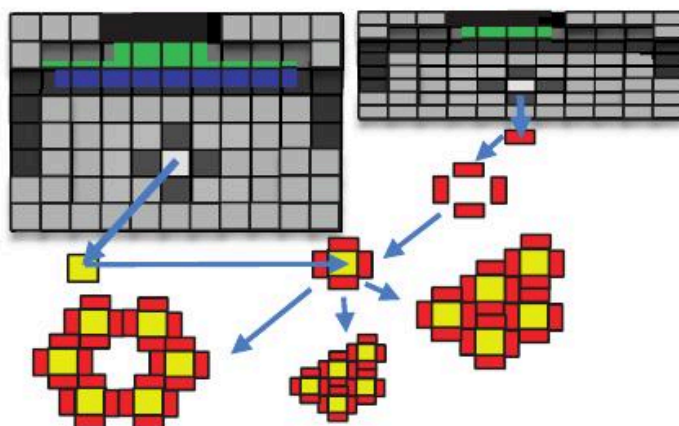
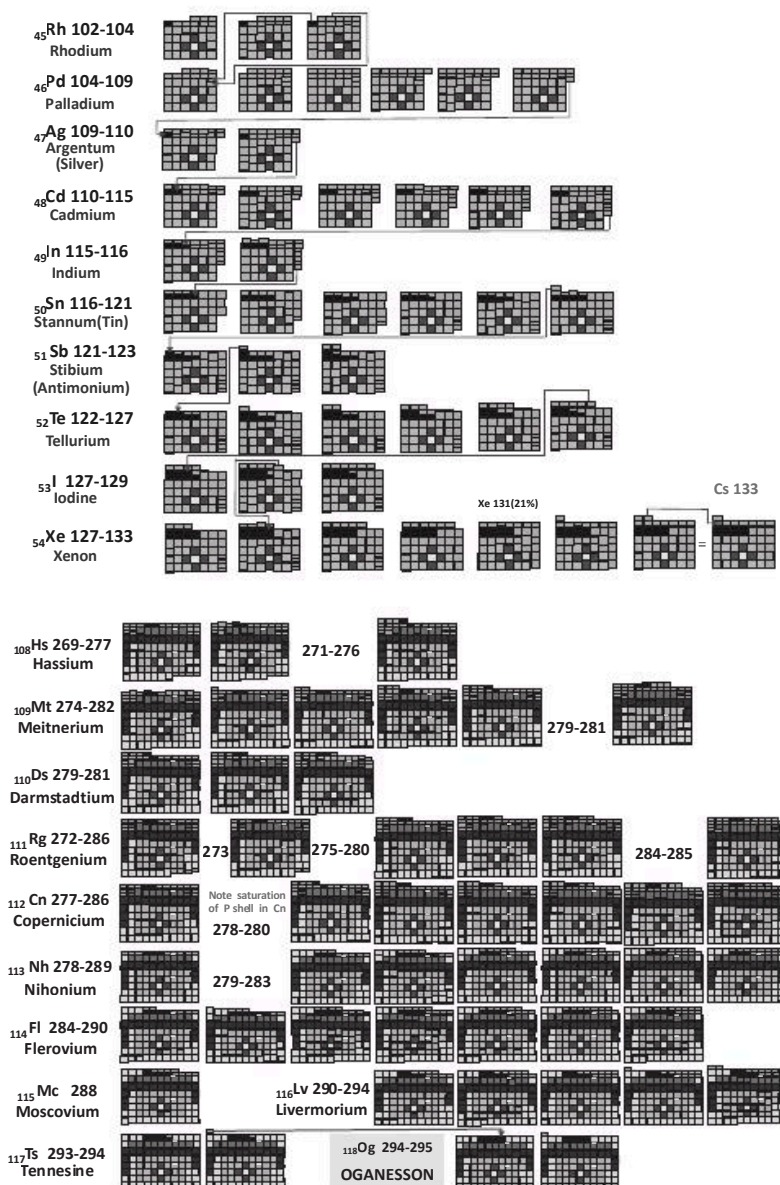
Fig. 6. See text



Then we can continue with some inorganic compounds.



"Duplo" bricklaying including marginal + ('male') and - ('female') binding sites and molecular combinations works well until Iron, when the intrastellar burning processes cease and other nucleosynthesis mechanisms, notably neutron capture take over



This is the concluding figure, epitomizing Oganesson as both Integral and Icon of the Periodic Table; canvas as well as palette of its patterns within its perfectly rectangular noble gas frame; all the shells with $1 + 4 + 9 + 16 + 16 + 9 + 4$ saturated alpha = Helium bricks, that is, completing the seventh round of a theoretically

possible eight-period Bohr Aufbau cycle [4–8], plus $2 \times 29 = 58$ excess Neutron contour fillers in right K L M N O P Q positions, and everything tessellated by just two tile varieties; a quadratic Helium 'Alphabit'® and its latitudinal half Deuterium 'Betabit'® in alternating Fermionic and Bosonic order and exhausting all forms under them so that they can be applied in all scales and media and utilizations. This is alluded to in the figure as bits and algorithms in online interactive computer systems and other realizations, with Oganesson as the natural processor and keyboard.

Conclusion. While other geometries are spanned between other reciprocal spaces, the present one specifically comprises our Euclidean Universe by an interior algebra part realizing the Standard Model by serial transformations of its infinitesimal generators [6], and the exterior part of the Periodic Table. here focused on. Of course only an infinitesimal — but hopefully representative — fraction can be exemplified, but there is still no single substance or simple compound tested that has not been possible to reproduce, including the proteinogenic amino acids, DNA and RNA, and raising rich possibilities of a ground-up real structural elucidation and manufacture in a wide range of e.g. protein composition and functions, material constitution and cellular mechanisms, as well as in art and education with correspondingly large and rapidly achievable enterprises. The great question, then, and answered by yes! and no! by Lie, is whether his lines are by themselves this structure-direct or just proxies of a more essential substrate, perhaps dark mass and energy, responding by the mysterious resultant graphs of a linear vector space? But what can be more essential than a line or more linear? with dark energy and mass direct associated with the ongoing astronomical phase shift between straight and round.

Finally a note on the Electron-Proton exchange in the modules which gives an adequate lodgment of the Electron's extension and wave/particle duality and photoelectric effect and others as well as the Proton's central occupation of the same wave unit.

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