Conclusion

As already said in the introduction, this essay does not pretend to present a perfectly elaborated *Theory of Everything*, but rather to show that a rigorous approach to elastic solid lattices by an Euler coordinate system, as we developed in this essay, provides a much simpler framework for investigation than differential geometries such as those used for example in general relativity, but which are very rich and fertile since it has been shown quite simply that it is possible *(i)* to make very strong and often perfect analogies appear with all the major physical theories of the macrocosm and the microcosm, such as Maxwell's equations, special relativity, general relativity, Newtonian gravitation, modern cosmology, quantum physics and the standard model of elementary particles, and *(ii)* reveal strong unifying bridges between these various theories.

About the central role of Newton's equation of the cosmological lattice

Since the beginning of this essay, we note that Newton's equation (figure 3.1) that we presented in chapter 3 for the *imaginary isotropic cosmological lattice* has everywhere played a central and capital role, and that it is at the basis of most of the amazing properties of the perfect cosmological lattice, including:

- *the propagation of transverse waves* coupled to longitudinal wavelets, managed by the Newton equation, which implies that pure transverse waves can only exist with circular polarization (which is a fundamental property of photons),

- *the existence of domains of expansion* ($\tau_0 < \tau_{0cr}$) *in which there are no solutions of longitudinal waves to Newton's equation*, but only *quasi-static solutions* which are the basis of the phenomena of gravitational interaction between topological singularities, or *localized longitudinal vibration modes*, which are the basis of *the quantum dynamics* and *the spin of localized topological singularities*,

- *the curvature of the wave rays* in gradients of the volume expansion, which is also a direct consequence of Newton's equation, and which predicts the possibility of the existence of black holes which irrevocably capture transverse perturbations,

- *the complete Maxwell's equations* for the rotation vector $\vec{\omega}$ when the volume expansion field is homogeneous, which show that the electromagnetism equation $\partial \vec{B} / \partial t = -\overrightarrow{\mathrm{rot}}\, \vec{E}$ is nothing other than the expression of Newton's equation of the cosmological lattice applied to this particular case,

- *special relativity*, with the contraction of rulers and the dilation of time for an observer moving within and with respect to the lattice, which is a direct consequence of Newton's first partial equation,

- *Newtonian gravitation* and *general relativity*, which are direct consequences of the quasi-static solution of Newton's second partial equation, in the case where the topological singularity considered has an energy density or rotation charge density below a certain critical value,

- *the spatial curvature of space for the **GO*** observer situated outside the lattice and *the space-time curvature for local observers **HS*** within the lattice itself, which implies a direct analogy between the divergence of Newton's equation and the famous *Einstein equation of zero divergence* $\vec{\nabla} \bullet \boldsymbol{T} = 0$ *for the energy-momentum tensor* which ensures that the laws of conservation of energy and angular momentum are respected,

- *the black holes*, static solutions of Newton's second partial equation in the presence of macroscopic vacancies in the lattice when $\tau_0 > 1$,

- *the neutron or pulsar stars*, static solutions of Newton's second partial equation in the presence of macroscopic interstitial clusters in the lattice,

- *the weak interaction force* between the edge dislocation loops and the twist disclination loops, which is also a consequence of Newton's second partial equation,

- the *quantum physics*, the *wave functions*, the *Schrödinger wave equation*, and the *notion of spin*, which are consequences of Newton's second partial equation in the dynamic case of gravitational perturbations associated with localized topological singularities of the cosmological lattice, when these have an energy density or rotation charge density that is above a certain critical value. This critical value of the energy density or of the rotation charge density then becomes an extremely important quantity since it actually corresponds to *a quantitative value which defines the famous quantum decoherence limit*, i.e. the limit of passage between a classical behaviour and a quantum behaviour of a topological singularity,

- *the photons*, quanta of the transverse solution of circular polarization of the Newton equation,

- *the pure and hard quantum concepts*, such as *bosons, fermions and the indistinguishability of topological singularities*, as well as *the Pauli exclusion principle*, which are all deduced directly from the application of the second partial equation of Newton to several localized topological singularities.

About the perfectly innovative role of the curvature charge

In our approach of the cosmological lattice, a perfectly innovative concept appears, *the charge of curvature of the edge dislocation loops*, which is an unavoidable consequence of the treatment of a solid lattice and its topological singularities in Euler coordinates. This concept does not appear absolutely in all modern theories of physics, whether in general relativity, in quantum physics or in the Standard Model, while in our approach this concept provides explanations for many obscure points of these theories , among which the main ones are:

- *the weak force associated with the cohesion of the corner-screw dispirations:*

Considering topological singularities formed by the coupling of a twist disclination loop with an edge dislocation loop, which are called dispiration loops, *an interaction force similar to a capture potential* appears, *with a very weak range*, which induces interactions between loops presenting a perfect analogy with the weak interactions between elementary particles of the Standard Model.

- the matter-antimatter asymmetry:

In our approach, the matter-antimatter asymmetry has no more mystery because it is precisely the charge of curvature which becomes responsible for the appearance of *a weak*

asymmetry between the particles (hypothetically containing edge loops of interstitial nature) and anti-particles (hypothetically containing edge loops of a lacunar nature).

- the mass of curvature associated with the curvature charge and its consequences:

Each topological singularity is associated with a mass of curvature due to the curvature charge which is added to its mass of inertia, and which induces slight differences in the behavior of the gravitational interaction forces between matter and anti-matter, and which provides simple explanations for several still mysterious phenomena of the cosmological evolution of matter, such as *(i) the segregation between matter and antimatter within galaxies*, *(ii) the formation of gigantic black holes* (macroscopic lacunar singularities) at the heart of galaxies by gravitational collapse of antimatter, *(iii) the apparent disappearance of antimatter* in the Universe following the formation of the black holes in the heart of galaxies, and *(iv) the formation of neutron stars* (macroscopic interstitial singularities) by gravitational collapse of stars of matter within galaxies.

- the appearance of neutrino antigravity and its consequences:

The negative mass of curvature dominates the positive mass of inertia in the case of the pure edge dislocation loop, which we associate with the neutrino of the standard model. This phenomenon leads to the fact that the neutrino is gravitationally repellant for other particles, which provides simple explanations for several still mysterious phenomena in the cosmological evolution of matter, such as *(i) the formation of galaxies* by precipitation of matter and antimatter in the form of aggregates within a sea of repellant neutrinos, and *(ii) the concept of dark matter* which is replaced by the concept of *"sea of repellant neutrinos"* in which are immersed all galaxies, globular clusters, and other structures of the visible Universe. This sea of neutrinos exerts a compressive force on the stars of the periphery of the galaxies, which must necessarily rotate faster to compensate for this compressive force by an additional centripetal force of rotation.

- the bosonic or fermionic nature of the particles:

The curvature charge has another major interest linked to the bosonic or fermionic nature of the particles. Indeed, we note that *all the particles with which a charge of curvature is associated (leptons, quarks and baryons) are fermions with a half-integer spin, which satisfy the Pauli exclusion principle*, while *all particles which do not have a curvature charge (photons, gauge bosons, gluons and mesons) are bosons with an integer spin, not subject to the Pauli exclusion principle*. There is very probably here a crucial role played by the curvature charge, which could impose a boson or fermion behavior on a given particle.

About the importance of the microscopic structure of the cosmological lattice

The structure of the cosmological lattice also plays a major role in the analogies we have developed, but it is especially at the level of the structures of microscopic topological singularities in loops that it plays a crucial role. Indeed, it was necessary to imagine *a face-centered cubic lattice with an axial property of dense planes, imaginary "colored" in red, green and blue, and satisfying some simple rules concerning their arrangement,* to find topological loops surprisingly analogous to all particles, leptons, quarks, intermediate bosons and gluons of the first family of elementary particles of the Standard Model. And the existence of a connecting

fault energy between dense planes has allowed to explain the appearance of a force with asymptotic behavior between the quark-like singularities, quite similar to the strong force of the Standard Model, and which forces the formation of doublets or triplets of singularity loops similar to the mesons and baryons of the Standard Model.

And it was also necessary to imagine *the existence of two types of stacking faults between the dense planes of this axial CFC lattice*, to try to explain the existence of the three families of the Standard Model of elementary particles.

From this enumeration of the important roles of Newton's equation and the structure of the cosmological lattice, we can conclude that *the Newtonian inertia of the lattice in absolute space, its elasticity by shear, by rotation and by volume expansion, its microscopic structure and the existence of the curvature charge associated with the edge dislocation loops* are the main ingredients of the cosmological lattice theory and are the keys to explain all the properties of this particular lattice, and thus, by analogy, of the real Universe, even if there are still many obscure points in this analogy.

Still unclear points about the Crystalline Ether

It is clear that *the Crystalline Ether* that we have developed throughout this book, in spite of the undeniable success it has brought us, is by no means perfect. There are still many obscure points which deserve to be studied and, if possible, clarified. Among them, we will mention the most important ones, in the order of their appearance during the presentation, and in the form of questions:

- does a "crystalline ether" really exist, i.e. a cosmological lattice of CFC structure with axial properties, what are the "corpuscles" that compose it, which would possess a purely Newtonian mass of inertia in absolute space, and what are the relations existing between these "corpuscles" and the Higgs boson of the Standard Model?
- what is the physical nature of the isotropic elasticity of the cosmological lattice constituting the crystalline ether, which leads to the moduli $K_0 = K_3 > 0,\ 0 < K_1 << K_0,\ 0 \leq K_2 << K_3$ allowing to express the elastic free energy of the lattice per unit volume?
- what is the origin of the kinetic energy of the lattice necessary for the behaviors of the cosmological expansion of the lattice?
- what role could the "corpuscles" of the cosmological lattice play in hypothetical diffusion phenomena within the cosmological lattice (which could very well explain some properties of magnetism)?
- would it be possible that there are still vector electric charges?
- what exactly are the parameters ζ_{BV}, ζ_{BC}, ζ_{BM} introduced to calculate the energy of the loops, and are they really independent of the background expansion of the lattice?
- what could be the role of *the slip mixed dislocation loops* in our analogy with elementary particles?
- what is the relevance of the analogy between macroscopic vacancies and black holes, as well as between macroscopic interstitial and neutron stars?
- what physical explanation and which numerical values should be given to the parameters α_{BV}, β_{BV}, α_{BC}, β_{BC}, α_{BM}, β_{BM} used for the calculation of the energy dependence of the loops in the background expansion of the lattice?

- how to explain physically the fact that the parameters a and b used to find the clock and the rulers of the observer ***HS*** must be worth exactly 1/4?
- what is the thermal dependence of the free energy of the cosmological lattice, and could this justify a kind of “liquefaction” of the lattice for extremely small values of the volume expansion, in the vicinity of the “big-bang” ?
- how, from a topological point of view, can a dislocation loop or a disclination loop turn on itself to explain the spin?
- what makes a certain topological loop have a spin 1/2 or a spin 1, and what is the exact role of the charge of curvature in the value of the spin and the bosonic or fermionic behavior of a particle?
- what exactly are the structure of the cosmological lattice and the nature of the colored planes of this lattice, and what is the link between these colored planes and the "corpuscles" composing the lattice?
- how can topological singularities analogous to quarks have a spin when they are linked to others by a connecting fault energy tube?
- and many other questions, of a purely physical, or even philosophical nature which are not within the scope of this book, but which are very intriguing.

About the unifying power of our Crystalline Ether Theory

In fact, even if there are still many obscure points, it appears that our Crystalline Ether Theory contains strong analogies with all the great theories of modern physics, and that in this it has *an enormous unifying power.* And this approach by the cosmological lattice is *very simple*, on the contrary of the theories of superstrings or of the theory M which the theorists propose to unify “of force” the physical theories by *quantifying gravity* and by independently introducing into it the four elementary interactions, which leads to *extremely complicated mathematical theories*, in very complex spaces with n dimensions (n = 11 for theory M), and which have so far shown no predictive power.

It is interesting to note here that the superstring theories use cords and branes in complicated multidimensional spaces to quantify gravity, while our approach also uses cords, loops and membranes, but which are then simple topological singularities of a purely three-dimensional lattice, with an additional dimension of absolute time completely decoupled from the dimensions of space, since time can be measured there by the universal clock of an imaginary observer ***GO*** external to the lattice in absolute space .

And if the quasi-static volume expansion of this lattice on the macroscopic scale is the expression of the phenomena attributed to gravitation, the dynamic fluctuations of the expansion of this lattice on the microscopic scale are nothing other than the expression of the phenomena attributed to quantum physics. It is therefore wrong to try to quantify the theory of gravitation, since quantum physics in the Crystalline Aether Theory is precisely the expression of the dynamic fluctuations of gravitation at the microscopic scale.

About the epistemology and the consequences of this essay

It is true that, in this essay, nothing comes yet to give a definitive explanation to the existence of the Universe, to the reason of being of the big-bang, and why the universe could

be constituted by *a crystalline ether.* These points remain, at least for now, within the purview of each individual's philosophy or beliefs. But, from an epistemological point of view, this essay shows that it is possible to find a very interesting framework to unify the various current physical theories, a framework in which there would no longer be many mysterious phenomena other than the reason to be of the universe. And this approach is based in fact on a single concept absolutely essential, but of a disarming simplicity, which one could state in the following way, while being inspired by a famous quotation of the great physicist that was Richard P. Feynman:

"It is possible to observe and measure from the outside, with an absolute Eulerian reference frame endowed with fixed and immutable rulers and a universal clock, the spatio-temporal evolutions of a solid lattice having both a certain microscopic structure, specific elastic properties and Newtonian inertia properties. This one sentence contains, as you'll see, a huge amount of information about the universe, as long as you put a little imagination and thought into it. "



Richard Feynman
(1918-1988)