Can Geosciences relaunch the concept of ether?

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Abstract: This article is written in honor of my mentor Franco Selleri who has helped to consolidate my awareness of the existence of a medium subtended to ordinary matter, and from which everything comes. From my field, the Earth Sciences, come clues converging on an important role of the ether in the geological evolution of Earth and planets, as well as all the structures of the universe. Paleogeographic reconstructions allow a rough quantitative evaluation of the amount of new ordinary matter that is added to the planet in the unity of time, and the consequent statement of some cosmological consequences and on the inner energy balance of the Earth. The concept of central flow of ether defended here is different from the Lorentzian stationary ether, but the two concepts could be made compatible.

Keywords: Ether flow, Expanding Earth, Cosmology, Earth’s inner energy.

1. Introduzione

My mentor Franco Selleri was an exceptional cultural promoter for whom every idea and theory, even if not shared by him, was considered for his overall potential deserving to be developed, or for only some partial aspects capable of arousing interest or being able to be bricks for other buildings. "Will you read my work? Will you take it into account?" They asked him; "If only a good idea is contained in the text, of that I will take into account" he replied.

In my case, a recent graduate more inclined to a naturalistic than physical-mathematical approach to science, he appreciated my ability to overcome what theorists developed, producing simple models based on objects of experience (Garuccio et al 1977; Scalera 1983). Something similar happened at the time of Foucault's pendulum, a mechanical effect that revealed the Earth's rotation, but never predicted by the great theorists of the time, who formalized its theory only after the experiment. Later, after having addressed me to the Earth Sciences, to which I was more worn, I continued to visit Franco's studio during my frequent visits to Puglia. In the mid-'80s I was working on a Macintosh 512 to the translation of the book by the Australian geologist Samuel Warren Carey “Terra in Espansione” and the problem of how the planets grew was important for me – spiral galaxies contributed to the reflections.

A mass increase could not be excluded and the possible origins of the phenomenon were different: multiplicative creation of Dirac, absorption of ether, or exotic particles, etc. With a FORTRAN collected for the Mac, I developed simple graphic codes in
which in a central field that increased with time, test masses were launched that spiraled towards the origin of the field.

The envelope of all the rotation curves (of the component of the velocity of the test masses in the direction of the observer at infinity) reminded the flat rotational curves of the galaxies and the thing was meaningful to me. Even Franco was struck by that simple simulation: something material could well fill the space. And while he undertook the road to a better definition of space-time in Lorentzian terms, I slowly came to feel the need for a flowing ether that moves and acts in this space nourishing the celestial bodies.

Finally I recall an exhortation, repeatedly made to me by Franco, not to be too enthusiastic about my research, but always keep in mind that the drawers of the history of science are full of forgotten, wrong, obsolete ideas. I have always felt the presence of this sword of Damocles.

2. The stakes of the infinite universe evolving without big-bang

Many researchers have carried out, starting from the middle of '800, those that can be defined “cartographic experiments with variable radius”, in which the Earth’s paleogeography is reconstructed on globes of smaller radius than the modern one, until the oceans have been completely eliminated at about a half of the current radius. At ING, then INGV, I have dealt with these reconstructions for a long time, combining them with different data (Scalera 2013, 2015).

Trying to understand in which cosmos can best fit the conception of the expansion of the Earth and celestial bodies, means making choices: before we should identify the most probable cause of expansion, which in the case of our planet has increased about tenfold its volume from the Triassic. Such a conspicuous increase testifies immediately against possible changes in the mineralogical phase from compact crystalline lattices to open lattices. Although some have proposed it, a silicon mantle resulting from phase change from a metallic liquid core is very unlikely.

It should then be considered a cosmological cause as the multiplicative creation of Dirac or a flow of ether directed towards the center of the bodies that determines - with its transformation into ordinary matter - the mass increase. Between the two I preferred the latter as having the highest explanatory power, with the possibility in some versions to formulate laws similar to the Newtonians on gravity, but I will not hide the difficulties.

The ether flowing toward the interior of the celestial bodies is a concept not foreign to Newton that already hypothesized its transformation in ordinary matter in the terrestrial depths, together with an inverse transformation of matter, expelled like vapors from the Earth and converted back to ether in outer space: a closed cycle. This idea also fascinated Giovanni Bernoulli (1667-1748) who thought of a “central torrent” of ether - directed towards the Earth's center - which explained with hydrodynamics all the laws derived by Newton for his “attraction”. Euler (1707-1783) in his “De causa gravitatis” (published anonymously) derived Newton's laws from the gradient of a pressure field.
Worthy of note in this story was the formulation of the “paradox of D'Alembert” in fluid-dynamics, where an object in uniform rectilinear motion in a perfect fluid does not suffer forces that slow it down, and proceeds so forever, while if it varies its speed or if the fluid accelerates only then inertial-like forces are manifested on it. As if the ideal fluid confer mass and inertia and apply forces to the body. So a perfect fluid that would accelerate towards the Earth with inverse-quadratic law of distance would generate a real field of gravity. This same conception of hydrodynamic ether is found in the awareness expressed by Ernst Mach (1838-1916) - precisely in the pages of his treatise that both influenced Einstein - that D’Alembert’s paradox should be better investigated for the consequences it could have in the deduction of principles of dynamics (details in: Scalera 2012). Recall that at the end of the nineteenth century it was widespread a concept of ether, from whose flow and aggregation the celestial bodies would be born and grow up (an example in: Lord Kelvin 1901). Einstein was instead categorical in abhorring just this type of ether, the flowing ether, while it was possibilist for other types more compatible with his different theories of relativity and unified field (Kostro 2001).

From the Earth’s Sciences, with simple hypotheses, we can substantiate the ether using successive global reconstructions with variable radius, evaluating with paleogeography – starting from the increase of terrestrial radius from one geological epoch to one of the following ones – the mass of the added spherical cap. By renouncing the modeling of similar increases for the internal solid and liquid core, for which each hypothesis would be arbitrary, the conversion rate of constituent material into ordinary one can be calculated as energy transferred in the unit of time (per year or second, mediating from Triassic to Recent, 250 Ma) and density at Earth’s surface of the ether that produces it (assuming gaseous ether; see Table in following):

\[ E_{\varepsilon_y} = \frac{M_0 c^2}{250 \text{Ma}} = 2.15 \times 10^{33} \text{ J/yr} ; \quad \varepsilon_m^3 = 1.19 \times 10^7 \text{ J/m}^3. \]

with \( M_0 \) = added shell mass; \( c \) = speed of light. For what has been said about the arbitrariness of any evaluation for the radius increase of the main spherical separation surfaces such as the core-mantle boundary, the above estimates should all be considered approximate by default. The underestimation could be even more pronounced because the efficiency of the ether-matter conversion is not known, in the sense that not all the ether could convert, and we could not exclude that a quantity not currently evaluable can be transformed into other non-experimentable products.

The density of the constitutive material \( \varepsilon_m^j \) should be understood only as a “local constant” depending both on time and place. From time, because the constituent material pours in the ordinary and thus tends to be depleted along cosmic times; from place, because the ether must thicken to convert into ordinary matter. There are several possible conceptions of ether and its becoming concentrated; below we list the main types and features that require a weighted choice:
The ether of Le Sage (1724-1803) - gaseous non-fluent but dynamic - and that of Euler are not listed, and we have already chosen those that are substance or energy and not pure empty space. The choice between the three “fluid” ethers is not easy because each of them has its pros and cons. With non-exhaustive considerations: – 1) The Lorentz ether can be an absolute reference linked to the cosmic microwave background, generating inertia and mass, but not the gravity nor the expansion of the celestial bodies. The contractions and expansions of space and time would physically emerge (Bell 1976; Selleri 1993). – 2) The incompressible perfect fluid ether can generate mass and inertia with the mechanism of D’Alembert’s paradox, but giving rise only to a very different gravity compared to the Newtonian one (the $g$ would be linked to $1/R^5$). Alternatively it generates a gravitation having right properties with the well-known fluid dynamics laws of the “Newtonian” attraction between pairs of sources or 3D discharges, but hydrodynamic discharges do not accumulate mass as the planets do. – 3) The gaseous ether could give rise to a gravity consistent with Newtonian one and produce expansion of cosmic objects, but because of its variable density during the convergence towards the celestial body it could not generate (with the paradox of D’Alembert) mass and inertia constant everywhere for a given object. Alternatively, Euler’s conjecture could be explored on the role that in this type of ether has its pressure field decreasing as it approaches the body. It seems that we can not have explanations of mass, inertia, gravitation, equivalence, all at the same time. This is a complication analogous and in part coinciding with that on which Newton coerced, who needed too many ethers that he could not test, and that led him to renounce all. At this point it is enough for us to admit that the sciences of the Earth require a material ether that converts itself into ordinary matter during its convergence within the celestial bodies.

Not knowing today the physical laws on the conditions (pressure, density, temperature, ...) to which its conversion would occur, we only expect that the ether tends to accumulate and increase in density more in the inner terrestrial region of the core, where, starting from the core-mantle boundary, the gravity acceleration drops almost linearly to zero towards the geocenter. The conversion should be more probable and efficient in this region of strong slowing of the flow of ether. A different density of the ether below the surface of the crust would manifest itself in anomalies of the gravity field for both $g$ and $G$. These anomalies have long been looking for the last century under the name of “fifth force” without having been able to highlight them. The difficult modeling of the crustal geological stratifications depends on our fairly precise knowledge of the thickness and density only in the drilling locations, with the much more inaccurate “interpretative” help of seismic tomographies on the rest of the investigated volumes.

<table>
<thead>
<tr>
<th>Acceleration to the attractor (well)</th>
<th>Stationary ether Lorentzian</th>
<th>Perfect flowing ether Incompressible</th>
<th>Gaseous flowing ether Compressible</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>∝ $1/R^5$</td>
<td>∝ $1/R^2$</td>
<td>∝ $1/R^{1/2}$</td>
</tr>
<tr>
<td>Velocity to the attractor (well)</td>
<td>0</td>
<td>$1/R^2$</td>
<td>$1/R^{1/2}$</td>
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Fig. 1. An evolutionary universe derived from Earth Sciences. The universe that we can now observe directly or indirectly, from large-scale cosmic structures to microphysics, is being set up at the expense of a constitutive material which we can notice due to the expansion of celestial bodies. This impalpable matter is being formed by drawing a constituent material of a lower order, and so on. Our ordinary matter and its structures (micro and macro) are constituent matter, an “ether”, for a universe of higher order of spatial and temporal scales immeasurably greater than ours. All universes are supplied by the structures of a lower order and all form a continuum in mutual evolution. The boundaries between one universe and the next of major or minor order are not well defined. For example, the micro and macro boundaries of our universe are only due to our current ability to build devices and observational experiments, and are in progressive enlargement.

That in reality these gravitational anomalies exist we can realize it by jumping out of scale and observing the galaxies and their unexpectedly flat rotation curves (the orbital velocity should decrease as the inverse of the square root of the radius). Those flat curves can be the result of at least two effects: the mass increase of the galactic nucleus towards which the mass-energy of the ether converges, with consequent spiraling of the spiral arms, interpretable as stellar paths; and also the dependence of Newton's gravitational “constant” $G$ from the density of the ether.

In this conception it can be shown that time is not limited to the past by the singularity of the big-bang, nor towards the future. The density of the constitutive material decreases, it is poured into the ordinary one in an infinite time, but this process is also
perpetuated in the aggregation of ordinary matter in structures and macrostructures (from particles to superclusters of galaxies and beyond) as if the universe of objects that we can experience, from the micro to the macro, constitute an “ether” that will build – with its flow and evolution – a universe of a higher level that will evolve on scales of time that we cannot imagine and for which the space-time scale of our universe will remain not perceptible. One should imagine that this process took place in order to constitute also the current ether and that therefore it is an evolution unlimited from scale of dimension, time scale, space and time. The re-introduction of the ether leads to an extreme evolutionary image of the universe, very competitive with respect to the evolutionary one of the big-bang. In this new image, without needing the concepts of matter and dark energy, cosmic inflation and accelerated expansion of the universe, it is possible to explain many phenomena differently: redshift, Olbers paradox, space-time contractions, light deflection. A significant stake.

3. The stakes of the energy balance of the Earth

The problem of the energy balance of the Earth has long been debated (Fiorentini 2007; Anderson 2009; among many others) without having had a definitive solution. Today we can reexamine it from the new perspective provided by a central flow of constitutive matter.

At the beginning of 2017 the results were published of the two experiments – Borexino and KamLAND – set up to measure the radiogenic heat of the Earth (Borexino collaboration 2017; Shimizu 2017). Against a total value of the terrestrial heat flux of 45-47 TW (Terawatt = 10^{12} Watt) the three main models of heat prediction produced by the decay of radioactive elements provide:

<table>
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<tr>
<th>Cosmochemical approach</th>
<th>The composition of the Earth is based on the enstatite chondrites, which show a closer isotopic similarity with the mantle and an iron content high enough to explain the terrestrial metallic core</th>
<th>11±02 TW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geochemical approach</td>
<td>For the relative abundances of the lithophile refractory elements it adopts a chondritic composition, then placing limits on the absolute abundances from terrestrial samples</td>
<td>20±04 TW</td>
</tr>
<tr>
<td>Geodynamical approach</td>
<td>It is based on the hypothetical energetics of mantle convection and on the observed heat flux on the surface</td>
<td>33±04 TW</td>
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</table>

To reach 45-47 TW of the superficial heat flux we must add to the radiogenic the primordial heat created by the formation of the planet, which has slowly dissipated until it reaches the modern residue estimated to be between 5 TW and 15 TW. Obviously, the geodynamic approach, for its hypothesis of the existence of convective motions in the mantle, would estimate a faster dissipation of the primordial heat, preferring for it today’s values below the average of ≈10 TW. If the geodynamic model (33 TW) had been
verified by experiments, by adding conservatively 10 TW of primordial, we would be below but very close to the total measured flux on the surface.

To the three radiogenic heat flux values predicted by the models respond the KamLAND and Borexino experiments with results of 8-16 TW (best value) and 18-28 TW (best value) respectively. With these values, the sum of radiogenic (average KamLAND-Borexino ≈18 TW, average Borexino ≈24 TW, maximum Borexino ≈28 TW) and primordial (mean ≈10 TW) is more distant from the surface heat flux value. Some geophysicists (Anderson 2009; among others) invoke the possibility of counting the highest values allowed by standard deviations, but the problem should not be underestimated.

The missing heat could be provided by at least two exothermic processes: an hypothesized nuclear fission in a reactor generated by the migration by gravity of the radioactive elements towards the region near the Earth's center (Herndon 1993). It would produce no more than 5-7 TW, but some researchers would reject it on the basis of various arguments, including geochemical ones (Degueldre & Fiorina 2016). The second possibility is that a transformation of constitutive matter into ordinary one is active in the Earth's core, a process inverse to the already said fission: an exothermic “fusion” that increases the degree of aggregation of the constituents of the ether up to ordinary particles and atoms.

This flow of ether is a process of which today we cannot but have vague ideas, but seen together with other problems related to the Earth's core (thermal conductivity, heat fluxes, convective motions maintenance, etc.; a synthesis in Sumner 2015) assumes importance as a field of investigation.

4. The stakes of the reappearance of antimatter in the Universe

In physics there are two large parties. The first thinks he has reached the definitive degree of microscopic knowledge in elementary particles that cannot be further divided (point particles). It is a party with ties to philosophical idealism, which also recalls political idealism with its acceptance of the status quo and consequent renunciation of going further and working towards the improvement of situations.

The second party is inspired by everything that has happened in the history of science and believes that every structure should be made up of even smaller structures in a sort of infinite regression. For its followers, the rationalists, the particles are similar to indivisible points only because of our temporary ignorance of what constitutes them. In this scheme open to future progress can also be framed the general idea of ether and its infinite levels, more and more microscopic.

The nucleosynthesis and the origin of the chemical elements have been explained for few decades in the scenario of the expanding universe. First with the fusion of baryons and leptons, and then with a primordial quark soup, always set in the high temperatures and pressures of the initial phases of the big-bang and of the interior of stars. It is assumed in these studies that matter, in the early stages of the universe, is already constituted only by particles and not by antiparticles. But for reasons of symmetry, the
initial explosion, the primitive singularity, would have produced matter and antimatter in equal amount. The first party mentioned above is therefore obliged to hypothesize a generation of a surplus of matter in the first moments of the expansion. After the rapid annihilation of matter with antimatter, this surplus would have reached our time by aggregating according to the mechanisms of subsequent nucleosynthesis.

For Andrei Sakharov (1967) there are three conditions that must be satisfied for an excess of bariogenesis to occur: – 1) Violation of the baryonic number according to the laws of physics to be revealed. – 2) Violation of the C and CP symmetry. The hypothetical process that changes the baryon number must act favoring the production of baryons on the production of antibaryons. – 3) Be far from thermodynamic equilibrium. If all levels are populated according to a Boltzmann distribution, because CPT guarantees that each level with a positive number of baryons has a corresponding level with a negative baryon number, the total baryon number is zero. At equilibrium, transformations in one sense would be equiprobable to inverse transformations, but if with the thermodynamic non-equilibrium an arrow of time is present, direct and inverse processes would not be zero-sum. There is a vast literature in which one seeks to find sufficiently efficient processes of baryon number violation, and not in conflict with aspects of the big-bang cosmology, but without yet come at the head.

Instead, going back to thinking in terms of ether and infinite regression opens up completely different scenarios. The universe would possess infinitely more microscopic levels and in one or more of these matter and antimatter – in structures unknown to us – could coexist separate by fields of emergent forces at that level. The matter we observe today at our level would therefore already be a container of both, and the “antiparticles” that we are able to produce in the laboratories would also be manifestations of matter. The problem of the disappearance of antimatter in our universe would appear to be ill-posed.

5. Conclusion

I have explained only some of the stakes arising from a return to the concept of ether, that today the dominant approach to science attempts to hide. It has not yet been possible to choose between the various types of ether, mainly because experimental data are lacking. The experiments of Cahill and Consoli (Cahill 2009; Consoli et al. 2014) reveal the existence of an ether background, but not its characteristics. Returning to Newton’s difficulties in theorising different ethers, could it be that their multiplicity is real? That there is the Lorentzian ether space in which flows an ether constitutive matter? A container and a content? This and many other questions must currently remain open.

I imagine that Franco Selleri was also developing first thoughts on all this and also on how we can explain gravity: I think it is no coincidence that in one of the last conferences in which Franco was involved, an invited contribution was by Mayeul Arminjon about his gravity theory based on Euler’s conjecture (Arminjon 2004). Also Franco had
visited in Australia Reg Cahill, a speaker at the Congress of Erice on the Earth expansion.

It is surprising that the ether, often considered a nineteenth-century concept, is able to provide an image of the universe evolving on infinite levels compared to the big-bang one. And that besides the possible geophysical implications on the energy balance of the Earth, its adoption together with both the awareness of infinite regression, and of the intrinsic unknowability of the whole depth of the Apeiron (in essence an act of scientific humility) can give back – typical oxymoron – a small but important cognitive role to our unsurpassable ignorance. It is from this that, for example, the overcoming of the great mental ghost of the non-existence of antimatter comes, with the recognition of our already being symmetrical and constituted by something that could annihilate itself in nothing in a very short moment.

6. References


