

ADVANCED RELATIVITY

Unification of matter, space, mind, and consciousness

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The whole development of theoretical physics can be seen as a continuous improvement of the models of space and time. No physical law can be formulated without being collocated in an opportune space-temporal background. This fact stimulated many times in the history of physics the idea of a tight connection between the physical processes and the global arena in which they take place. In the 20th century three fundamental theories have changed the understanding and explanation of the phenomena occurring in the physical universe: special relativity, general relativity and quantum theory. Special relativity modified the notion of the three-dimensional Euclidean space characteristic of Newton's physics in such a way to incorporate time in a smooth four-dimensional continuum (the Minkowski space-time). In the picture of special relativity, the Minkowskian four-dimensional space-time is the fundamental arena which acts as the medium for all of physics. Later on, general relativity generalized the Minkowski space-time to describe gravitational phenomena. The crucial discovery of general relativity was the acknowledgment that Newton's space-time and the gravitational field are the same thing and that the dynamics of the gravitational field and of any other dynamical object is fully relational, in the Aristotelian-Cartesian sense.

However, the most radical and relevant scientific revolution happened probably with quantum theory. Indeed quantum theory introduces much more spread scenarios and problems than those offered by every previous physical theory. Fundamental and intriguing perspectives determined by the quantum formalism as regards the arena of the physical processes are in particular the following: the existence of non-local correlations and the fact that subatomic particles can be in entangled states, the wave-corpuscle duality as well as the special role that seems to be ascribed to the conscious observer in the measurement processes. Now, despite over a span of few years theoretical physics has opened important perspectives in the exploration of new territories (such as the meaning of matter at the Planck scale and the role of the quantum information), certain conceptual confusions in different physical theories and significant foundational problems as regards what must be considered as the "real" arena of physical processes are evident. The fundamental fact which subtends these problems is that Einstein's general theory of relativity and quantum theory are mutually incompatible. One clearly needs a new consistent unifying theory which incorporates the principles of both quantum mechanics and general relativity, and reduces to them in appropriate limits. On the basis of the current research, in order to achieve a coherent unification of general relativity

and quantum physics a solution could be obtained by a precise redefinition of the background of physical processes and thus by a deep reinterpretation of the meaning of space and time. In this regard, for example Macías and Camacho recently emphasized that what is needed is either a theory of gravity with a non-dynamical Newtonian time, or a quantum theory with a dynamical time in its construction [1]. Today, significant current research are based on the denial of the existence of space or time as fundamental physical entities (think, for example, of Chiou's timeless path integral approach for relativistic quantum mechanics, Palmer's view of a fundamental level of physical reality based on an Invariant Set Postulate, Elze's approach of time, Girelli's, Liberati's and Sindoni's toy model of a non-dynamical timeless space as fundamental background of physical events, Caticha's approach of entropic time, Prati's model of physical clock time, as well as a more radical approach, proposed by Verlinde, according to which, not only time but also space–time as a whole is emergent through an holographic principle [2-8]).

On the other hand, in the second half of the 20th century, the concept of a physical vacuum as fundamental medium that subtends the three-dimensional space as well as time emerged. In the “grand unified theories” (GUTs) the physical vacuum constitutes the medium that carries the so-called zero-point field, where energies turn out to be present even when all classical forms of energy vanish (namely at the absolute zero of temperature). On the basis of the quantum field theories which describe the known particles and their interactions, the unified physical vacuum is not only a theoretical mathematical entity but indeed acts as a physical reality, which turns out to be characterized by different levels or domains, in other words there are various contributions to the energy density of the unified vacuum. The realistic concept of the vacuum completes and complements Einstein's theory of relativity (although it places in doubt one of its pillars, the constancy of the speed of light). Relativity theory views space-time as relative and dynamic, interacting with matter and energy. It is the “background” against which the events of the manifest world unfold. But the origins of this background are not accounted for in relativity theory: space-time is simply “given,” together with matter and energy. This is much the same in the currently elaborated theories of everything (TOEs). TOEs would be truly theories of everything only if they were “background independent”; that is, if they did not merely assume the presence of space-time, but showed how it arose in the universe. The TOEs developed to date, based for the most part on string and super-string theories, cannot do this. The majority of the versions of strings works, just like Quantum Field Theory, which is its closest relative (and thus like also the Standard Model of particle physics), with a flat Minkowski spacetime, while a correct, authentically relativistic (in the sense of general relativity) theory should be independent on the background, or not presuppose any metric signature. The current impasse of theoretical physics points towards the necessity to recognize a deeper – and non-local – floor of the universe which is able to achieve a coherent unification between quantum physics and general relativity. “If we are ever going to find an element in nature that explains space and time,” Princeton physicist John Wheeler asserted, “we surely have to find something that is deeper than space or time – something that itself has no location in space or time” [9]. On the other hand, in his 1930 paper *The Concept of Space*, already Einstein himself noted, “We have now come to the conclusion that space is the primary thing and matter only secondary; we may say

that space, in revenge for its former inferior position, is now eating up matter” [10]. A few years following the publication of Einstein’s thought, Erwin Schrödinger restated this basic insight: “What we observe as material bodies and forces” he remarked, “are nothing but shapes and variations in the structure of space.” [11].

More and more current theories ascribe physical properties to space, more exactly, to the field or medium that subtends space. In particular, Amrit Sorli and the author of this review have introduced a research line according to which the arena of natural phenomena is a three-dimensional timeless physical space, where time exists only as a measuring system of the numerical order of material changes, and physical objects emerge from opportune diminutions of its energy density (with respect to the Planck energy density). The concept of time as a mathematical quantity measuring the numerical order of material changes has moreover the merit to provide a suggestive unifying rereading of the Jacobi-Barbour-Bertotti theory and of Rovelli’s approach of time [12]. As a consistent development of this line of research of a timeless space as a fundamental background of physics, Amrit Sorli has coined the term Advanced Relativity, in order to underline that this approach, by introducing the new view that measurement and experience have equal epistemological validity, allows us to go beyond the results of special relativity and general relativity, integrating the different domains of physics, as well as the observer, mind and consciousness, in a single unifying picture where one has only one field, the quantum vacuum.

In the theory of Advanced Relativity, mass, gravity, electromagnetism, quantum behavior and, in line of principle, all physical fields are fully incorporated as different effects of a variable energy density of space. In his beautiful book “Advanced Relativity - Unification of matter, space, mind and consciousness”, Amrit Sorli shows in an incisive and appealing manner how matter, space, life and consciousness can be embedded inside a universal unifying picture which allows us to bridge the Heraclitean and Parmenidian aspects of contemporary physics. Sorli’s approach of Advanced Relativity introduces the fundamental methodological research method represented by the bijective epistemology (which implies a bijective correspondence between elements of the model and elements of physical reality, namely each element in the physical model of phenomena which we examine corresponds exactly to one element of phenomena themselves) and accompanies it with the direct experience and the experimental data. Sorli shows that in Advanced Relativity there is no “epistemological gap” between the model and the physical reality, by fully recognizing that changes run in NOW, which can be considered as the essential basis for the development of science. From the insight that the interpretation of time as the 4th dimension of space is not adequate, Sorli’s Advanced Relativity develops the idea of the variable energy density of space and, by considering this energy as the fundamental energy of the universe, allows new perspectives to be opened in physics as well as in technology (such as regarding new ideas of how get free energy from space and how to use the energy of space for interstellar travel). One of the most intriguing aspect of Sorli’s approach lies in the possibility to explain, in a very simple fashion, striking quantum phenomena such as the non-locality, the quantum entanglement or the double-slit experiment. Universal space where time is just a mathematical sequence of motion can explain in a simple way the non-local correlations of two subatomic

particles in EPR-type experiments. In *Advanced Relativity*, space is the direct information medium between entangled particles. Moreover, as regards the Bohm view of undivided wholeness, Sorli speculates that it means that matter is the vibration of consciousness in the lower frequencies of three-dimensional space and thus his famous implicate order may be interpreted as the order for which the behavior of matter is guided by the higher dimensional Hilbert spaces. In this picture, in the EPR experiment, when we measure the spin of a particle A, the particle B will automatically get the opposite spin because higher dimensional spaces associated with higher levels of consciousness have the intrinsic function of keeping symmetry between entangled particles.

In fact, Sorli develops the suggestive and original description of consciousness as the n-dimensional Hilbert space. Sorli evidences then that consciousness is the same in every human being, and that the origin of the observer in every human being is the same consciousness. Another suggestive and relevant perspective of *Advanced Relativity* lies in the prediction that consciousness is the real origin of life, which all over the universe has the tendency to develop in intelligent organisms. In this picture, human beings must be aware that are only parts of the large universal process in which matter is developing towards consciousness, that their real will is the will of the universe, which is that towards consciousness. The following extract from Sorli's book is very significant in this regard: "In *Advanced Relativity*, the human being and human society are subsystems of the universe. *Advanced Relativity* is surpassing geo-centrism and is introducing in anthropology, psychology, sociology and economy the "cosmological approach", where human society is the subsystem of nature, which is subsystem of planet Earth, which is subsystem of solar system and so on. Today, human society does not respect the fundamental laws of the universe, which results in the enormous problems of today's human society. In *Advanced Relativity* a deep connection with consciousness represents the basis for psychophysical health. The more the given society is conscious more the society is healthy, in the sense of harmonious living with nature, prosperity and wealth".

In this book Sorli shows in a brilliant way how it is possible to unify the material world, the psychological world of the mind and the consciousness domain in one organic unity, where different layers of reality are different frequencies of consciousness, which is the origin of this existence. Whilst in mainstream science "material" and "spiritual" are divided and this determined a huge existential gap in today's western civilization, instead *Advanced Relativity* can be seen as a humble attempt to erase the illusion that separates the material and the spiritual, coherent to the systemic view of life which is now emerging (see, for example, the recent works of E. Laszlo and F. Capra). Sorli shows in a clear way that a profound experiential consciousness research leads to the acknowledgement that the evolution of life is an integral part of cosmic dynamics, of the greater cyclical phases of the universe in which matter evolves towards consciousness. The "cosmic anthropology" will allow a deep connection between natural sciences and social sciences in a single unitary approach in which consciousness emerges as the fundamental entity and implies that a timeless experience of oneness is the real goal of both science and society. Sorli evidences, as a consequence, that in today human society it is of crucial importance that *Advanced Relativity* is taught, in

particular as regards the topic of the origin of the observer. In fact, Sorli clearly writes: “Experiential science of the observer has an immense potential for the integration of different cultures and religions. Modern society needs the appropriate “spiritual education” in order to overcome problems we are facing since the beginnings of the human civilization: wars, violence, starvation..... In this sense the whole universe is guided by consciousness. When the human mind is tuned with consciousness, it creates beauty and wealth. When mind is disconnected from consciousness, it creates chaos”.

In synthesis, Amrit Sorli’s book “Advanced Relativity. Unification of matter, space, mind and consciousness” can be considered as a very appealing intellectual attempt to construct a powerful starting point towards an ultimate “theory of everything” that, with opportune refinements from the mathematical point of view, could solve important foundational questions of theoretical physics and contribute to the development of a new holistic science in which matter and consciousness emerge as different aspects of the same fundamental reality.

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