

Light in Science, Culture, Society, and Spirituality – The Transdisciplinary Unifier

1. The physical light

The light characterizes one of the four physical interactions – the electromagnetic interaction – which is, together with the gravitational interaction, one of the most familiar to the human being.

The four known physical interactions are very different from each other. Taking into account, for example, *the intensity* of the interaction, the strongest, as its name shows, is *the strong interaction* (which is exercised between hadrons, particles of the atomic nucleus). *The electromagnetic interaction* (acting on electrically charged particles) is a hundred times weaker than the strong interaction. *The weak interaction* (which is exercised between leptons and hadrons) is really weak: it is one hundred thousand times less intense than the strong interaction. As for *the gravitational interaction* (which acts on all cosmic bodies), it is tremendously less intense: you must divide 39 times by 10 the intensity of the strong interaction in order to obtain its intensity.

The same diversity appears when you take into account the amplitude of the interaction. The gravitational interaction and the electromagnetic interaction have infinite amplitude. They manifest everywhere in the cosmos. They play their role at a macroscopic scale, which explains why they were the first to be recognized as physical interactions. In contrast, the strong and the weak interactions have very small amplitude. A centimetre should be divided 13 or 14 times by 10 in order to get the distance of strong interaction. The scale of the weak interaction is even smaller (much smaller) than that of the strong interaction.

Despite this great diversity, physicists believe today that all interactions can be *unified* into one and the same theory.

Every physical interaction has its messenger: the photon for the electromagnetic interaction, the vector bosons for the weak interaction, the gluon for the strong interaction and the graviton for the gravitational interaction.

Physical interactions are described by „fields”.

A field could be represented through a network of interlinked metal *strings*. The network fills the entire space. The strings are infinitely small, and therefore, in a small region of space there is an *infinite* number of strings. The vibration of a certain string corresponds to a particular field quantum. The photon is the quantum of the electromagnetic field. Various fields interact with each other: different networks made of resorts are interconnected through other resorts, composing super-networks, networks of networks. A specific description of the unity of the world, where visible and invisible coexist, is thus possible. The strings themselves are invisible, but their vibrations are noticeable, detectable.

According to this picture, one can assert that *everything that is manifested is vibration*. Quantum physics shows that there is no one single point in the universe which might be inert, immobile, without movement.

Elementary particle physics is described in contemporary physics by superstrings.

The word “superstrings” indicates that elementary particles are not punctual particles, but vibrating strings. These strings live in a world with one dimension: they have a length of the order of Planck's length (1.62×10^{-33} cm), but do not possess thickness. In fact, *all particles in nature appear as vibratory modes of one and the same string*, which makes an enormous simplification to the complexity of the physical world and justifies the hope that *all* the parameters of the theory (dimensionless numbers) will be fixed by the theory itself, thanks to a universal self-consistency. The entire cosmos appears as a kind of music resulting from the vibration of a single string. Jakob Boehme (1575-1624) already said, long time ago: “The sun is born and produced by all stars. It is the light extracted from universal nature and, in turn, it shines in the universal nature of this world, where it is linked to other stars, as if all of them together were one single star.”

The unification of the strong, weak and electromagnetic interactions happens at at fabulous energy (10^{15} times higher than the energy corresponding to the proton mass). According Heisenberg's relationship, this energy corresponds to an infinitesimal distance (10^{-29} cm): if the proton was as big as the Sun, this unification scale would be that of a speck of dust.

The energy corresponding to the unification will never be achieved in our accelerators, but it has already been reached in the early big-bang. Therefore, the grand-unified theories are very important for understanding what happened in the early big bang. The universe was likely a fireball where temperature of hell prevailed. An undifferentiated energy was animating an inform mass of quarks, leptons and messengers, described by a single interaction. This fireball potentially contained the entire universe. Then, through a continuous

cooling, different interactions occurred gradually. Originally, when an exact symmetry ruled the world, all the stirring particles in the seething fireball had a zero mass. Today, the only messenger observable, of zero mass, is the photon: somehow, there is nothing but light, as a trace of this initially perfectly symmetric world.

Particle and cosmos are therefore so closely linked. The loop is thus closed: *by understanding the infinitely small, we understand the infinitely large.*

If the physical universe will disappear one day, the light will remain. The lifetime of the photon is infinite.

2. The spiritual light and the Hidden Third

Which is, in fact, the light that truly allows us to see? The physical light helps us to perceive the exterior world and therefore to survive. Reason is like a sun for our physical body and gives to us the capacity of discovering the regularities and the laws of Nature.

However, if we refuse the reductionist vision asserting that the human being is just a collection of quarks, particles, cells and neurons, we are lead to accept the idea present in many civilizations which precede our own civilization, namely the idea of the double nature of the human being: a natural nature (physical, biological and psychical) and a divine nature, illuminated by the inner light. The inner light gives birth to the transconscient vision and allows us to live our true life.

In the context of transdisciplinary methodology, the central notion of Hidden Third allows us to discover the contours of the spiritual light.

Transdisciplinarity signifies the study of the interaction between the Object and the Subject and leads to a new knowledge.

The transdisciplinary methodology is expressed through three axioms: The ontological axiom, the logical axiom and the epistemological axiom. In the context of the present talk, we are interested only by the ontological axiom.

The ontological axiom asserts that there are, in Nature and society and in our knowledge of Nature and society different levels of Reality of the Subject and, correspondingly, different levels of Reality of the Object.

Reality today, conforming to the contemporary science, signifies an Object with its levels of Reality, a Subject with its levels of Reality and a third zone of non-resistance

between the Subject and the Object, irreducible neither to the Subject nor to the Object. This zone is called the Hidden Third.

Of course, we must distinguish between *Real* and *Reality*. *Real* means *what it is*, while *Reality* is related to the resistance in our human experience. The *Real* is, by definition, always hidden, while *Reality* is available to our knowledge.

Reality is simultaneously a single and a multiple One. If one remains confined to the Hidden Third, then the unity is undifferentiated, symmetric, situated in the *non-time*. If one remains confined to the levels of *Reality*, there are only differences, asymmetries, located in time. To simultaneously consider the levels of reality and the Hidden Third introduces a breaking in the symmetry of *unus mundus*. In fact, *the levels of Reality are generated precisely by this breaking of symmetry introduced by time*.

In the transdisciplinary approach, the Hidden Third appears as the source of knowledge but, in its turn, needs the Subject in order to know the world: the Subject, the Object and the Hidden Third are inter-related.

The human person appears as an interface between the Hidden Third and the world. The erasing of the Hidden Third in knowledge signifies a one-dimensional human being, reduced to its cells, neurons, quarks and elementary particles.

The Hidden Third between Subject and Object denies any rationalization. Therefore, *Reality* is also *trans-rational*. The Hidden Third conditions not only the flow of information between Subject and Object, but also the one between the different levels of reality of the Subject and between the different levels of reality of the Object. The discontinuity between the different levels is compensated by the continuity of information held by the Hidden Third. Source of *Reality*, the Hidden Third feeds itself from this *Reality*, in a cosmic breath which includes us and the universe.

The role of the Hidden Third is to ensure the link between Reality and Real. The Hidden Third cannot be known because it is the very source of knowledge. Catalyst of movement, it has infinity of faces. It is the guardian of our irreducible mystery and the only ground of the human dignity. Without the Hidden Third, everything is ashes.

The irreducible mystery of the world coexists with the wonders discovered by reason. The unknown enters every pore of the known, but without the known, the unknown would be a hollow word.

The Hidden Third, sun of the spiritual world, is the hidden light in the core of the visible light. It is interesting to remark that, in Romanian, the word „world” („lume”) is etymologically connected with the word „light” („lumină”). Both come from the Latin word „lumen”.

Our physical eyes distinguish objects, the vision enlightens our eyes and Reality enlightens our vision. From light to light we reach the matrix-light of all lights. The cosmic role of the human being is to continuously watch that this light never extinguishes

The Hidden Third allows to us to understand the meaning of our life. It allows society and culture to find their spiritual bridges. Without these bridges, society inevitably goes to decay and violence, and culture degenerates into a culture of entertainment.

I will illustrate the role of the spiritual light with two examples: one from theatre and the other one from painting.

3. The unifier role of light at Alexandre de Salzmann

Alexandre de Salzmann (Alexander von Salzmann) is born in 1874 in Tiflis (Georgia), in a family of German origin and died in 1934 in Leysin (Switzerland).

He studied in Munich, town animated in the early 20th century, by an extraordinary intellectual, artistic and spiritual effervescence. Alexandre de Salzmann becomes a very famous painter.

He goes in Hellerau, near Dresden, in 1911, called by Wolf Dorn who sensed that the relationship between ideas and practice of Swiss composer Jaques-Dalcroze and a general reform of society. Wolf Dorn succeeds to bring around him four geniuses in their fields: the musician Émile Jaques-Dalcroze (1865-1950), the decorator, theater director and thinker Adolphe Appia (1862-1928), the architect Heinrich Tessenow (1876-1950) and the painter Alexandre de Salzmann. From their interaction is born out a place that becomes a cultural

center of Europe, founded on innovative, visionary and revolutionary ideas. In this place Alexandre de Salzmann invents a new lighting system which makes him famous in the world of theatre.

Alexandre de Salzmann writes in 1912 in his essay “Light, Lighting and Illumination”:
“Light must be like an orchestral instrument whose crescendos and diminuendos conform to the entire musical score. [...] If the musical qualities of light are to be developed, the source of light must be invisible. The light must be as mobile and free-floating as a musical tone. [...] Light clarifies movement. Not that it makes movement visible, that is, knowable. The *how* is everything. Only through light can movement take on form and expressiveness. [...] It must so affect the movements that it and the music together comprise *one* psychic force. [...] light does something more than tell stories about the sun, moon and stars. We do not demand of it that it produces effects. Nor must it make things pretty, nor evoke moods. It must only give to colours, surfaces, lines, bodies and movements the possibility of unfolding themselves. None of these elements should act at the other’s expenses, least of all the lighting itself, which should function as a *binding* force.”

The Festival Hall of the Dalcroze Institute in Hellerau was a true temple of light. Paul Claudel said: "The illumination of Mr. Salzmann allows variation, with an extraordinary suppleness, of the psychological and material environment in which each scene is happening. It provides to the earthly action the supernatural and marvelous coronation by the light. »

In a somewhat surprising way, the interest in the ideas of Alexandre de Salzmann comes today from a different direction than theater: architectural lighting. The great Mexican architect Gustavo Avilés, working, since 1984, on the use of light in architecture and is the director of Lighteam company, made several architectural lightings in Mexico and around the world. He recently completed lighting of the Metropolitan Cathedral in Mexico City. Gustavo Avilés and his team are developing transdisciplinary methods in architectural lighting related to the ideas of Alexandre de Salzmann. Gustavo Avilés actually wrote a study on the relationship between architectural lighting and the work of Alexandre de Salzmann pointing to the fact that light is able to unite human beings on the physical, emotional, rational and spiritual levels. Gustavo Avilés, which is certainly the contemporary master of light, was a guest speaker at the opening days of the International Year of Light that took place in January 2015 at UNESCO Headquarters in Paris. We are happy to have him between us.

4. The light and the cross – On the painting of Silviu Oravitzan

In the centre of the mystery of the world is the light. This fundamental truth penetrates Oravitzan's whole art.

Oravitzan's paintings have upon the spectator a strong vibratory effect. Viewed from a distance, they appear as neutral and decorative. On approaching them, from a precise angle of view and in certain conditions of ambience light, the paintings *lighten themselves*, animated by a strange throb which penetrates our inner self unleashing an organic light and a feeling of warmth, accompanied by a profound serenity, of the kind only prayer and meditation might generate.

The network of crosses and squares in the Oravitzan's paintings are like a visual representation on the network of networks in the theory of superstrings in physics. The vibration born in the spectator's soul is a sign of the universal cosmic vibration.

Oravitzan offers us the vision of the spiritual light, through the image of the cross. In the Christian Orthodox tradition the Holy Trinity is called, conforming to the theology of Saint Gregory of Nazianzus, the « trisolar God ». Gregory of Nazianzus (330-390) writes: “ [...] in the three suns which interpenetrate each other, unique is the fusion of light.” This trisolar God reveals Itself in Oravitzan's paintings.

Inspired by orthodox symbols, Oravitzan's paintings reach a dimension which is at the same transcultural. It can be fully experienced anywhere in the world, by anyone who is animated by the vibration of the spiritual light. Silviu Oravitzan, as Alexandre de Salzmann and other great artists, had the revelation of the light inside the visible light and knew how to make it perceptible for us.

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