The (meta)physics of immortality: Death and eternal life in Frank Tipler and Robert Lanza's theories

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Abstract

In an age when the explanatory and consolatory narratives of religion about death seem to lose their appeal, referring to scientific backgrounds to develop new theories about life after death seems an effective alternative. A demonstration of this assumption is given by the success of theoretical physicist Frank J. Tipler's books *The Physics of Immortality* (1994) and *The Physics of Christianity* (2007), and of the ones by famous physician Robert Lanza (in collaboration with the astronomer Bob Berman) *Biocentrism* (2009) and *Beyond Biocentrism* (2016). Both Tipler's Omega Point theory and Lanza's Biocentricism are based on particular interpretations of the concepts underlying the so-called "new physics", in particular quantum physics, the physics of time, and the cosmological anthropic principle. These two theories attribute a decisive role to the consciousness and thus to intelligent life in the construction of reality, proposing the hypothesis that life is destined to last forever. This implies that the individual consciousness of every human being, after death, should persist in other forms and contribute to the evolution of the universe.

Keywords: death, physics, immortality, Biocentrism, Omega Point theory

Foreword

At the very basis of the modern conception of scientific knowledge lies the separation between the domain of the knowledge acquired through the scientific method and those that pertain to metaphysical conceptions: the rise of a scientific community capable of developing theories independently from any metaphysical backgrounds marks the transition from natural philosophy to science[1]. The demarcation between science and metaphysics proposed by Karl Popper (1959) is based on the criterion of the refutability, or falsifiability, of a theoretical system. A system is considered scientific – according to Popper – if it makes assertions that may conflict with observations. Since concepts like God, human soul or afterlife are not observable – that is, they cannot be analyzed empirically – it derives that they belong to metaphysics, not to science. However, in the last decades the "demarcation problem" assumed new relevance in the debate within the philosophy of science (Pigliucci & Boudry, 2013). The development of contemporary theoretical physics, with assertions that often go beyond the empirical investigation regime, forced theorists to question the role of falsification as a criterion of demarcation (Carroll, 2018; Pigliucci, 2016). This has led to the development of new

1 It is the point of view expressed, among others, by Herbert Butterfield (1959), Arthur Koestler (1959), Edward Grant (1997), Paolo Rossi (2000) in their histories on the origin of modern science.

approaches to rethink the border between science and pseudoscience, in a debate that seems to have entered today in its critical phase (Kragh, 2017; Dawid, 2017).

This article aims to analyze two proposals based on the assertions of contemporary theoretical physics that make a real trespassing of science in the field of metaphysics, assuming the idea of afterlife as their object of investigation. These are the hypothesis of biocentrism proposed by Robert Lanza, a biotechnologist, together with Bob Berman, an astronomer, and the Omega Point theory proposed by the theoretical physicist Frank Tipler. The choice of studying these two proposals instead of others coming from the vast plethora of conjectures on the reconciliation between science and metaphysical conceptions of afterlife depends on three factors: 1) these are proposals promoted by personalities belonging to the scientific community, well rooted in the academic establishment, not outsiders; 2) these proposals are based on a careful evaluation of the concepts of contemporary theoretical physics and, in one case (Tipler), they propose assertions that can be refuted through empirical observations; 3) they were disseminated through best sellers translated worldwide, and therefore they received a wide media coverage.

In the first part I summarize Lanza's biocentrism and Tipler's Omega Point theory; in the second part I try to analyze them taking into account their scientific backgrounds and tracing a genealogy of the ideas on which they are based; in the last part, I suggest new ways to explain these two hypotheses in the light of the demarcation problem.

Robert Lanza's Biocentrism

Robert Lanza is a scientist specialized in the study of stem cells. He is currently Head of Astellas Global Regenerative Medicine and Chief Scientific Officer of the Astellas Institute for Regenerative Medicine, a research facility affiliated to the international pharmaceutical company Astellas. He is also Adjunct Professor at the Wake Forest University School of Medicine. His researches, carried out in teams with scientists from American and international universities and research centers, have been published in leading academic journals. In 2014 he was included in a list of the "100 Most Influential People in the World" by TIME Magazine. His popular book *Biocentrism: How Life and Consciousness are the Keys to Understanding the True Nature of the Universe* (2009) was written in collaboration with Bob Berman, an astronomer who collaborates with popular science magazines and who participates as a guest in television programs.

The starting point of Biocentrism is that «the laws of physics exactly balanced for animal life to exist» (Lanza, 2009, p. 7). This discourse is based on the assumptions of the so-called "anthropic principle", according to which the values of fundamental constants and other physical parameters of our universe are the result of a sort of self-selection, due to the fact that the universe hosts life (at least on our planet). According to Lanza, the discovery of the so-called fine-tuning of the fundamental parameters of reality undermines the traditional conception of a universe that is the result of a casual evolution, in which life plays no role[2]. On

2 The anthropic principle in its current formulation was proposed in 1973 by astrophysicist Brandon Carter as a solution to the fine-tuning problem. He distinguished between two interpretations: according to the weak anthropic principle, the observed values of physical and cosmological quantities are not all equally probable, but are subject to the restriction that there are places where a life based on carbon can evolve and that the universe is old enough to make it possible; according to the strong anthropic principle, the universe must possess those properties that allow the development of life within it, at some stage of its history (Barrow & Tipler, 1986).

the contrary, he believes that life must be considered the central feature of the universe, what explains the very existence of the universe in the form we know. If our universe would host no life (and intelligent life especially), the universe simply would not exist. This is the essence of the Biocentrism. In his book, Lanza endorses the interpretation of the anthropic principle proposed by the eminent theoretical physicist John A. Wheeler, known as *participatory anthropic principle*, according to which the existence of observers is necessary to allow the existence of the universe itself (Wheeler, 1978). Indeed, where the "weak" interpretation of the anthropic principle suggests a sort of tautology (the universe has these parameters because we exist, and if it had others we would not be here to measure them), the "strong" more disputed interpretation suggests that life should be considered as an indispensable ingredient for the physics of our universe, without which the whole reality would have no sense at all (Barrow & Tipler, 1986).

Lanza belongs to the supporters of the "strong" interpretation and explains the fine-tuning problem through Biocentrism. According to his First Principle of Biocentrism, «what we perceive as reality is a process that involves our consciousness» (Lanza, 2009, p. 23). Lanza therefore rejects the traditional division between *res cogitans* and *res extensa* dating back to Descartes and to his mechanistic vision of the universe, totally indifferent to human presence in the cosmos. He claims to be closer to the non-dualist views of Eastern philosophies, which do not admit this radical division. Lanza borrows the idea of a determining role of consciousness in the fabric of reality from Von Neumman-Wigner's interpretation of quantum mechanics, in which the presence of a conscious observer (able to make observations of the quantum system and endowed with self-awareness) is determinant for the functioning of quantum mechanics itself. He writes: «When studying subatomic particles, the observer appears to alter and determine what is perceived. The presence and methodology of the experimenter is hopelessly entangled with whatever he is attempting to observe and what results he gets» (Lanza, 2009, p. 49). Here Lanza uses quantum mechanics' pivotal concept of entanglement, at the center of a lot of debates still underway in the philosophy of physics for its paradoxical aspects (Bricmont, 2016; Rickles, 2016)[3]. According to Lanza, without the presence of a conscious observer, subatomic particles «at best exist in an undetermined state of probability waves» (Lanza, 2009, p. 59), as Von Neumann-Wigner's interpretation says (Von Neumann, 1955).

This does not mean – Lanza says – that a conscious observer is able to manipulate reality or modify it at will. Here he intends to distance himself from the New Age conceptions of quantum physics, or from his purely pseudoscientific versions, expressed for example in the

3 The concept of entanglement or non-locality emerged in quantum physics with the so-called "EPR paradox" (from the names of physicists Einstein, Podolsky and Rosen who proposed it as a mental experiment in 1935): it assumed that by accepting the postulates of traditional interpretation of quantum physics, there would have been a paradox due to the violation of the limit of transmission of information placed by the speed of light predicted by the theory of relativity. Specifically, if you have two sub-particles that share mirror properties because they are produced by the splitting of a parent particle – e.g., the spin of particle A has a value of +1/2 while that particle B is -1/2, for the law of conservation of angular momentum – the measurement of a property of particle A has instant effect on the specular property of particle B, regardless of distance. This violates two principles of classical physics: firstly because the property of particle A or B is in an indeterminate state until the measurement is made, so the value that will emerge from the measurement is completely random, and yet the specular particle will assume the opposite property, showing the existence of a random correlation; and secondly because, suggesting the existence of a correlation that does not take into account the distance, it violates the principle of locality (according to which distant objects cannot have instantaneous causal influence in an instantaneous way). With the non-locality theorem by John Stewart Bell, in 1964, non-locality was proved to be an essential property of quantum physics, and the phenomenon was later demonstrated in many laboratory experiments, so it is now accepted by the scientific community, raising important problems on the nature of reality.

popular documentary *What the Bleep Do We Know!?* (2004), quoted by Lanza in the text as an example of the distortion of quantum physics' concepts. He rather defends a probabilistic view of quantum mechanics, according to which it is not possible to decide in advance the outcome of an observation of a quantum system, while admitting that the transition from the probabilistic state to the ontological state of a quantum system is possible only in the presence of an observer. The biocentric hypothesis, therefore, provides that reality exists only if there is intelligent life, but rejects the idea that reality can be manipulated by consciousness (a popular idea among pseudo-scientific theories like those of the "quantum mind"). Rather, the basic concepts of physics, namely the existence of time and space, must be rethought in the light of Biocentrism: time and space are constructs of the mind, i.e. ways in which consciousness gives meaning to reality, but they do not exist in an absolute sense.

From this, Lanza goes so far as to question the concept of "death": «If time is an illusion, if reality is created by our own consciousness, can this consciousness ever truly be extinguished?» (Lanza, 2009, p. 146). The answer is no. This is because the conservation law requires that energy should never be destroyed, but only subjected to transformation: therefore, the amount of electricity produced by our body and our mind, and which produces what we call consciousness, cannot fade after death. Consciousness is conserved in some way, according to Lanza, because without it the universe cannot exist; therefore, the dissolution of the physical body does not coincide with death, because from the point of view of consciousness the universe is timeless and not subject to change.

He further explores this issue in *Beyond Biocentrism: Rethinking Time, Space, Consciousness, and the Illusion of Death* (2016), published again in collaboration with Bob Berman after the success of the first book. Here, Lanza assumes the point of view of the information theory to explain the phenomenon of consciousness and in general the very nature of reality: «If information is defined as everything involved in cause-and-effect exchanges, then information interactions are continuous and omnipresent on all levels», he writes (Lanza, 2016, p. 155). The same energy transformations should be understood as an exchange of information. Therefore, whereas previously Lanza considered consciousness as an expression of a certain quantity of energy, now he defines it as a quantity of information. However, the conservation law still applies: information can change, but does not disappear into thin air. Information about the universe we perceive, Lanza argues, constitutes the reality itself: to be computable, information must be acquired by a conscious mind. Therefore, putting the concept of information at the center of his theory of Biocentrism, Lanza concludes: «All we know and can know is contained within our mind/the information processed in our brains» (Lanza, 2016, p. 164). We are, ultimately, "machines with awareness", to use its expression.

In *Beyond Biocentrism* Lanza argues that it is necessary to get rid of the self/body identification, in order to get rid of the false conception of death. It is not true that when we see a dead body the person who owned that body no longer exists. This is because, above all, since time is a construct of our mind, «they cannot be thought of as "going away"—which requires the temporal concepts of before and after» (Lanza, 2016, p. 209). But then how is it possible that we can no longer interact with the consciousness that was inside that body? Returning to the idea of conservation of energy and information, Lanza argues that the consciousness of the "dead" person has entered a state of quantum superposition: it exists, but in an indeterminate state that is incomprehensible to our senses, exactly as all the possibilities of a quantum system exist when they are entangled, before the observation is made. From the

standpoint of the one who dies, the consciousness remains unaltered and he experiences the true timeless structure of the universe, just as an entangled quantum system experiences it.

Frank Tipler's Omega Point Theory

Frank Tipler is Full Professor at the Department of Mathematics and Physics at Tulane University and a former student of John A. Wheeler at the University of Texas, strongly influenced by his ideas. With John D. Barrow, Tipler published in 1986 the influential book *The Cosmological Anthropic Principle*, where they exposed their thesis on the problem of fine-tuning and the apparent central role of life in the universe. Barrow and Tipler proposed a particularly "strong" version of the anthropic principle, known as the *ultimate anthropic principle*, according to which, when intelligent life emerges in the universe, it is destined to fill the entire universe and to survive forever. In his controversial book *The Physics of Immortality* (1994), Tipler starts exactly from this assumption to develop his Omega Point theory, defined as «a testable physical theory for an omnipresent, omniscient, omnipotent God who will one day in the far future resurrect every single one of us to live forever in abode which is in all essentials the Judeo-Christian Heaven» (Tipler, 1995, p. 1).

The Omega Point is a singularity at the end of time when it will become possible to emulate eternally all living beings that existed in the universe in every age. The existence of the Omega Point represents a sort of postulate for the ultimate anthropic principle: if a conscious observer is needed so that the universe exists (it is the same assumption of Lanza's Biocentrism), how it should be possible that the universe existed well before the emergence of conscious life? This paradox is solved by assuming a conscious mind at the end of the universe that acts as an observer and "creator" of the universe in what appears to us as our past. It would seem an even more paradoxical solution; but Tipler mentions to support it the famous Wheeler's delayed choice experiment, a mental experiment that seems to demonstrate the possibility that an observation made in the present of an event happened in the past (for example the explosion of a supernova) could influence this same event in the past. In this way, it becomes admissible for an observer of the remote future, with its own observation, to give meaning to all past reality.

The omnipotent and omniscient mind that Tipler defines Punto Omega is identified by him with the God of the Judeo-Christian tradition. In particular, in the Omega Point it becomes possible to resurrect all the beings lived in the past, in a form that is identical to the one Christ had after the resurrection (not therefore a resurrection in the form of "ghost", but in the flesh, although in a "transfigured" form). The assumption that makes Tipler's resurrection possible is the same as Lanza's: the essence of a living being can be traced back to his information: «More generally, it requires us to regard a "person" as a particular (very complicated) type of computer program: the human "soul" is nothing but a specific program being run on a computing machine called the brain» (Tipler, 1995, pp. 1-2). He believes that the Omega Point is a kind of universal Turing machine, able to emulate every other computable machine, including that represented by the human brain.

For Tipler, «a "living being" is any entity which codes information (in the physics sense of this word) with the information coded being preserved by natural selection» (Tipler., 1995, p. 124). Tipler believes that this explicitly reductionist conception of living being is in fact close to the theological notion of "soul" provided by Thomas Aquinas, which he borrowed from

Aristotelianism. In fact, the soul represents, for the scholastic theology, "the form of activity of the body", and the soul informs (that is, it gives shape) the body with which it is united. Therefore, Tipler's vision would not be antithetical to Christianism. The resurrection promised by Christ in the Gospels will occur through a kind of computer simulation, which does not mean creating a false reproduction of the true living being, perhaps in a "ghostly" holographic form, but a recreation of it in a form that is totally indistinguishable from the current one. As intelligent life will fill the entire universe, computers' processing capabilities will increase. Gradually, life will begin to move through mind-uploading techniques inside computer hardware. According to Tipler, this transfer of a human consciousness to a digital medium does not produce a self that is different from the original one, because by reproducing it to perfection, it guarantees its continuity in terms of consciousness. Similarly, when we die and our physical body deteriorates, the resurrection that occurs in the Omega Point within the super-emulation happens without interruption from the point of view of our subjective time: we will close our eyes to immediately reopen them in the Paradise that God/the Omega Point created for us.

To justify the idea that «there is simply no way for the emulated people to tell that they are "really" inside the computer, that they are merely simulated, and not real» (Tipler, 1995, p. 207), Tipler uses the principle of "Identity of Indiscernibles" introduced by Leibniz, according to which entities that cannot be distinguished by any means whatsoever have to be considered identical. Therefore, «simulations which are sufficiently complex to contain observers – thinking, feeling beings – as subsimulations exist physically» (Tipler, 1995, p. 210). Our life after the resurrection will be very similar to the one we experience in this world, even with the same loved ones we lost in the past: indeed, based on the quantum principle of non-locality (that is, the state of entanglement that holds quantum systems that interacted in the past even at very large distances), it would not be possible to resurrect someone without emulating at the same time all the people that interacted with them in the past and in the same environment with which they interacted in their mortal life.

Tipler's theory postulates that the universe is closed. A closed universe is a universe that does not expand forever from the initial singularity (Big Bang), but in which gravity overcomes cosmic expansion at some point, causing its collapse. The universe must be closed because, if it expands eternally, sooner or later it would become impossible to extract information from the regions of the universe moving away from our horizon of observation. In these regions, called "event horizons", information in the form of light cones centered on the event no longer reach us and would be lost forever from our point of view. Vice versa, the Omega Point is the point where all the light cones converge into the distant future: if not, the Omega Point could not resurrect (i.e. emulate) the lives of those whose information lies beyond the event horizon. Moreover, an open universe would inexorably end with a thermal death, a state in which it is no longer possible to extract energy, so that life cannot exists anymore; vice versa, in a closed universe it is possible to extract useful energy from the gravitational energy that produces collapse. This point is so important that became the "First Testable Prediction of the Omega Point Theory". Tipler's closed universe, however, is not a cyclic universe. Another Tipler's prediction is that under no circumstances gravity can become repulsive, so as to provoke, in the moment of the final collapse, a "rebound" that makes the cosmic expansion resume. The Eternal Return, according to Tipler, is essentially opposed to the idea of progress inherent in the Judeo-Christian theology and is therefore to be rejected. On the other hand, if in the

moment of the final collapse a rebound occurs, it would be impossible to produce the final singularity that Tipler defines "Omega Point", and the whole theory would prove to be wrong.

When the book was published in 1994, the hypothesis of a closed universe was still prevailing in cosmology. But in 1998 two different research groups revealed that the universe, rather than slowing its expansion due to gravity, is accelerating its expansion, subjected to an unknown "dark energy". Today, therefore, the hypothesis of a closed universe has been ruled out and everything leads scientists to believe that the universe will expand forever. This represents a blatant falsification of Tipler's prediction. Instead of abandoning his theory, however, Tipler has identified a possible way out in his next book *The Physics of Christianity* (2007). He imagines that intelligent life, once filled the whole universe, will intervene on the fabric of reality so to nullify the positive cosmological constant that produces the acceleration of universe's expansion. This could be done by pushing the Higgs field, which is in a state of false vacuum, in the state of true vacuum, that is, in its state of minimum energy, releasing enough energy to produce (for the relationship between mass and energy established by Einstein) a significant increase in gravitational attraction so to trigger the collapse of the universe. It is not a testable prediction, but just a hypothesis.

From Russian Cosmists to New Age physics: a genealogy of Lanza and Tipler's ideas

Theories do not emerge from nothing. This also applies to those that can hardly be defined as fully scientific theories. Reconstructing the genealogy of the ideas on which Lanza and Tipler's proposals are based is therefore essential to understand their success as well.

First, both proposals provide answers to a problem that emerged overwhelmingly in the field of theoretical physics and the philosophy of physics during the 20th century, that is the role of intelligent life in the universe. Von Neumann-Wigner's interpretation of quantum mechanics, on a one hand, and the cosmological anthropic principle, on another hand, questioned the traditional mechanistic vision of a universe indifferent to life, which would have appeared entirely randomly as a result of fortuitous coincidences and the "blind" mechanism of natural selection. Within the scientific community itself there are some alternatives to this vision, and the proposals by Lanza and Tipler fall within this debate, which instead intend to restore to intelligent life an absolute centrality, as in a sort of reversal of the Copernican revolution. Both proposals are also based on a reductionist interpretation of the concept of "life", understood as a mere process of information processing. It is useful to note that this "informational" interpretation of life was first proposed by one of the fathers of quantum physics, Erwin Schrödinger, in his lecture series entitled *What is life?* (Schrödinger, 1944). Since then this paradigm has been affirmed above all in physics circles, as an attempt to "crack" the mystery of life with a different approach than that of biology, but it has also been embraced by an evolutionist like Richard Dawkins (1986). By reducing the problem of life and consciousness to information, it is possible to treat these issues with instruments proper to physics, as Lanza and Tipler do.

The thesis of Biocentrism is also based on other more heterodox assumptions, in particular the idea of a non-dual reality. Lanza deals with this issue in *Beyond Bicentrism*, where he writes: «Today, the world still remains essentially divided into these basic two views of reality, Western and Eastern, dualistic and non-dualistic, that existed over a millennium ago» (Lanza, 2016, p. 24). Although in his first book he wanted to distance himself from New Age

theories and also from a classic of quantum mysticism such Fritjof Capra's *The Tao of Physics* (1975), he later writes:

> It will surprise no one that our detour involves a turn to the East. It is there, in Hinduism and Buddhism, that these very issues remain front and center. This actually constitutes a major difference between Western religions and those with roots in the Indian subcontinent. In the Judeo-Christian tradition, duality is central to the perception of reality. The basics of life and the cosmos involve relationships – often encompassing tension or conflict – between the individual versus nature or the individual self and its relationship to a deity that is separate. They're almost always temporally structured, as when one's present life stands opposed to its spiritual goal, which supposedly lies in the future. Thus, for Westerners, a bedrock fundamental is the existence of time. (Lanza, 2016. pp. 131-132)

These are exactly the same considerations expressed by Capra in his 1975 best-seller. Capra, for example, spoke of «a trend of thought which led, ultimately, to the separation of spirit and matter and to a dualism which became characteristic of Western philosophy» (Capra, 1975, p. 20). And then he summarizes the Eastern point of view as follows: «The most important characteristic of the Eastern world view – one could almost say the essence of it – is the awareness of the unity and mutual interrelation of all things and events, the experience of all phenomena in the world as manifestations of a basic oneness» (Capra, 1975, p. 130). Compare this statement with Bob Berman's experience told in *Beyond Biocentrism*, in which the astronomer realizes «that birth and death do not exist. That all is perfect eternally, that time is unreal, and that all is one» and that things «were no longer separate items existing in space; instead, everything was the same continuum» (Lanza, 2016, p. 135). Even Capra, at the beginning of his book, describes a similar mystical experience. Robert Lanza is not for nothing a regular guest of the seminars of the international non-profit organization "Science and Nonduality", which explores the topics of physics by hybridizing them with Eastern mysticism. On the organization's website we read:

> Nonduality is the philosophical, spiritual, and scientific understanding of non-separation and fundamental intrinsic oneness (…). Dualities are usually seen in terms of opposites: Mind/Matter, Self/Other, Conscious/Unconscious, Illusion/Reality, Quantum/Classical, Wave/Particle, Spiritual/Material, Beginning/End, Male/Female, Living/Dead and Good/Evil. Nonduality is the understanding that identification with common dualisms avoids recognition of a deeper reality (https://www.scienceandnonduality.com/about/nonduality/).

It is therefore undeniable that Lanza's Biocentrism has its roots in the so-called "quantum mysticism", born between the 1960s and 1970s in the United States (Kaiser, 2011) and subsequently spread worldwide. Among the endorsers of his books, we also find Deepak Chopra, a New Age best-selling author with his books *Quantum Healing* (1989) and the most recent *You Are The Universe* (2017), where the same thesis of Lanza is resumed.

Tipler's Omega Point Theory is instead inscribed in Western thought and avoids influences of some sort from quantum mysticism. The explicit inspiration of Tipler's theory comes from Pierre Teilhard de Chardin (1881-1955), a paleontologist, evolutionist and Jesuit theologian, who had some clashes with the Church for his heterodox views. In his book *Le Phénomène Humain* (1955), Teilhard proposed the Omega Point as the peak of complexity and intelligence, a transcendent being endowed with the same qualities attributed to God and

toward which human beings naturally tends. For Teilhard, evolution is not a random process, but a development aimed at increasing complexity and intelligence until the full universe will become filled with intelligence (*noosphere*), so as to merge with the One, i.e. God. Evolution would be guided by a particular form of energy, called radial energy, which contrasts the second law of thermodynamics according to which entropy, that is the degree of "disorder" of the universe, is inexorably destined to grow over time; radial energy pushes life towards increasing forms of complexity. This is a strongly "vitalistic" vision, which costed Teilhard the accusation of pantheism on the part of the ecclesiastical hierarchy, since in his vision this sort of psychic energy is present in all living things, not just in human beings. Tipler, however, while drawing heavily on Teilhard's theory, believes that his ideas are «completely wrong» (Tipler, 1995, p. 112), as they were formulated as an alternative to Darwinism in a time when, especially in France, Darwinism was hardly considered by evolutionists (*Le Phénomène Humain* was written in the 1930s), so that subsequent developments and the emergence of neo-Darwinism completely discredited Teilhard's radial energy hypothesis. However, Tipler believes that «"radial energy" is actually quite analogous to another physics concept, information» (Tipler, 1995, pp. 112-113). In this way, by replacing radial energy with information, it is possible to assert that the quantity and complexity of information in the universe is destined to grow, to produce in the distant future the advent of the Omega Point, able to reproduce all the information created in the universe through a principle similar to the universal Turing machine.

But the affinities between Lanza and Tipler's theories and those of Nikolai Fedorovich Federov (1829-1903), father of the Russian "cosmism", are possibly of a greater interest. Cosmism was a unique doctrine that foresees the future ability of human civilization, through technology, to resurrect the dead. Tipler does not mention cosmism in his works, but certainly Teilhard was influenced by it: Young (2012) says that he followed the lessons of one of them, Vladimir Ivanovich Vernadsky (1863-1945), at the Sorbonne. In his writings, Vernadsky used the term noosphere, the same of Teilhard. Vernadsky was convinced that life, similarly to matter and energy, is an eternal constant of the cosmos, which has always existed and will always exist, similarly to what Lanza and Tipler say. With increasing complexity, intelligent lifeforms will be able – according to Vernadsky – to take control of their evolution and change the universe according to their needs.

This assumption is the basis of cosmist thought. Fedorov, in his role of librarian at the National Library of Moscow, was able to inspire a whole generation of Russian intellectuals; his thought was exposed in several writings later collected in the posthumous volume *Philosophy of the Common Task* (also known as *Philosophy of Physical Resurrection*). His idea is that in the world there is neither birth nor death, but only transformation, so that when the body decomposes it is always possible, theoretically, to bring back to life the dead collecting all its dispersed atoms and infusing new life into them. According to Fedorov, this will be the aim of humankind in the distant future: to recover all the atoms of dead people and to bring them back to life when technology will make it possible. This will require humans to move to the Moon and then to other planets, to recover the dust dispersed in interplanetary spaces. Like Tipler, Fedorov conceived space travels not as an end, but as a mean to allow humans to control the whole universe in order not to leave even a single particle that belonged to those who died in the past. It is the same idea as Tipler's Omega Point, in which all the light cones must converge, so that the information of all those who have lived in the past can be recovered and reproduced. We could even draw an analogy between quantum entanglement and the

concept of *rodstvo* that, for Fedorov, represented what holds human beings and the whole universe together. In particular, when humanity will begin to collect the dust that belonged to the dead, the *rodstvo* will produce a kind of resonance when we are in the presence of the atoms belonging to one of our ancestors. Tipler imagined that entanglement allows people resurrected in the Omega Point to stay in touch with their loved ones.

George M. Young (2012) noted that the legacy of Russian cosmism has been inherited today by transhumanists, both in Russia and – above all – in the United States. There is no doubt that Tipler was influenced by transhumanism in his theory. He mentions mind-uploading, the hypothetical technology that would make possible to transfer the information of a human being onto a digital medium. Mind-uploading is one of the key concepts of transhumanism, being considered as the final solution to the problem of death, which transhumanists – like cosmists – intend to defeat with the support of technological progress (Moravec, 1988; Paura, 2016). It is therefore possible to suggest a direct link between cosmism, the Omega Point theory by Teilhard de Chardin, transhumanism and Tipler and Lanza's ideas. All these ideas share the belief that «the currently disregarded and unimagined sciences, that is, the alternative sciences, the "parascience" or the "pseudoscience", can contribute to the discovery of what we need to know» (Young, 2012, p. 235).

Pseudoscience, alterscience, minor science

Following a traditional sociological interpretation, we should understand these two theories using the concept of "re-enchantment". Richard Jenkins defines re-enchantment as a phenomenon consisting of two tendencies, «one which insists that there are more things in the universe than are dreamed of by the rationalist epistemologies and ontologies of science, the other which rejects the notion that calculative, procedural, formal rationality is always the "best way"» (Jenkins, 2000). However, the use of this concept to interpret this type of theories is problematic, as some recent studies have shown (Asprem, 2014; Togrimsson, 2017). We can certainly define as re-enchantment phenomena those pseudoscientific theories that suggest the possibility to contact dead by channeling, justifying this through the paradoxes of quantum mechanics, or that affirm the reality of the so-called near-death experiences. Here, however, we face two very different cases. The first, Lanza's Biocentrism, does not propose ways to get in touch with the afterlife or to experience directly the timelessness of the universe, so it is quite different from the typical attitude of New Age beliefs claiming the possibility to change reality through parascientific powers: Lanza simply proposes an interpretation of reality in the light of the discoveries of contemporary physics. Tipler's Omega Point theory is even more problematic: whereas Lanza, while imitating scientific language by proposing "postulates", does not provide empirically testable predictions for his Biocentrism, Tipler instead tries to develop a real scientific theory, fully equipped with empirically testable predictions, such as the mass values, of the Higgs boson and the top quark, not yet known at that age, or the topology of the universe. However, some of these predictions have been later falsified, as we have seen, although Tipler attempted to take account of the new empirical results to redefine his theory.

Nor can we speak here of true pseudoscience. If we would be guided exclusively by Popper's principle of demarcation, we should conclude that Tipler's theory is in all respects scientific, especially if we consider that it has also been partly published in accredited scientific

journals[4]. But if we accept that the difference between "belief" and (scientific) "knowledge" consists in the fact that scientific knowledge will never be able to respond to questions pertaining to metaphysical beliefs, in particular on the existence of God, soul or afterlife (Bronner, 2004), then we must admit that Tipler's theory is not an instrument of scientific knowledge. Alexandre Moatti (2013) proposed the concept of *alterscience* to define those heterodox theories of scientists who try to remain in the science, but proposing alternative theories to the accredited ones, for example to general relativity or quantum mechanics; here, however, we have two members of the scientific community who do not question any of the theoretical axioms and discoveries of contemporary science, but extend their assumptions. Nevertheless, some features of alterscience, such as the emphasis on a "holistic" science that overcomes the traditional division in compartments, or the belief that the explanations proposed by mainstream science are inadequate and that contemporary science is in an impasse, may be traced in the case of Lanza, whose theory of Biocentrism is proposed as an alternative to the mainstream explanation of the birth and evolution of the universe or quantum mechanics' paradoxes.

Wolf-Meyer and Cochran (2015) recently proposed to use the concept of *minor science*, borrowed from Gilles Deleuze and Félix Guattari, for studying the quantum consciousness theories proposed by scientists such as Stuart Hameroff and Roger Penrose (1996). Minor science emerges within the scientific community as an attempt to extend traditional scientific research into "fringe" contexts, where the dominant scientific research by its very nature could not venture, with the aim of suggesting solutions to problems that emerge during the scientific progress, such as the role of the observer in quantum mechanics or the fine-tuning problem. Minor science is characterized by three elements: it is deterritorialized, that is, it employs scientific language but outside its traditional field of competence, for example employing concepts of physics and cosmology to propose a theory such as the Omega Point; it is intensely political, that is, it is opposed to the dominant science and starts from ethical assumptions, which it intends to defend (e.g., non-duality in the case of Lanza's Biocentrism, which is opposed to the alleged dualism of Western science); third, minor science is "bacheleor", which means that it does not involve research groups or laboratories, but a limited number of individuals. Nonetheless, minor science operates in the context of scientific community, not outside it as in the case of pseudoscience. According to the authors, «as scientific disciplines continue toward specialization, some scientists see the opportunity to capitalize upon lacunae in thought to forward new scientific paradigmas» (Wolf-Meyer & Cochran, 2015). This makes minor science a fertile ground for the sociology of scientific knowledge, thanks to its peculiar feature to be at the boundary between normal science, pseudoscience and borderland science (Shermer, 2013). The study of these theories in the light of new sociological and ethnological paradigms with respect to the more traditional concept of "re-enchantment" can aid us to better understand the complexity of the construction of scientific knowledge and the relations between scientific community and general public, especially considering the success of these theories within the popular science.

4 As Shermer (2013) suggests: «What makes them borderlands science instead of pseudoscience (or nonscience) is that the practioners in the field are professional scientists who publish in peer-reviewed journals (…) From a pragmatic perspective, science is what scientists do».

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