PAVEL FLORENSKY ON SPACE AND TIME

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ABSTRACT. An investigation of the views on space and time of the Russian polymath Pavel Florensky (1882-1937). After a brief account of his life, I study Florensky's conception of time in *The Meaning of Idealism* (1914), where he first confronts Einstein's theory of special relativity, comparing it to Plato's metaphor of the Cave and Goethe's myth of the Mothers. Later, in his Analysis of spatiality and time, Florensky speaks of a person's biography as a four-dimensional unity, in which the temporal coordinate is examined in sections. In *On the Imaginaries in Geometry* (1922), Florensky argues that the speed of light is not, as in Relativity, an absolute speed limit in the universe. When bodies approach and then surpass the speed of light, they are transformed into unextended, eternal Platonic forms. Beyond this point, time runs in reverse, effects precede their causes, and efficient causality is transformed into final or teleological causality, a concept on which Florensky elaborates in his Iconostasis. Florensky thus transformed the findings of Einsteinian relativity in order to make room for Plato's intelligible Ideas, the Aristotelian distinction between a changing realm of earth and the immutable realm of the heavens, and the notion of teleology or final causation. His notion that man can approximate God's vision of past, present and future all at once, as if from above, is reminiscent of Boethius' ideas.

KEYWORDS: Florensky, Einstein, Plato, Goethe, relativity, philosophy of time.

> *There is no man who has not been a follower of Plato, at least for a moment of his life ... Who has not experienced how the insuperable wall between subject and object crumbles and breaks, how the Ego leaves the confines of its egotistical isolation, breathes the sublime air of knowledge as deeply as it can, and becomes a single thing with the entire world?*[1]

[1] Pavel Florensky, *Obščečelovečeskie korni idealizma* ("The universal human roots of Idealism"), in *Sočineniya v četyrekh tomakh*, vol. 3.2, Moskva 1999, p. 146.

0. Introduction

In previous contributions, I have discussed how in the Western tradition time, in its connection with death, has always been a major factor of worry and suffering for human beings,[2] and how thinkers from various times and places have supposed that in order to find peace of mind, we must somehow overcome time and think in terms of timelessness or eternity. I've also written about how, for someone like Boethius, God sees all events in the world, which we take to occur in chronological succession, simultaneously, and I've suggested[3] that this God's-eye view is similar to the "block-time" perspective in the philosophy of time, based on Einstein and Minkowski's notion of the inseparability of space and time within a four-dimensional continuum. According to this view, there is a sense in which all moments of time already exist simultaneously, and there may be a way for us to learn to perceive reality, to some extent, as such a timeless whole. Plotinus, Porphyry and Boethius, to name but a few Neoplatonist examples, certainly believed that time is a secondary, derivative phenomenon, restricted to the sensible world, and that the true reality of the intelligible world is not characterized by either time or space.

In the present article, I will examine how a 20th-century Russian thinker approached these problems, combining the views of Einstein and Minkowski with insights from several other traditions to come up with solutions that are unique to him, but still consonant with some aspects of ancient philosophy.

1. Pavel Florensky: his life and times

Pavel Florensky was born near Evlach, Azerbaijan in 1882, but soon moved with his family to Tbilisi, Georgia, where he attended high school. He excelled in the study of classical languages, and continued to read Greek and Latin literature throughout his life,[4] but upon graduation he chose to enroll in physics and mathematics at the University of Moscow, where he studied, among other things, the set theory of Georg Cantor. He graduated in 1904 with a thesis on discontinuity in geometric curves, and although he could have had a University career in mathematics, he chose instead to enroll in the Theological Academy of Moscow, where he studied until 1908.

Florensky now began to associate with many of the most outstanding figures of the Russian intelligentsia: he became close friends with the symbolist poet Andre Bely, son of his mathematics professor Bugayev, and came to know Berdyaev, Bulgakov, and Blok. He taught the history of philosophy at the Theological Academy from

[2] Chase 2012.

[3] Chase 2014.

[4] A work such as *The Meaning of Idealism*, for instance, is filled with learned philological studies of the meaning and etymology of several Greek and Latin philosophical terms.

1908 until its closure in 1919, and completed his masterpiece the *Column and basis of truth* in 1914.[5]

Throughout this time, Florensky carried out intense scientific research, taking out some thirty patents for scientific discoveries and inventions. After the Revolution, he was assigned in 1919 to work at the Karbolit plant in Moscow, which produced plastic materials, and from 1921 he worked as an electrical engineer at the Glavelektro (Central administration for the electrification of Russia) and the Goelro (State institute of technical electronics), where he did research on electrical and insulating materials.

It was also in 1921 that he was hired to teach the theory of space at the Higher State Technical-Artistic Laboratories (VKhUTEMAS). This led to the publication of two of the works we're going to be concerned with here: *The imaginary in geometry* (1922)[6] and *Analysis of space and time in figurative works of art* (1924-5).[7]

Until this time, thanks to his scientific skills Florensky had been able to get along with the Soviet regime, even though he always lectured and attended conferences dressed in his priest's robes. He first encountered problems with censorship when, in his book on the imaginary, he argued that Dante had anticipated non-Euclidian geometry in the *Divine Comedy*, yet he was able to defend himself in an open letter. He fared less well under Stalin, and was arrested in 1933[8] on the charge of belonging to a counterrevolutionary organization. He was condemned to ten years of hard labor and shipped first to Siberia, where he continued his research on electronics and insulating materials, to which he now added the study of permafrost, then to the Solovetsky Islands in the White Sea, where he did research on algae. He was sent back to Leningrad and shot on the night of December 8, 1937.

Florensky was one of the last of the Renaissance men. He studied and published on an incredible variety of subjects in the sciences and the humanities, including folklore, anthropology, the history of religions and philosophy, linguistics, aesthetics, mathematics, geometry, physics, biology, theology ... the list goes on and on. He has often been compared to Leonardo Da Vinci,[9] but even Leonardo did not, I think, make such substantive contributions to such a wide variety of fields. Many intellectuals of the past century dabbled in both science and the humanities, but few, if any, acquired such in-depth expertise in so many disciplines. It was the goal of Floren-

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[5] Italian translation in Florensky 1974.

[6] Florensky, *Minimosti v geometrii, Oput novogo istolkovaniya mnimostej*, Moscow: Pomor'e. Italian translation of the last part in Florensky 2007, 278-288.

[7] Florensky, *Analiz prostranstvennosti i vremeni v khudozhestvenno-izobrazitel'nykh proizvedeniyakh*. Italian translation in Florensky 1995.

[8] He had already been arrested twice before: once by the Tsarist regime in 1906, and again in 1928. On the latter occasion, he was exiled to Nizhny Novgorod, but was soon allowed to return to his home in Sergeiev Posad upon the intervention of Gor'ky's ex-wife Yekaterina Peshkova (Graham/Kantor 2009, 141).

[9] By S. Bulgakov and N. Lossky, for instance; cf. N. Valentini in Florensky 2012, 151.

sky's life's work to bring together science, philosophy and theology, all in the pursuit of what he saw as the truth.

This truth was ultimately religious in nature: Florensky was, after all, a priest,[10] and even his scientific research was secondary, in his view, to the truth of the Christian revelation.[11] However, at least part of this truth could also be formulated in terms of philosophy, where it was synonymous with what Florensky called "realism", which he defined as "a faith in the trans-objective reality of being"[12]. Florensky had a deep belief in the existence of a world of Platonic Forms, a world that is more real than the sensible world of our everyday experience. In his view, as we shall see, the most recent, cutting-edge discoveries and theories of the physics of his day supported this belief.[13] Some of Florensky's interpretations of contemporary physics may seem to us fantastic and far-fetched, but no more so, I would argue, than some of the wackier theories that are current among the world's best physicists today.[14]

2. Time in *The meaning of Idealism*

In his work entitled *The meaning of Idealism,*[15] first published in 1914, Florensky, following Ouspensky,[16] discusses the exercises developed by C. H. Hinton,[17] which were intended to enable us to perceive a fourth dimension by forcing us to visualize space independently of any particular viewpoint. These exercises seemed unnatural to Florensky: like Picasso's early Cubist paintings, they are too mechanistic and artificial. They are not "actively vital", and lack inner strength and authentic life.[18]

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[10] After a secular upbringing, Florensky experienced a spiritual crisis and religious conversion in 1899, at the age of seventeen. He became a priest in 1911.

[11] This can be seen, for instance, by the way he defends Aristotelico-Ptolemaic cosmology against Copernicanism at the end of his book on the Imaginary.

[12] Florensky, *Autoreferat*, p. 128 quoted in Florensky 2008a, 65. Cf. Florensky, *O realizme* ("On realism"), *Sočineniya* vol. 2, pp. 527-531; Italian translation in Florensky, 2008a, 201-206.

[13] In one of the last letters he sent to his family from the Gulag, Florensky speaks of the "mystery" that can sometimes throw off "the mask of the corporeal"; cf. N. Valentini in Florensky, 2012, 155. The sense of the mysteries of nature, which Florensky shared with Einstein, is linked to a feeling of "terror"; cf. Florensky 2003, 65. It is also an important theme in the thought of Goethe; cf. Hadot 2006, 278ff.

[14] I'm thinking, for instance, of the "many worlds theory": the hypothesis of a virtually infinite number of parallel universes, which appears to be the majority view among physicists today.

[15] Florensky, *Smysl idealizma* ("The Meaning of Idealism"), in *Sočineniya*, vol. 3.2, pp. 68-144. Italian translation in Florensky 2012.

[16] *The Fourth Dimension*, 1909; *Tertium Organon*, 1911.

[17] Hinton's works (*A New Era of Thought*, 1888; *The Fourth Dimension*, 1904) were first translated into Russian in 1915, although his ideas probably circulated earlier; cf. Dalrymple Henderson 2013, 378.

[18] Florensky calls Picasso a "defiler of tombs" (*oskvernitil' mogil*); cf. Florensky 2012, 62 = *Sočineniya*, vol. 3.2, p. 106. On Florensky's attitude to Picasso, see N. Misler in Florensky 1995, 372f.

Florensky then goes on to discuss[19] what he considers a secularized version of Plato's myth of the Cave, and of Plato's definition of time as a moving image of eternity: "the kinetic theory of time", which, he tells us, is equivalent to "the principle of relativity", by which he means time as part of a four-dimensional spacetime.[20] In general, Florensky argues, a person in a world of *n* dimensions cannot perceive a reality of *n* + 1 dimensions, but he can perceive such a world in succession, as a series of moments or "microtomic sections". Time appears when one traverses this series of moments, which thus ends up being equivalent to a fourth dimension.

I think what Florensky has in mind here is the notion that the history of an object can properly be pictured as a three-dimensional "world-tube" in space-time: that is, a cylindrical object like a sausage, each two-dimensional "slice" or section of which can be imagined as the universe as it exists at a given moment of time.[21]

To try to make comprehensible the higher perception of this four-dimensional reality, Florensky makes use of two images: Plato's myth of the Cave from *Republic* bk. VII, and Goethe's realm of the Mothers from *Faust*, Part II, act 1[22]. The relation between the three-dimensional world and the true, four-dimensional world is analogous to that between the shadows projected on the walls of Plato's cave and the objects that cast them. The Ideas, for their part, are the mothers of all that exist, and they live in the depths of our three-dimensional world (*glubina nashego trëkhmernogo mira*).

3. Florensky and the Mothers

In the second part of Goethe's *Faust* (lines 6210ff.), Faust must get hold of a tripod that will allow him to call forth the image of Helen. He asks Mephistopheles how to go about this:

Mephistopheles
Yet, there is a way.

Faust
Tell, without delay!

Mephistopheles
I unwillingly reveal a higher mystery,
Goddesses, enthroned in solitude.
No space round them, much less time:
There is no way to speak of them.

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[19] Florensky 2012, 62ff.

[20] On the inseparability of space and time according to Minkowski, which Florensky wholeheartedly accepts, cf. his letter from the Gulag to his son Kirill, Italian translation in Floresnky 2000, 264; 1995, 319; 323.

[21] Cf. Chase 2014. Similarly, a worm and a butterfly are parts of a single image with rather dissimilar temporal sections (Florensky 1995, 143).

[22] Florensky 2012, 61ff.; 1995, 57.

They are the Mothers!

Faust (*Terrified.*)

Mothers!

Mephistopheles

Do you tremble?

Faust

The Mothers! Mothers! It sounds so strange!

Mephistopheles

So it is. Goddesses, unknown, as you see,
To you Mortals, not named by us willingly.
You must dig in the Depths to reach them.

The divinities Goethe calls the Mothers, some of whom are sitting and others walking, are surrounded by the images of all creatures, and they occupy themselves eternally with formation and transformation. As omnipotent powers, they divide these images of life, sending some toward the tent of the day, and others toward the vault of night. They cannot perceive individuals, only schemes ("Schemen").

In this myth, which Goethe seems to have invented on the basis of a pair of passages from Plutarch (*Life of Marcellus*, ch. 20; *On the obsolescence of Oracles,* ch. 22), the Mothers are thus imagined as custodians of the "originary phenomena" (*Urphänomene*) or archetypes of all things. These archetypes, which are at the basis of Goethe's philosophy of nature, are the original forms from which series of transformations and the laws of universal metamorphosis arise. As Pierre Hadot has written, such originary phenomena

> …allow us to glimpse an inconceivable, unexplorable, unfathomable transcendence, never directly accessible to human knowledge, but of which we can have a premonition by means of reflections and symbols.[23]

It would take us too far afield to show how profoundly consonant this Goethean theory of the *Urphänomen* is with Florensky's views on nature, form, symbolism, and even the ultimately unknowable nature of the Absolute Principle, a view Florensky also found in Cantor. Here, let us simply note that what Florensky found important in Goethe's Mothers, custodians of the *Urphänomenen*, is that for them, space and time mean nothing ("Um sie kein Ort, noch weniger eine Zeit"), and that they dwell in the depths ("Nach ihrer Wohnung magst ins Tiefste schürfen"). According to Florensky, these characteristics make them ideal candidates for identification with Plato's world of Ideas.

Florensky goes on to argue that any process of change in an object can be conceived in various ways. We usually conceive a phase in an object's development as an

[23] Hadot 2006, 258.

inner modification of that object. But we could also picture it as the passage of a four-dimensional object moving through three-dimensional space.[24]

Florensky is being very allusive here, but I think he is referring to the idea that four-dimensional reality, like Plato's world of Ideas, is timeless and changeless. When we perceive a moving, changing, sensible world, what we are in fact seeing is a three-dimensional projection of a four-dimensional reality.[25] If one takes a pack of cards, each one containing the image of a person in a slightly different position, and flips the cards quickly with one's thumb, one will see the image appear to move: likewise, what we see as motion and change is merely the quick succession of immobile slices of reality. In Florensky's terms, the phases in an object's development can be seen, not as successive changes, but as simultaneous "reciprocal limits". Such limits are, I suggest, like slices in a loaf of bread or a sausage, or individual cards in a deck, each of which is immobile and changeless in itself, but the transition between them makes it seem as though they are in motion.

To understand something as a process, Florensky continues, means to add together the moments by which it surges forth, and this entails grasping time as a fourth coordinate and seeing the phenomenon in question as four-dimensional. An example is a human being's personality: as manifested by his biography, such a personality cannot be grasped by taking one moment and isolating it from its context.[26] Every moment in such a biography is a section, or slice of the person's existence. Thinking of the unity of all such moments is an act of synthesis, and such a unity takes place not in time, but in eternity.[27]

4. Time and biography in the *Analysis of spatiality and time in the figurative work of art*

About a decade later, in his work *Analysis of spatiality and time in the figurative work of art*, Florensky returns to the question of biography. Not only persons have biographies, however, and Florensky uses the interesting example of a tree and its relation to a forest. The proper unit for the study of botany is not an isolated tree, but the forest of which it is a part. Yet even this forest, as an entity, which "configures its own form" i. e. assigns to itself its own entelechy,[28] should not be viewed as if in a photograph, capturing its state at a moment in time. Instead, the forest is a four-

[24] In his book on the imagination, this is how Florensky explains the sudden appearance and disappearance of stars; we now know these phenomena as supernovas.

[25] These are Ouspenskian ideas, cf. Dalrymple Henderson 2013, 382-384.

[26] Cf. Florensky 1995, 146: "A single isolated moment does not show us the entire image of a thing, nor do many such moments when each of them is taken individually, and the form of the phenomenon is not grasped according to the fourth coordinate [viz., time]".

[27] Florensky, 2012, 111-112.

[28] Florensky 1995, 149. Today we could designate such an entity as a self-organizing system.

dimensional form expressing itself in time, and an observer who viewed only a three-dimensional section of it would miss "its biography in its totality". The way to comprehend the four-dimensional existence of the forest is through "mystical contemplation", through the understanding of a symbol "capable of becoming the forest itself", in the way that the smell of a flower can become the symbol not only of the flower, but of the entire landscape of which it is a part. This contemplation by means of a symbol allows one to grasp an object "in its instantaneity".

In the realm of art, as Florensky explains elsewhere in the same work,[29] the biographical portrait has the task of presenting the supratemporal unity of the personality. This must involve an image in which the temporal coordinate is examined in sections, although it is usually considered in depth, an idea he attributes to Martin Luther. Florensky's source here is Carl du Prel's *Philosophie der Mystik*, which he read in the Russian translation of 1895.[30] In the German edition, Luther is cited as saying: "God sees time not lengthwise, but in cross-section: everything is in a heap before him"[31]. Du Prel goes on to elaborate as follows: "Luther thus reduces God's omniscience (...) to poetic imagination, and brings it into parallel with the intuitive mode of knowledge of the genius, whereby what appears to reflectively searching man as a temporal succession is transformed into a juxtaposition that can be taken in at one glance".

Here, Du Prel is referring to a (possibly apocryphal) quote from Mozart, who supposedly said the following about his creative process:

> My brain catches fire, especially if I am not disturbed. It grows, I develop it more and more, ever more clearly. The work is then finished in my skull, or really just as if, even if it is a long piece, and *I can embrace the whole in a single glance*, as if it were a painting or a statue. In my imagination, I do not hear the work in its flow, as it must appear in succession, but *I have the whole in one block*, as it were. What a gift! Invention, elaboration, all that happens within me as in a magnificent, grandiose dream, but when I manage to super-hear the assembled totality, that's the best moment (...) it is perhaps the greatest benefit for which I must thank the Creator.

I've suggested previously[32] that Mozart's timeless, simultaneous view of a process that takes place in time is similar to the way Boethius' God perceives all at once all the chronologically successive events in the world we live in. In turn, this view of things bears a close resemblance to the view of reality that follows from the special relativity of Einstein and Minkowski, and its philosophical implications as worked out by contemporary block time theorists.

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[29] Section LXXXI, p. 187 ff. Misler, written November 9, 1924.

[30] As Misler points out.

[31] "Gott sieht die Zeit nicht der Lange nach, sondern der Quere nach an: vor ihm ist alles auf einem Haufen".

[32] Chase 2014, 104.

5. Enter the imaginary. Time in *On the imaginaries in geometry*

Florensky published *On the imaginaries in geometry* in 1922, although parts of it go back to his student days at Moscow.[33] In it, he provides a new interpretation of imaginary numbers in non-Euclidean geometry and in the theory of relativity. Most of this short work is highly technical, but the last few pages are the ones that got him into trouble. Here, in a conclusion that contrasts abruptly with the rest of the book, Florensky uses the concept of imaginary numbers to argue that Dante, in his *Divine Comedy*, anticipated some aspects of non-Euclidean geometry: Dante's space was finite and elliptical, just as modern physics has shown is the case for time, which is finite and bounded, and for space.[34] Florensky goes on to argue that the Theory of Relativity's postulate that the speed of light constitutes a universal speed limit does not mean that nothing can travel faster than the speed of light. It merely means that when the speed of light is exceeded, new conditions of life appear which we cannot imagine in our current condition. The transition between these two types of state is discontinuous.[35]

More precisely, Florensky thinks that the speed of light constitutes an absolute speed limit for terrestrial phenomena, but not for heavenly phenomena. He goes on to give his own interpretation of Lorentz-Fitzgerald contractions, concerning the way a system in motion will appear to an observer at rest. When the velocity of a system's motion is less than the speed of light, the apparent characteristics of the bodies of the system are those we observe in our terrestrial experience. But when the velocity of the system's motion is faster than light, these characteristics become imaginary. Special relativity predicts that at speeds near the speed of light, the length of objects contracts in the direction of motion according to a specific equation[36]; likewise, time dilates, or slows down, by an inverse equation. According to Einstein, this means that if the speed of light were ever achieved, time would stop and objects would shrink to the point of disappearing. Florensky, however, interprets this as meaning that at the border between Earth and Heaven, which he calculates to be situated between the orbits of Uranus and Neptune, the length of any body becomes equal to zero, and its mass and duration become infinite. But while Einstein saw these results as proof that no body can travel at a speed equal to or higher than light, Florensky believes they mean that the velocity of a body approaches the speed of light, that

[33] The concluding portion has been translated into Italian in Florensky 2007, 278-288.

[34] On the finite nature of space and time in modern physics, cf. Florensky 1995, 228. Einstein, of course, held that space was finite but unbounded; cf. Gleiser 1997, 258.

[35] The importance of discontinuity is a central fulchrum of Florensky's thought; cf. Graham & Kantor 2009, 87-89; 200; Zák 2009. It is also, of course, a key feature of modern physics since the introduction of quantum mechanics; cf. Gleiser 1997, 216; 226; 228; 235.

[36] The Lorentz factor. On time dilation and length contraction, consequences of Einstein's principle that the speed of light is independent of the motion of its source and of the observer, see, for instance, Gleiser 1997, 206ff.

body "loses its own extension, becomes eternal and acquires an absolute stability"[37]. This, he continues, is nothing other than an expression in terms of physics of what Plato means by the ideas, which are incorporeal, unextended, immutable and eternal. It also corresponds to Aristotle's forms and to the realm of the stars, which are exempt from terrestrial laws.

We see, then, that Florensky has taken Einstein's results and stood them on their head. Special relativity showed that at speeds equal to light, objects would lose their extension and time would stand still, and Einstein interpreted this as a proof by *reductio ad absurdum* that the speed of light constitutes an absolute, unbreakable speed limit throughout the universe. Florensky, in contrast, thinks the speed of light is a limit only for what he calls the Earth, that is, the region extending from earth to the area between Uranus and Neptune: at that limit, objects transform into eternal, unextended Platonic forms.

And that's not all. When bodies exceed the speed of light, Florensky argues, time runs in reverse, so that effects precede their causes and efficient causality is transformed into final causation, and "beyond the confines of maximum velocity extends the kingdom of ends". He expresses the same result by claiming that in such conditions, the length and mass of bodies become imaginary. In the presence of bodies travelling at faster than the speed of light, he claims, space breaks, just as air breaks in the presence of bodies moving faster than the speed of sound, giving rise to what we now call sonic booms. When this happens, qualitatively new phenomena arise, which are characterized by imaginary parameters. The only way currently known to us to reach this realm of the imaginary – which Dante called the realm of the Empyrean – is through the acceleration of bodies, or perhaps of some of their particles, to velocities faster than the speed of light, a process which causes space to break and bodies to "turn inside out"[38]. But there is nothing to prove that there can be no other method of access to this realm.

6. Time and Dreams in the *Iconostasis*

Some of these odd-sounding notions are clarified in a work based on lectures Florensky gave between 1918 and 1922, and which was posthumously published under the title *Iconostasis: essay on the icon.*[39] Here, Florensky begins, following Du Prel once again, by discussing dreams as the bridge between the sensible and the intelligible world. The time of dreams moves with incredible velocity compared to the time

[37] Loc. cit., p. 287.

[38] *Čerez razlom prostranstva i vyvoračivanie tela čerez samogo sebya.* The rare word *vyvoračivanie* comes from the verb *vyvorachivat'*, equivalent to the verb *vyvërtyvat'*, "to unscrew, twist, wrench, turn inside out". This process of "turning inside out" or inverting what is external to what is internal and *vice ver*sa has to do with reversing the second principle of thermodynamics; see Florensky's letter from the Gulag to his son Kirill, as studied by Zák 2009.

[39] Italian translation in Florenskij, 2008b.

of what we call the real world: in fact its velocity can become infinite, at which point time turns back upon itself and reverses direction, from future to past and from effects to causes; in other words, it becomes teleological, which is the same thing as to say that it becomes imaginary.

Florensky tries to prove these paradoxical conclusions from the phenomenology of dreams. Let us say that while I am asleep, my neck makes contact with my iron bed, and this causes me to dream I am being executed in the French revolution. This is the way causality works in what we call the real world. It is efficient causality, from cause to effect: the physical fact of my neck touching the iron bed *causes* my dream of my execution. In my dream, however, a whole series of events leads up to my execution: the French revolution itself, my trial, my imprisonment, my transport to the place of execution, etc., etc. All these events are *caused* by the dream event of my execution (which in turn is efficiently caused by my neck touching the iron bedstead), but now it is a different kind of causation. Here the direction of causation is reversed, because the effects, at least in dreamtime, seem to precede their cause, which is the event of my execution. In fact we have to do with a case of teleological or final causation[40]: the series of dream-events leading up to my execution take place *in order that* my execution may take place. This is the sense in which the direction of time, and therefore of causation, is reversed in the world of dreams and imagination. It is also, Florensky asserts, true of the inner time of organic life, in which time runs from effects toward its causes or goals. Man can also accede to this world of imaginary time in artistic creation and in mystical ecstasy.

Of all Florensky's publications, it was his book on the Imaginary that was immediately censored by the Soviet regime, and may have led to his eventual condemnation and imprisonment in the Gulag.[41] This was probably because in it, Florensky interpreted the most recent developments in mathematics, geometry and physics in such a way that they not only did not contradict, but even reinforced the Aristotelian-Ptolemaic cosmology. More important for our present purpose, Florensky interpreted Einstein's theory of special relativity as providing an explanation of the connection between the sensible world and the intelligible realm of Platonic forms, which he, like many Islamic thinkers, associated with the imagination. Bodies accelerating beyond the speed of light become incorporeal, at which point time runs in reverse and teleology reigns, because causes no longer need to precede their effects, as in efficient causality, but can follow them, as happens with cases of final causality.

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[40] On these notions, see for instance Chase 2012b.

[41] The work was attacked in an article by the Stalinist hack Ernst Kol'man, entitled "Against the most recent discoveries of the bourgeois world view", which appeared in the journal *Bol'shevik* in 1933, the same year of Florensky's final arrest. On Kol'man, see Graham and Cantor 2009, 128-130.

7. Conclusion

By interpreting current scientific results in an idiosyncratic way, Florensky thus sought to preserve the Aristotelian-Ptolemaic doctrine of a distinction between the sublunary world and the perfect realm of the heavens. He was also able to find a place and an explanation for the Platonic Ideas, and for the existence of teleology and final causation. All of these points were part and parcel of Florensky's goal of showing that ancient philosophy and cosmology were a great deal closer than is usually supposed to the views of contemporary science.

When it comes to evaluating Florensky's views, there are several factors that should be taken into consideration. We may smile at his idea that the realm of earth ends between Neptune and Uranus, but we should remember that in his time, prior to the discoveries of Hubble,[42] the extent and the age of the universe, and even the nature of the galaxies, were still unknown.

Florensky was a practicing scientist all his life, active in a bewildering number of fields. As a deeply religious man, however, he did not study natural phenomena for their own sake, but in order to reveal the "mystery" that lies beneath the "mask" of physical reality. It was this conviction that gave him the courage to continue his scientific activity even in the appalling conditions of the Soviet Gulag, but it could also lead him to interpret modern scientific findings so that they would not conflict with the belief system of Orthodox Christianity. On the other hand, Florensky gave voice as early as 1903 to the conviction that science and religion "are equally necessary for man, equally valid and sacred (...) one sacredness cannot and must not contradict another, just as one truth cannot completely exclude the other"[43].

Florensky must be considered a bold pioneer in the attempt to bring together ancient philosophy and modern science. With gentle obstinacy, and amid a life filled with family, social, and religious obligations, which he carried out with unstinting self-abnegation, Florensky devoted himself to thought and died for his ideas.

Florensky is of interest to me for several reasons. Perhaps due to his voracious reading in philosophy and science, he came up with views that are strikingly reminiscent of those we have seen in Boethius[44]: God can see all moments of time at once,[45] and this is what His eternity consists in. Yet under certain circumstances, it may be possible for human beings to approximate this vision, even in this life. In

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[42] Edwin Hubble's major publications, confirming that distant nebulae were receding from the earth at a speed proportional to their distance, began to appear in 1929. Einstein, who had previously believed in a static universe, acknowledged in 1931 that Hubble had proved the universe was expanding. Cf. Gleiser 1997, 271ff.

[43] "On a presupposition of the conception of the world", in Florensky, *Simbolo*, p. 14. Yet Florensky can also argue for the superiority of religion over science: cf. "Macrocosmos and microcosmos", in Florensky 2007, 212.

[44] Chase 2014.

[45] Florensky 1974, 245; 389.

mystical experience, for instance, one may reach the point of perceiving time and its subdivision into past, present and future "from on high"[46], and here again one is reminded of Boethius' insistence that God sees all things from a kind of lofty citadel or watchtower. More specifically, when human beings entrust themselves with humility to God and love one another after the example of the three Persons of the Trinity, they can leave behind the confines of spacetime and taste Eternity. By participating in the eternal act of the Trinity, the mystic thus rises above time, and perceives all of time, past, present, and future, as a unique Now.[47]

In addition to his exemplary and courageous life, Florensky's project of bringing together science and the humanities is, I believe, one that is even more urgent now than it was in his day. We can agree with the judgment by Natalino Valentini: "Florensky may be considered the pioneer of a new orientation of thought, capable of inaugurating novel relations between culture and scientific research, and of anticipating some of the main revolutions in contemporary scientific thought"[48].

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[46] Florensky, "Dogmatism and Dogmatics", Italian translation in Florensky 1999, 163.

[47] Zák 2001, citing Florensky 1974, 54; 244-255.

[48] In Florensky 2007, p. xxxi.

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