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Theology and Science in Copernicus' Universe

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Abstract. The publication of Copernicus' *On the Revolutions of the Heavenly Spheres* (since now on referred to as *Revolutions*) marked the beginning of the Scientific Revolution. Christian doctrine played a key role for the emergence of the scientific turning point, that brought about the transition from a qualitative to a quantitative approach to natural phenomena. Although the Polish scientist was not a philosopher in the ordinary sense of the term, he shared with many other protagonists of modern science the idea of the universe as mathematical harmony created by God. In this sense, modern scientific thought completed the development that took place since the Scholastic Age. In the historical period between the XII and the XVII century, indeed, Christianity proved a fundamental factor for a considerable growth in natural knowledge.

Keywords: Copernicus; science and faith; Christian cosmology; mathematical universe; Scientific Revolution.

Introduction

Denying the innovative dimension of Copernicus' work would be nonsensical. However, as the beginner of the Scientific Revolution, he adopted both original and traditional elements in his own vision, in which the

mathematization of the world fitted with teleological assumptions. In the *Revolutions*, the dedication to Pope Paul III and the first book stand for a general introduction to the whole volume. The contents of that initial section clearly show the methodological and philosophical principles forming part of the Copernican Theory.

The great novelty of the Earth orbiting around the Sun, led Copernicus to hesitate before the edition of his work. During the early phases of his astronomical investigation, he wrote the *Commentariolus*, that was a brief outline of his theory, that began circulating in manuscript. In 1540 the *Narratio Prima*, a kind of summary of the new heavenly system, was issued by George Joachim Rheticus, Copernicus' disciple and collaborator. Rheticus started supervising the publication of the *Revolution*s, but that project was finally carried out by Andreas Osiander, a Lutheran Minister, who provided the edition with an anonymous preface, whose contents are discussed in this paper. Having suffered from a stroke in December 1542, Copernicus could not witness the events about the printing of his book. He passed away on May 24, 1543, and the tradition, according to which he saw a copy of the *Revolutions* before his death, is probably a legend.

1. Mathematical realism

A distinctive feature strongly emerged, not only from the opening pages of the *Revolutions*, as it characterized the entire work: the mathematical peculiarity of astronomy. "Mathematics is written for mathematicians" (Copernicus 1952, 509); as a result, only expert mathematicians could express opinions about astronomical questions. The community of scientists had experienced a significant evolution of mathematical astronomy in the historical phase preceding the Scientific Revolution, but another detail should be added to explain the real meaning of Copernicus' words. His view on the mathematical arrangement of the cosmos relied on a realist conception of science. In his unsigned preface, Osiander, plausibly to avoid any possible contradiction with the immediate perception of phenomena, and with the literal interpretation of some biblical passages, declared that Copernicus'

theory should be accepted only as a new way to save the appearances, without the necessity to consider it true.

> For it is the job of the astronomer to use painstaking and skilled observations in gathering together the history of the celestial movements, and then – since he cannot by any line of reasoning reach the true causes of these movements – to think up or construct whatever causes or hypotheses he pleases such that, by the assumption of these causes, those same movements can be calculated from the principles of geometry for the past and for the future too. This artist is markedly outstanding in both of these respects: for it is not necessary that these hypotheses should be true, or even probably; but it is enough if they provide a calculus which fits the observations [...] For it is sufficiently clear that this art is absolutely and profoundly ignorant of the causes of the apparent irregular movements. And if it constructs and thinks up causes – and it has certainly thought up a good many – nevertheless it does not think them up in order to persuade anyone of their truth but only in order that they may provide a correct basis for calculation. (Copernicus 1952, 505–506)

In his outlook, Osiander took inspiration from Ptolemy's *Almagest*, in which computational astronomy had to find useful devices to achieve empirical accuracy. So, while the goal of philosophical cosmology mainly consisted in developing rational explanations for heavenly movements, Ptolemaic astronomy "was a mere geometrical representation of celestial motions, and did not profess to give a correct picture of the actual system of the world". (Dreyer 1953, 202)

> But it is proper to try and fit as far as possible the simpler hypotheses to the movements in the heavens; and if this does not succeed, then any hypotheses possible. Once all the appearances are saved by the consequences of the hypotheses, why should it seem strange that such complications can come about in the movements of heavenly things? (Ptolemy 1952, 429)

A detailed account of the Ptolemaic philosophy of nature would go much beyond the scope of this essay, as the astronomer from Alexandria was also the author of the *Planetary Hypotheses*, in which calculations were supported

by a complicated combination of celestial spheres. Anyway, the Copernican program totally differed from the contents of Osiander's foreword, and just that sharp difference convinced the readers of Copernicus' treatise that someone else had added that preface to the original manuscript. More in detail, putting the sun in the center of the heavenly orbs meant the existence of a more rational and harmonic universe, in which mathematical description and physical reality exactly coincided.

> The absurder my teaching about the movement of the Earth now seems to very many persons, the more wonder and thanksgiving will it be the object of, when after the publication of my commentaries those same persons see the fog of absurdity dissipated by my luminous demonstrations. Accordingly I was led by such persuasion and by that hope finally to permit my friends to undertake the publication of a work which they had long sought from me. (Copernicus 1952, 507)

Mathematical realism and precision not only entailed that the new astronomical system was more harmonic than the former one, as they also required its unalterable structure. In other words, the physical reality of geometry implied the impossibility to introduce any mathematical solution, aimed only at guaranteeing a better correspondence between theory and observations.

> And so, having laid down the movements which I attribute to the Earth farther on in the work, I finally discovered by the help of long and numerous observations that if the movements of the other wandering stars are correlated with the circular movement of the Earth, and if the movements are computed in accordance with the revolution of each planet, not only do all their phenomena follow from that but also this correlation binds together so closely the order and magnitudes of all the planets and of their spheres or orbital circles and the heavens themselves that nothing can be shifted around in any part of them without disrupting the remaining parts and the universe as a whole. (Copernicus 1952, 508).

To put it more simply, saving phenomena could not be limited to the construction of a theory in accordance with empirical reality, and a coherent cosmology remained the only way to justify appearances.

> But afterwards in the remaining books I correlate all the movements of the other planets and their spheres or orbital circles with the mobility of the Earth, so that it can be gathered from that how far the apparent movements of the remaining planets and their orbital circles can be saved by being correlated with the movements of the Earth. (Copernicus 1952, 508)

The Copernican Theory constituted an essential basis of the definitive achievement of a mathematical universe. However, another point worth noting is that the Polish astronomer did not entirely abandon the idea of a teleological world, as he replaced the Aristotelian physical finalism with another kind of finalism, the latter being linked with the geometrical structure of celestial bodies. Therefore, while in Aristotle's mind heavenly orbs rotated as a consequence of their being made of the ether as a divine and perfect matter, according to Copernicus their circular motions were due to their spherical shape.

> After this we will recall that the movement of the celestial bodies is circular. For the motion of a sphere is to turn in a circle; by this very act expressing its form, in the most simple body, where beginning and end cannot be discovered or distinguished from one another, while it moves through the same parts in itself. (Copernicus 1952, 513)

In this case, Copernicus adopted the Aristotelian terminology to highlight that the act, as a realization of the form (ἐντελέχεια), entirely depends on the geometrical structure of bodies, and that idea just represented the decisive step rendering him the beginner of the Scientific Revolution as a process of mathematization of all nature. On this new concept of teleological universe, he grounded the abandonment of the Aristotelian distinction between heavenly and sublunary worlds, that had characterized ancient and Medieval natural philosophy. The Earth is spherical, and it naturally rotates around its axis.

> Now that it has been shown that the Earth too has the form of a globe, I think we must see whether or not a movement follows upon its form and what the place of the Earth is in the universe. For without doing that it will not be possible to

> find a sure reason for the movements appearing in the heavens. (Copernicus 1952, 514)

The harmony of the Copernican model was directly connected with the strict geometrical arrangement of the universe, that excluded the recourse to unreal mathematical devices. So the scientific reductionism of the new planetary system lied in the absoluteness of its own mathematical order.

> I find it much more easy to grant that than to unhinge the understanding by an almost infinite multitude of spheres – as those who keep the earth at the centre of the world are forced to do. But we should rather follow the wisdom of nature, which, as it takes very great care not to have produced anything superfluous or useless, often prefers to endow one thing with many effects. (Copernicus 1952, 526)

Similarly to other planets, the earthly sphere gravitated around the Sun, as the geometrical finalism ('affect') stood for the commonality of universal movements. That was a clear instance of the mathematical reductionism characterizing the Scientific Revolution, and justifying the demotion of the Earth from the central position in the new geometrically arranged universe.

> It is believable that this affect is present in the sun, moon, and the other bright planets and that through its efficacy they remain in the spherical figure in which they are visible, though they nevertheless accomplish their circular movements in many different ways. (Copernicus 1952, 521)

Even the regularity of celestial motions can be attributed to the spherical shape of heavenly bodies, as an unmodifiable natural feature. "Now circular movement always goes on regularly, for it has an unfailing cause". (Copernicus 1952, 520)

The impossibility of the terrestrial motion was firmly established by Ptolemy in the *Almagest*. In his opinion, ascribing an orbital movement to our planet meant the abandonment of the above-below distinction with respect to the Earth's centrality. Broadly speaking, it entailed the unreasonable

acceptance of unobserved physical consequences on all bodies sharing the terrestrial rotation.

> By the same arguments as the preceding it can be shown that the earth can neither move in any one of the aforesaid oblique directions, nor ever change at all from its place at the centre. For the same things would result as if it had another position than at the centre. And so it also seems to me superfluous to look for the causes of the motion to the centre when it is once for all clear from the very appearances that the earth is in the middle of the world and all weights move towards it [...] And if it had some one common movement, the same as that of the other weights, it would clearly leave them all behind because of its much greater magnitude. And the animals and other weights would be left hanging in the air, and the earth would very quickly fall out of the heavens. Merely to conceive such things makes them appear ridiculous. (Ptolemy 1952, 10–11)

Copernicus' geometrical finalism promoted the refutation of the division between natural and violent motions of the Earth, and the natural dimension of the terrestrial movement. The following considerations highlight the reasons why the terrestrial motion would not imply any observable consequence.

> But if someone opines that the Earth revolves, he will also say that the movement is natural and not violent. Now things which are according to nature produce effects contrary to those which are violent. For things to which force or violence is applied get broken up and are unable to subsist for a long time. But things which are caused by nature are in a right condition and are kept in their best organization. Therefore Ptolemy had no reason to fear that the Earth and all things on the Earth would be scattered in a revolution caused by the efficacy of nature, which is greatly different from that of art or from that which can result from the genius of man. (Copernicus 1952, 518)

Thus, he maintained the traditional view of a finite and ordered universe, but he advanced an innovative idea of order, exclusively based on mathematical ratios.

> Why therefore should we hesitate any longer to grant to it the movement which accords naturally with its form, rather than put the whole world in a commotion-the world whose limits we do not and cannot know? And why not admit that the appearance of daily revolution belongs to the heavens but the ‘reality belongs to the Earth? (Copernicus 1952, 519)

God and the universe

The mathematical structure of Copernicus’ world, determined by his conception of geometrical finalism, resulted from the divine will. The spherical shape of the universe was the best possible form for the created reality, and it was specifically related to God’s revealing action. Understanding the real nature of the mathematical order meant trusting the truth of the world as a divine gift, and God’s providential dominion over everything. That basic principle cannot be taken as an unessential detail completing the new cosmos, as it should be deemed an all-encompassing view grounded upon the biblical message.

> Accordingly, when I had meditated upon this lack of certitude in the traditional mathematics concerning the composition of movements of the spheres of the world, I began to be annoyed that the philosophers, who in other respects had made a very careful scrutiny of the least details of the world, had discovered no sure scheme for the movements of the machinery of the world, which has been built for us by the Best and Most Orderly Workman of all. (Copernicus 1952, 508)

In Copernican terms, astronomy was a kind of discipline par excellence, whose mathematical realism allowed researchers to grasp the beauty of the world as an irrefutable evidence for the human understanding. In *Wisdom* 13,5, the analogy of simple proportion permits human beings to see in creatures a similarity with the absolute perfection belonging to the Divine Person. That is why, in the words of Copernicus, the contemplation of the geometrical order established by the Supreme *Logos*, though it required a high level of mathematical knowledge, reinforced the concept of creation as the first step of revelation.

> And since a property of all good arts is to draw the mind of man away from the vices and direct it to better things, these arts can do that more plentifully, over and above the unbelievable pleasure of mind [which they furnish]. For who, after applying himself to things which he sees established in the best order and directed by divine ruling, would not through diligent contemplation of them and through a certain habituation be awakened to that which is best and would not wonder at the Artificer of all things, in Whom is all happiness and every good? (Copernicus 1952, 510)

"How exceedingly fine is the godlike work of the Best and greatest Artist". (Copernicus 1952, 529)

Thus, even in the *Revolutions* one can find the Biblical inspired principle of analogy, whose profound meaning exerted a direct influence on the most outstanding authors of the Scientific Revolution. In the following excerpt, Copernicus referred to *Psalms* 19 and 104, to exalt the mathematical order revealing the divine love for humans, that are made able to contemplate the greatness of His design.

> For the divine Psalmist surely did not say gratuitously that he took pleasure in the workings of God and rejoiced in the works of His hands, unless by means of these things as by some sort of vehicle we are transported to the contemplation of the highest Good. (Copernicus 1952, 510)

Copernicus predicted the problems his own theory was going to face. The revolutionary impact of his system induced him to anticipate the criticisms coming from intellectuals, who intended to keep the immobility of the Earth and the literal interpretation of some biblical passages. The mathematical specificity of astronomy rejected any opinion given by incompetent mathematicians, and the Polish scientist implicitly affirmed the need to adopt the principle of accommodation for a true interpretation of sacred texts concerning natural phenomena.

> But if perchance there are certain "idle talkers" who take it upon themselves to pronounce judgment, although wholly ignorant of mathematics, and if by shamelessly distorting the sense of some passage in Holy Writ to suit their

> purpose, they dare to reprehend and to attack my work; they worry me so little that I shall even scorn their judgments as foolhardy. (Copernicus 1952, 509)

A similar declaration can be read in the second book of this work, where Copernicus stated that even specialist astronomers often speak about the motion of the Sun and stars, just to accommodate their expressions to common language and understanding.

> But no one should be surprised if we still speak of the rising and setting of the sun and stars, et cetera; but he should realize that we are speaking in the usual manner of speech which can be recognized by all and that we are nevertheless always keeping in mind that: "To us who are being carried by the Earth, the sun and the moon seem to pass over; and the stars return to their former positions and again move away". (Copernicus 1952, 557)

The *Revolution*s, of course, was not an exception; showing the empirical evidence of terrestrial sphericity, Copernicus wrote: "many stars situated to the north are seen not to set, and many to the south are seen not to rise any more". (Copernicus 1952, 511)

The shift from the absolute centrality of the Earth to a multi-centered spatial representation brought about a paradoxical compromise, as Copernicus still believed in Aristotelian physics when coping with terrestrial natural events. The expression 'certain natural appetency', indeed, reflected the biomorphic and Greek inspired universe, whose 'affect' also involved the heavenly realm. On the contrary, the priority given to geometrical shape left an unbridgeable gap between Copernican and Aristotelian views. In any case, not only geometrical features of bodies, but also physical ones, such as gravity, openly showed the plan devised by the divine grace.

> Therefore, since there are many centres, it is not foolhardy to doubt whether the centre of gravity of the Earth rather than some other is the centre of the world. I myself think that gravity or heaviness is nothing except a certain natural appetency implanted in the parts by the divine providence of the universal Artisan, in order that they should unite with one another in their oneness and wholeness and come together in the form of a globe. It is believable that this

> affect is present in the sun, moon, and the other bright planets and that through its efficacy they remain in the spherical figure in which they are visible, though they nevertheless accomplish their circular movements in many different ways. (Copernicus 1952, 521)

As a devout Catholic, Copernicus understood that his own theory represented an essential tool for solving the question of the reformation of the calendar. It is well known that complaints over calendar were very common, and unsatisfactory solutions had been proposed by eminent Medieval and Renaissance scholars, as none of those proposals succeeded in settling that intriguing debate. To tell the truth, despite the relevant contribution offered by his astronomical system, "it appears by now ascertained that Copernicus' role in this question was quite limited" (Proverbio 1983, 129).

> Mathematics is written for mathematicians; and among them, if I am not mistaken, my labours will be seen to contribute something to the ecclesiastical commonwealth, the principate of which Your Holiness now holds. For not many years ago under Leo X when the Lateran Council was considering the question of reforming the Ecclesiastical Calendar, no decision was reached, for the sole reason that the magnitude of the year and the months and the movements of the sun and moon had not yet been measured with sufficient accuracy. From that time on I gave attention to making more exact observations of these things. (Copernicus 1952, 509)

Another very meaningful argument on the theological dimension of Copernican astronomy can be illustrated. On the one side, the Copernican universe was not regulated by real mechanistic principles, notwithstanding the originality of the geometrical finalism as the reason of celestial motions. On the other side, having declared the crucial role performed by geometrical structure, he affirmed the existence of an independent nature, regulated by laws established by the Creator since the beginning of everything. That idea implicitly denied pantheistic and animistic views, in which the mover keeps in contact with the moved object. It would be enough to recall that in Medieval natural philosophy, the refusal of the action performed by

celestial intelligences as movers of heavenly bodies, by the Scholastic philosopher John Buridan, resulted in the theory of *impetus*, namely the first formulation of the principle of inertia. Despite the centrality of the Sun in a mathematical universe owed something to Neoplatonic cosmologies, the autonomy of natural phenomena and the essential role of the Creator proved the modernity of the Copernican worldview, that paved the way to the future developments of astronomy.

In his well known work, *The Copernican Revolution*, Thomas Kuhn highlighted the Neoplatonic cosmological view as the true origin of Copernicus' heliocentric system. As a sort of Platonism including Stoic, Aristotelian and Pythagorean principles, Neoplatonism formed an essential part of the philosophical discussion during the Renaissance period, that is the historical phase preceding the edition of the *Revolutions*. The Neoplatonic view of the world arranged in mathematical forms was based on the establishment of a great chain of being, connecting the One and the many into a necessary emanationistic process, in which the universal soul determined the animation of the world and the participation of every reality in the cosmic order. Despite its pantheist character, Neoplatonic doctrines influenced Christian thought; in the ancient and modern philosophy, indeed, several authors tried to conciliate the generative action performed by Plato's demiurge or Plotinus' One with the biblical Creator. In the modern age, Neoplatonic philosophy was often associated with Hermetism, a term often considered as a synonym of magic and occultism. Neoplatonism and Hermeticism certainly impacted modern natural philosophy, the influence exerted by alchemy on the origin of scientific chemistry being probably the most evident instance of their impact. As regards to astronomy, the leading function of the Sun as the source for universal energy, and the belief in the geometrical natural order represented meaningful factors influencing Copernicus' theory.

> In the center of all rests the sun. For who would place this lamp of a very beautiful temple in another or better place that this wherefrom it can illuminate everything at the same time? As a matter of fact, not unhappily do some call it the lantern; others, the mind and still others, the pilot of the world. Trismegistus calls it

> a "visible god"; Sophocles' Electra, "that which gazes upon all things." And so the sun, as if resting on a kingly throne, governs the family of stars which wheel around. (Copernicus 1952, 526–528)

Anyway, focusing the influence exerted by Neoplatonism does not justify the assertion, according to which that philosophical doctrine stood for the main source of inspiration for Copernicus' model.

> Neoplatonism is explicit in Copernicus' attitude toward both the sun and mathematical simplicity. It is an essential element in the intellectual climate that gave birth to his vision of the universe. But it is often hard to tell whether any given Neoplatonic attitude is posterior or antecedent to the invention of his new astronomy in Copernicus' thought. (Kuhn 1957, 131)

So in Kuhn's view, the distinctive features of Copernican astronomy directly derived from Neoplatonism and its typical way to understand the God-matter relationship.

> The Neoplatonist's God was a self-duplicating procreative principle whose immense potency was demonstrated by the very multiplicity of the forms that emanated from Him. In the material universe this fecund Deity was suitably represented by the sun whose visible and invisible emanations gave light, warmth, and fertility to the universe. (Kuhn 1957, 130)

Copernicus' God, namely the Christian Divine Person, was not an emanating power generating a necessary and eternal universe, as He was the Supreme *Logos* creating out of nothing a mathematical harmony. In the *Revolutions*, the circular movement of orbs did not depend on their animation, as it was strictly linked with their geometrical shape. Similarly to other eminent figures of modern science, Copernicus deemed the creation of a geometrical world as part of the revealing activity of a personal God, aiming at allowing humans to grasp his supreme design. In sum, declaring a certain influence of Neoplatonic cosmology is correct, but considering that same influence to be decisive would be at least problematic.

Conclusions

Looking at Newton's synthesis as the final moment of the Scientific Revolution, it is easy to realize that the Copernican hypothesis on the structure of the world was significantly modified in the historical period following the publication of the *Revolutions*. Celestial spheres, for example, were arguably the most illustrious victims of the subsequent evolution in cosmological views. However, Copernicus was able to establish a sort of cultural heritage. In Kuhnian terms, one would define his thought a paradigm consisting of basic assumptions, such as the adoption of the principle of accommodation, or the idea of the mathematical harmony of the world as part of divine revelation and design. That cultural heritage was preserved by most of the major protagonists of the modern scientific enterprise. Galilei's definition of the universe as a book written in mathematical language proved a successful instance of the Copernican program. In the mind of the father of modern science, the universe, as a creation of the Supreme Word (*Logos*), was a readable reality, that he explained through the metaphor of the book of nature.

> Philosophy is written in this great book which is continuously open before our eyes – I mean the universe – but before we can understand it we need to learn the language and recognize the characters in which it is written. It is written in the language of mathematics, and its characters are triangles, circles, and other geometrical figures, without which it is humanly impossible to understand a word of what it says. Without these, it is just wandering aimlessly in a baffling maze. (Galilei 2012, 115)

Then, in his *Dialogue on the Two Chief Systems*, Galilei distinguished the extensive understanding, that is proper of God, from the intensive knowledge belonging to man. He stated the divine nature of mathematical understanding, because the human intensive learning, despite its inferiority to God's as regards to its dimension and velocity, can be considered to be absolute as the divine one (Galilei 2012, 228–230). Galilei's vision confirmed some basic tenets of the Copernican view, namely the perfection of the mathematical

knowledge, as the result of God's revelation, and its being a fundamental premise of natural research.

Kepler's Copernicanism can be found in his mystical fervor leading him to embrace the Heliocentric model as a proof of the beauty of the universe, patterned on perfect geometrical forms by the Divine Wisdom. Such a fundamental presupposition rendered him able to discover the three fundamental laws of planetary movements. Even the coincidence between geometry and physical reality, resulting in locating the sun in the focus of elliptical planetary orbits, was an effective way to adhere to Copernicus' program. Galilei was a true Copernican when he wrote that science and faith cannot contradict one another, as God is the Author of both nature and Scripture. However, at the end of the *Letter to the Grand Duchess Christina of Lorraine*, he neglected the principle of accommodation, and declared that the Copernican Theory, if carefully analyzed, could agree with some meaning of the Bible.

> As for other passages of Scripture which appear to contradict the Copernican position, I have no doubt that, if this position were once known to be true and proven, those same theologians who now, believing it to be false, find such passages incapable of being interpreted in a way incompatible with it, would find interpretations for them which would accord with it very well, especially if their understanding of Holy Scripture were combined with some knowledge of astronomy. Just as now, believing the position to be false, they read the Scriptures and find only passages which conflict with it, so if they once entertained a different view of the matter they might well find just as many others which agreed with it. Then they might judge it fitting for the Holy Church to proclaim that God placed the Sun in the centre of the heaven and, by turning it on its axis like a wheel, gave the Moon and the other wandering stars their appointed course. (Galilei 2012, 93)

On the contrary, Kepler's position left no possibility of misunderstanding: Scriptures were written for ordinary people without a deep mathematical learning. Consequently, no scientific meanings can be attached to revealed texts. An accurate reading of the words included in the introduction to the

New Astronomy highlights the Copernican inspiration of Kepler's opinion on the relationship between Bible and astronomy.

> Thus Christ said to Peter, "Lead forth on high," (Lk 5:4) as if the sea were higher than the shores. It does seem so to the eyes, but optics shows the cause of this fallacy. Christ was only making use of the common idiom, which nonetheless arose from this visual deception. Thus, we call the rising and setting of the stars "ascent" and "descent," though at the same time that we say the sun ascends, others say it descends [...] Now the holy scriptures, too, when treating common things (concerning which it is not their purpose to instruct humanity), speak with humans in the human manner, in order to be understood by them. They make use of what is generally acknowledged, in order to weave in other things more lofty and divine. (Kepler 1992, 60)

On the whole, Copernicus' assigning to the Earth a diurnal axial motion and an annual revolution around the Sun was not only a brilliant mathematical idea, or a mere revival of Pythagorean and Platonic philosophies. The failure of all the astronomical solutions adopted by his predecessors was simply a stimulus for the construction of a new astronomic model relying on mathematical reductionism, and closely related to some basic points of Christian doctrine. Being creation out of nothing an integral part of revelation, the realism of the universal mathematical language was an unquestionable starting point for the study of nature, whose sameness is due to God's command.

The idea of the science-faith unresolvable conflict is still supported by contemporary naturalists. However, the Scientific Revolution occurred in a Christian background, as its protagonists "believed in a saving Birth that once took place in a manger". (Jaki 2000, 54) Science, as a quantitative description of nature, rejects any kind of pantheism, and presupposes a realistic metaphysical conception, according to which the existence of universal natural laws allows the reduction of phenomena into mathematical equations. (Giostra 2019, 60) Copernicus' astronomical research represents a substantial contribution to the validity of that worldview.

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