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Article

The Relationships between Scientific and Theological Discourses at the Crossroads between Medieval and Early Modern Times and the Historiography of Science: A Case Study from Fourteenth-Century Byzantium

Alberto Bardi¹ [<https://orcid.org/0000.0002-9440-2849>]

Abstract:

The history of the science of the stars (astronomy and astrology) in fourteenth-century Byzantium is significantly intertwined with the implications of theological and philosophical controversies. A less-explored astronomical text authored by the fourteenth-century Byzantine scholar Theorodos Meliteniotes (ca. 1320–1393 CE) provides new historical factors toward a historiography of the differences between scientific and theological discourses, their development in the transition to early modern times, and the different historical developments of science in the worlds of the Eastern and Western Churches.

Keywords: History of science; Historiography of science: Science and theology; Science and philosophy; Meliteniotes; History of astronomy; Astrology; Fourteenth-century Byzantium; Eastern and Western discourses on science; Transition from medieval to early modern times

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Introduction

The identification of the precise point of transition from modes of reasoning characteristically medieval to those characteristic of early modernity has long preoccupied historians of science who study the so-called Western world. The renowned Amos Funkenstein convincingly argued that science and theology blended in a wholly novel fashion into a single intellectual discourse, in which—in his own words—“theological concerns were expressed in terms of secular knowledge, and scientific concerns were expressed in theological terms” (Funkenstein 1986, 346). In the history of science in the world characterized by Christian Orthodoxy, the relationships between scientific and theological discourses during the shift between medieval and early modern times developed in a different fashion, and, to a large extent, they have yet to be comprehensively studied.

¹ Alberto Bardi is an Assistant Professor in the Department of the History of Science at Tsinghua University. Address: Department of History of Science, School of Humanities, Tsinghua University, Haidian District, Beijing 100084, China. E-mail: alberto.bardi@live.com

This paper examines a less-explored nexus between science and the theological controversies in the fourteenth-century Eastern Roman Empire. In so doing, it sheds new light on historical factors that might explain the journey that the science of the stars² and natural philosophy underwent in Orthodox Christianity in the late Eastern Roman Empire.³

Knowledge of the heavens and the motions of the celestial bodies was commonly understood as a path leading to the contemplation of God. Theological and philosophical conceptions are, therefore, essential in understanding how scholars conceived of the science of the stars in fourteenth-century Byzantium. This attitude was embedded in their world and constituted their *forma mentis* and their *Weltanschauung*: they were men of faith. This historical fact is worthy of attention at this point because it has two consequences for how the present paper has been conceived. First, this study is not intended as a contribution to the debates on “science and religion” because this field, in the author’s opinion, is better applied (if applicable) to more recent times: I consider it important not to apply recent categories to the distant past, and the historical circumstances this study examines do not permit the label of “science and religion,” because fourteenth-century scholars were not aware of the category “religion,” let alone that they could conceive it as a category which might be opposed to science. Also, their conception of science was far from what would come to be called “science” by Galileo Galilei or Francis Bacon. Second, this paper deals with the historical circumstances in which debates on theological issues occurred; it does not aim to provide a confessional reading of history.

Historiography on the different historical developments of science in the worlds of the Eastern and Western Churches has detected in the historical evolution of conceptions of sin and deification the key factors influencing the developments of science in Eastern and Western Christianity (Harrison 2016; Nicolaidis et al. 2016;). As Peter Harrison points out, the Western side, much more than the East, inherited an Augustinian approach toward the Incarnation of Christ, understood as a means of paying dues to God in reparation for original and actual sin. As such, participating in both spiritual and material deeds in the “fall-redemption” process is indeed effective, and sciences, from this perspective, can contribute to the union with God and the salvation of the soul (Harrison 2015; Harrison 2016). An emphasis on deification in the Eastern Church saw the Incarnation of Christ as a means of contemplating God and becoming godlike, mainly by renouncing what pertains to the corruptible things of the world. On this account, the role of science became problematic:

the intermediation of science between believers and creation, so evident in Western Christianity at least since the late Middle Ages, was a controversial matter in the East. Down through the ages, the stress placed on divine grace as the key notion in the Orthodox doctrine of salvation led to an emphasis on *theosis*—deification. The theological concept of deification was identified with an ascetic ideal that emphasized a kind of dismissal of the physical world, associated with an undervaluation of discursive and demonstrative reason. Thanks to this dominant spirituality—and up until the ascendance of modernity in the nineteenth century—science and secular knowledge were not conceived by mainstream Orthodoxy as an indispensable intermediary stage in the process of human union with God. (Nicolaidis et al. 2016, 566)

Although monasticism is present in both Western and Eastern Churches, spiritual life and asceticism assumed a prominent role in salvation in the East but not in the West, thereby

² I have chosen to use the term “science of the stars” to refer to both astronomy and astrology at the same time. This choice has been inspired by a valuable publication on the history of astrology (Rutkin 2019).

³ The connection between theological controversies and the sciences in late Byzantium was noticed by Sinkewicz (1986).

generating the simplistic conception that sciences and natural philosophy are less important, if not useless. The epistemological conception of the salvation of the soul in the Eastern Church is a consequence of—among other things—its more exclusive reliance on the Church Fathers than is the case with the Western Church, which was, in addition, decisively shaped through Saint Augustine’s “juristic attitude” toward sin and salvation, and through the Aristotelianism of Saint Thomas Aquinas (Thomism). However, there are several factors at the root of the schism between Eastern and Western Christianity (Williams 1999; Bradshaw 2004;). The factors mentioned above, detected by Nicolaidis and his team and other contributors, help to clarify the different approaches that the two worlds of Christendom took on the sciences, but, as Harrison observes, “There are, of course, numerous factors beyond these theological considerations that account for the varying fortunes of science in the different contexts of Eastern and Western Christianity” (Harrison 2016, 591).

I shall highlight additional factors by examining a less-explored astronomical text authored by the fourteenth-century Byzantine scholar Theorodus Meliteniotes (ca. 1320–1393 CE) and its link with the history of the science of the stars in fourteenth-century Byzantium as well as the implications of the developments of the Trinitarian conception of God, better known as the *filioque* question, as attested to in the Hesychast controversy and the controversy between Gregory Palamas and Barlaam of Calabria. The *filioque* question also referred to as the “great schism,” can be traced back to at least 1054 and remains a renowned point of controversy between the two Churches even to this day. Yet, so far, it has been treated as either a political or a theological matter (Runciman 2007). The formal point of contention between the two worlds was a single yet extremely weighty word (full of substantial theological and political consequences) of the Nicene Creed, *filioque*, meaning “and from the Son.” According to the Byzantine Orthodox authorities of the Church of Constantinople, it was dishonestly added by the Latins and was not part of the original version of the creed; hence, it did not correspond to a true formal expression of the Christian faith. An extensive scholarly literature has been produced on this subject, but its impact on the history of science is less charted territory (Nicolaidis 2011, 93–105). Such intricate links between the science of the stars and theological controversies are stunningly revealed in a fourteenth-century Byzantine astronomical text, which proves to be a key source for comprehending the differences in how the science of the stars developed in Byzantine Orthodox Christianity as compared to Western Christianity before the attacks on astrology by Giovanni Pico della Mirandola, the Lutheran reform, and the Copernican novelties.

The conclusions proposed in this work have a speculative nature. These limits notwithstanding, this paper provides a plausible and original interpretation, which could lead to an important historiographical revision.

The Science of the Stars in Fourteenth-Century Byzantium: A Brief Overview

Byzantine historiography unanimously agrees that the revival of mathematical astronomy in the Eastern Roman Empire occurred in the fourteenth century. This is a complex century for the science of the stars, and the present section cannot do justice to all facets of this complexity (Nicolaidis 2011, 69–118; Caudano 2020). The most obvious attempts to study Ptolemy’s works were the efforts of the Byzantine polymath Theodorus Metochites at the end of the thirteenth century, right after the restoration of the capital of the Empire in Constantinople (1261). This coincides with the beginning of a period of moderate prosperity and intellectual flourishing after the great losses of the Fourth Crusade (1204) (Bydén 2003). At the same time, there was a turn to non-Greek sources in the astronomical field in an attempt to correct Ptolemy’s inadequacies and acquire up-to-date materials, as is attested by

the travels of Gregory Chioniades to Tabriz and his translation of Persian astronomical works into Greek (Pingree 1964; Mavroudi 2023).

Moreover, as in every medieval culture, astrology was embedded in the realm of the science of the stars, but in the Eastern Roman Empire, its nature and legitimacy became dramatically problematic in the fourteenth century. It is, therefore, appropriate to describe the science of the stars in fourteenth-century Byzantium as characterized by two major, interrelated factors: (1) a tension between the boundaries of mathematical astronomy and astrological practice; and (2) a questioning of the reliability of non-Hellenic sources (i.e., non-Greek sources that did not directly stem from Ptolemy's works).

The question of whether astrology was a legitimate practice profoundly shaped the Byzantine fourteenth century. The practice of astrology was present, in fact, in the whole of Byzantine history, as in many cultures, and it has been explored in both intellectual history and philology (Magdalino and Mavroudi 2006; Magdalino 2006). Byzantine scholars active in astronomy held a shared belief in the utility of astronomy to attain the contemplation of God via the inspection of the heavens, but a division was to be found on the question of which properties of the celestial bodies should be taken into account when undertaking this task. This choice decisively influenced the future developments of the science of the stars in Byzantium from the second half of the fourteenth century. It was a time that coincided with a massive crisis in both foreign policy and internal social cohesion—the Empire was a pale shadow of its former glory. Nevertheless, learned men continued to practice astronomy and astrology extensively, and most of them were aware that the study of the heavens was problematic in the fourteenth century (Caudano 2020). The solution was likely to be found in correcting or reforming Ptolemy in a way that was tantamount to establishing a new model—an intellectual challenge which, as the Latin World was about to appreciate a few years later, would provoke debate and have major repercussions in politics, economics, and society at large.

Why did this process of mutual exclusivity between astronomy and astrology occur in the Church of Constantinople? As opposed to the Eastern Church, the Latin Church never rejected astrology *in toto*, and there were notable discussions of it by Roger Bacon, Saint Albertus Magnus, and Saint Thomas Aquinas (Rutkin 2019, 173–269) and it was a subject of academic teaching even after the vivid criticism of Giovanni Pico della Mirandola in his renowned *Disputationes adversus astrologiam divinatricem* (Disputations against Divinatory Astrology, 1496) (Rutkin 2002; Vanden Broecke 2003). History shows that, from the beginning to the middle of the fourteenth century, the legitimacy of astrology suffered as a result of a hardening of the Orthodox authorities' attitudes toward astrological practice. While astrological practice was undertaken throughout the Byzantine millennium, the official position of the Byzantine Orthodoxy was to reject it *in toto* after the Council of Constantinople of 1351. The preamble to the astronomical work entitled *Three Books on Astronomy*, authored by the Byzantine churchman Theodorus Meliteniotes in about 1352, testifies to this rejection (Tihon 2008; Bardi 2020). Meliteniotes was not the first Byzantine scholar to have suspicions about or to condemn astrology in late Byzantium (the Palaiologan period), but he was the only figure who banned this activity in all its aspects (Tihon 2006). But there were also discordant voices: the *Hermippus* dialogue (Kroll and Viereck 1895), a Christian defense of astrology written from a Neoplatonic perspective, originates from the same time as Meliteniotes. The Byzantinist Paul Magdalino argues that the opposition between Churchmen and astrologers is due to the fact that both groups assumed the role of mediators between heaven and earth, thus creating an irreconcilable conflict for the Eastern Orthodoxy (Magdalino 2006, 154–157). I will explore this further below.

The discussion about astrology was part of a more general debate concerning the relationship between secular knowledge and religious knowledge (Nicolaidis 2011, 93–105). The author of the official rejection of astrology, Theodorus Meliteniotes, was a member of the Palamite party and a hesychast. On this account, the reasons behind this process of

mutual exclusivity between astronomy and astrology are to be found in the facts of two other crucial events of fourteenth-century Byzantium: namely, the Hesychast controversy and the discussion about the *filioque* between Gregory Palamas and Barlaam of Calabria.

As for the search for a solution to Ptolemy's errors, which some scholars attempted by importing non-Hellenic astronomical sources and translating them into Greek, this translation activity also became part of more general debates on the worthiness of sciences in fourteenth-century Constantinople. Given the problems related to the status of the science of the stars and science in general in the Hesychast controversy, all of this made questions about the validity of non-Hellenic sources highly relevant (Nicolaidis 2011, 106–117).

As the above aptly shows, then, the intricacies related to the science of the stars in the Byzantine fourteenth century deserve much more attention than they have been granted to date. They will be considered more extensively in what follows.

The Controversy between Barlaam of Calabria and Gregory Palamas over the *Filioque*, the Hesychast Controversy, and the Science of the Stars

Barlaam of Calabria (ca. 1290–1348), a Greek monk from Southern Italy, is the key figure through which to interpret the consequences for the science of the stars of the decisions Byzantine Orthodox authorities took at the 1351 Council of Constantinople on the question of the *filioque* (Demetracopoulos 2011). The convention sanctioned the theological doctrine of the Byzantine scholar Gregory Palamas (1296–1359) on divine substance and energies as official for the Orthodox Church, thus widening irredeemably the divide between the Eastern and Western Churches (Kapriev 2011; Rigo 2004b). This solution to a theological controversy coincided with a socio-historical turning point that involved a well-known political dispute within Byzantine society, culminating in the hegemony of the hesychasts in formal Byzantine culture. It is worth keeping in mind here that hesychasts were usually anti-Latin.⁴

In the first half of the fourteenth century, the hesychasts, a group of monks from Mount Athos, became very influential in the Byzantine political sphere. One of their distinctive claims was that their practice of prayer and ascetic struggle allowed them to see God with their own eyes in the form of light (uncreated light). Around 1337, this particular claim was ridiculed as insane by Barlaam, who was lecturing on philosophy in Constantinople at the time. Barlaam's opprobrium was a reaction to previous attacks made against him. Some exponents of Orthodoxy had accused him of adopting non-Orthodox philosophical arguments in his theological works. One such exponent, Gregory Palamas, had criticized Barlaam before 1337 for discussing the problem of inserting the *filioque* into the Nicene Creed in unacceptable terms. On the basis of Aristotelian demonstrative philosophy, Barlaam had claimed that, given that God was unknowable and non-demonstrable to humans, it would not be possible to demonstrate the procession of the Holy Spirit. This meant that the Latin views on the *filioque* were indefensible and the Orthodox view was proven right (Sinkewicz 1982a).

Notwithstanding the use of Aristotelian philosophy on the *filioque* and the subsequent attack on the hesychasts, Barlaam had not contradicted Orthodox positions. But these interrelated issues touched on an extremely sensitive point of Orthodoxy: for Palamas, the question about the possibility of demonstrating the procession of the Holy Spirit also raised the question of whether God is the subject of certain knowledge, and denying that

⁴ Hesychast stems from the Greek word *hesychia*, i.e. quietness, peace of mind, silence, tranquility. The hesychast controversy in late Byzantium is still debated among scholars, and its complexity cannot be treated here in full. In-depth studies include, among others, Meyendorff (1974a); Rigo (1989); Russell (2019); Pino (2022).

demonstrability was equivalent to claiming that God is not the subject of certain knowledge (Sinkewicz 1982b). Therefore, Gregory Palamas responded to Barlaam by developing a doctrine explaining, in philosophical terms, how the transcendent God could be visible to human eyes (Meyendorff 1964; 1974b; Rigo 2004a). His arguments are based on two notions stemming from the Greek philosophical vocabulary, namely *ousia* (substance, essence) and *energeia* (activity, operation): the divine *ousia* is unknowable to any human intellect, but the divine *energeia* (such as the uncreated light the hesychasts claimed to see) can be reached through prayer and ascetic struggle. By reaching the contemplative status of a divine *energeia*, human beings might become godlike. The hesychast monks could have access to *energeia* through the purification of the heart, a goal which might be pursued through prayer, asceticism, and obedience to the divine commandments. The Council of 1351 was the final chapter of a series of synods convened at Constantinople to discuss and evaluate Palamas's doctrine, the defense of the hesychasts, and related theological and political problems. At any rate, the core problem that triggered the subsequent discussion between Barlaam and Palamas lay in the *vexata quaestio* of the *filioque*.

The debates on hesychasm came to coincide with the discussion about whether ascetic practice and prayer are superior to secular scientific knowledge about the contemplation of God, and whether secular knowledge is worth pursuing and, if so, to what extent (Nicolaidis 2011, 93–105). With regard to the science of the stars, traditionally considered a useful tool in striving to reach the contemplation of God, it was a question of identifying which properties of the heavens and the celestial bodies allowed for the attainment of the contemplative state. Astrology was, therefore, radically rejected in favor of mathematical astronomy, and these two parts of the science of the stars were, in the eyes of radical hesychasts, irreconcilable.

The controversy over Barlaam's defense of the Orthodox, anti-Latin position on the *filioque* became an extremely politically sensitive topic for Byzantine Orthodoxy. Indeed, it is on the *filioque* question that the Church of Constantinople based its distinctions and conflicts with the Church of Rome—the controversies surrounding the hesychasts and the theology of Palamas are ultimately a consequence of an overriding drive to be anti-Latin. As a result, first, as claimed by Nicolaidis, “the power of the monks in the church increased proportionally to the decline of the emperor's. Henceforth, any effort at union between the two great churches, even if promising in the short term, was doomed in the medium term to failure” (Nicolaidis 2011, 98). Second, the political success of the hesychasts calcified into an irreversible, negative view as regards the inquiry into the physical properties of the heavens and natural philosophy more broadly.

The Persian Astronomical Tables and the Hesychast Systematization of the Science of the Stars

The problems raised by Barlaam regarding the *filioque* and, by implication, the formation of the asceticism-science antithesis as a radicalization of hesychasm, are reflected in the history of a Byzantine set of astronomical tables with Islamic origins, the so-called *Persian Tables*. This work was widely circulated among scholars in the fourteenth and fifteenth centuries and survived among European astronomers thanks to Byzantine expatriates in Renaissance Europe (Bardi 2018; 2020; 2021).

The status of astronomical knowledge became problematic after the triumph of hesychasm in the Councils of Constantinople in 1341 and 1351, and non-Byzantine sources on astronomy became more problematic than ever. The debate, in essence, centered on two issues: (1) whether it is worth translating Islamic sources (Arabic or Persian) into Greek; and (2) whether their study and use are worthwhile. Thanks to Gregory Chioniades (c. 1240–1320 CE), Byzantine scholars in fourteenth-century Byzantium had at their disposal astronomical

knowledge with Islamic provenance (Pingree 1964; Tihon 1987; Bydén 2003, 241–256; Bardi 2019). Chioniades was known as a translator of works of Islamic astronomy from Persian and Arabic into Greek and this activity attracted significant criticism. Due to his acquaintance with such materials, Chioniades was accused of heresy and had to defend himself through an official act (Westerink 1980). Some fifty years later, the *Persian Tables*, likely brought to Constantinople by Chioniades, had spread among scholars and astrologers. Quite a few authors wrote commentaries on the *Persian Tables*, but the one most deserving of attention is that by Theodorus Meliteniotes, the influential churchman and proponent of hesychasm and the doctrine of Palamas, who was active around the middle of the fourteenth century in Constantinople and was rector of the Patriarchal School, the official educational establishment of Orthodoxy (Harris 2017). Meliteniotes composed the *Three Books of Astronomy* immediately after the Council of 1351 (Leurquin 1990; 1993). This work was very likely conceived as a textbook for the Patriarchal School where Meliteniotes was teaching (Nicolaidis 2011, 117). The first two books deal with Ptolemaic astronomy and the third is devoted to the *Persian Tables*. In accordance with the hesychast hegemony, Meliteniotes wrote preambles to provide a programmatic overview of the science of the stars compliant with the hesychast agenda and Palamite theology, incorporating Islamic astronomical knowledge into the teaching program of the Patriarchal School. In his view, Orthodox science of the stars allows for the investigation of the abstract properties of the celestial bodies by way of mathematics, while the inquiry into physical properties is worthless because the realm of physics (natural philosophy) deals with corruptible things, thus generating false or uncertain knowledge.⁵ Mathematics, on the other hand, provides the highest degree of certitude among the sciences, inferior only to theology. Following Palamas, Meliteniotes's conception of science argues that the intellect gains composite knowledge from studying the abstract properties of celestial bodies, and that this amounts to a partial account of reality. The science of the stars can, therefore, provide a partial knowledge of reality. A complete knowledge of reality can only be a gift of divine grace and may be achieved through prayer, ascetism, and purification of the heart (activities involving not only the intellect, but the whole soul and the body). On this account, although its field of inquiry is the heavenly body, which is part of the creation of God, the science of the stars does not go beyond the realm of nature (Sinkewicz 1986, 339).

As some physical properties of celestial bodies can be wholly or partially connected to human behavior and considered distant causes of actions, this causal reasoning would have led to a deterministic mindset, in which the existence of free will is denied. The key was in reconstructing the chain of causes that leads to an event. As this would have questioned a basic principle of faith, astrology was rejected *in toto* by the hesychast astronomical agenda on the grounds of determinism. On this account, Meliteniotes banned astrology as an illicit activity leading to the abyss of damnation. The next section takes a closer look at Meliteniotes's ban.

Meliteniotes's Ban on Astrology and the Institutionalization of Astronomy According to the Hesychast Agenda

In the first half of the fourteenth century, a prominent group of scholars emerged who deemed secular sciences capable of achieving higher degrees of knowledge than is described in Meliteniotes's statements. Their high estimation of secular knowledge is based on the

⁵ The superiority of mathematics to natural philosophy was a debated issue in Byzantium. On this point, Meliteniotes seems to agree with the positions of another Byzantine scholar of the generation preceding him, Theodorus Metochites (1270–1332). See Bydén (2003, 285–361). But there is no agreement among experts as to whether Metochites considered mathematical objects as the product of abstraction from matter or as preexisting in the mind: see Mariev (2017, 15, n.84).

claim that the causes of things have their place in the divine intelligence and the images of divine causes are in our souls. On these grounds, we can struggle to achieve an infallible knowledge of divine causes, and we can employ secular knowledge in order to destroy ignorance, and, in so doing, become godlike. The teaching of hesychasm, as well as that of Palamas and his followers, was at odds with this epistemology. For instance, in the *Defense of the Hesychast Saints* (1338), Palamas argues that it is a fundamental mistake to claim that one can identify the causes of divine intelligence. It is therefore impossible for science to discover either the causes of divine intelligence or its images in the human soul without the action of the Holy Spirit (Magdalino 2006, 133–162).

In spite of the hesychast view on scientific knowledge, astrology—conceived as the pursuit of divine intelligence through causes—was an extensively cultivated practice that was growing in fourteenth-century Byzantium. This socio-historical circumstance is echoed in Meliteniotes’s ban on astrology:

The task of looking at the changing configurations of the movements of the Sun and the Moon and the other planets in relation to each other and in relation to the Earth, the task of making certain predictions through astronomical knowledge—Ptolemy carefully discusses this in the thirteen books of the *Almagest*—and this takes place through philosophy as a knowledge of how the nature created by God behaves, and how everything in the divine boundaries and laws is completely guided; all of this is definitely great, and, frankly, more than great and very worthy to be studied. On the contrary, to accuse the heavenly bodies of being the cause of events by virtue of the quality of their movements and the peculiarity of their configurations, and to associate with their movements the births and the accidents, and thus to have the opinion that by some knowledge of the future one may be able to get a forecast—that is exactly the vain insanity of astrology, which, as a mathematical science, is implausible, for it combines our events with the motion of stars—; all that is an activity from which one receives nothing rational and that has nothing to do with the truth, it leads to error and the abyss of damnation, it is quite harmful to those who want to lead a pious life (*eusebein*).⁶

The stress on the pious life (*eusebein*) is worthy of attention, for it means living according to the laws of God and, therefore, being at peace with the creator, oneself, and society. It is connected with “piety,” which is respect for God, homeland, parents and relatives, and the entire community. The “pious” Byzantine scholar or the common Byzantine citizen had to respect these laws to live a happy life, receive God’s grace, and be accepted into the community. Going beyond these established boundaries would mean losing both the grace of God and the participation in a well-defined community.

Such a strong attack against astrology was not just motivated by the fact that such activity was cultivated excessively in Byzantine communities, as is often testified by Byzantine sources throughout the history of Byzantine Empire. Emperors and rulers were eager to know about the potential success of their decisions and of their future throughout the entire Byzantine millennium, as was the case in every culture of that time (this was one of the causes that led some scholars to denounce the corruption of Byzantine habits) (Nicol 1979, 100–103; Magdalino and Mavroudi 2006).

The reason for the clash between those *pro* and *contra* astrology around the middle of the fourteenth century is that its epistemological basis involved astrologers who sought to become godlike. This came into conflict with the epistemological view of the salvation of the soul proposed by the hesychasts and the doctrine of Palamas. In other words, there were two competing views on the idea of becoming godlike. As noted by Magdalino, the principles

⁶ My translation; for the original Greek text, see Leurquin (1990, chapter 1: lines 111–134).

of the Orthodox faith are at odds with those provided by astrologers: the latter present an intermediate step between human beings and God, that of faith in an animated universe—the *sympatheia*, stemming from Stoic philosophy—which connects humans, creatures, and celestial bodies. This generates a deterministic view of human life, where free will is impossible, as choices are predetermined by the celestial bodies. Faith in *sympatheia* is at odds with the Orthodox faith.

All this explains the pressures placed on the usefulness of astronomy in its mathematical respect, in the ability to compute the positions of the planets and predict eclipses. The Orthodox faith deemed this commendable as it helped in the contemplation of the cosmic order, the reflection of God's wisdom. This was enabled, once again, by mathematical certitude, the highest degree of certitude among sciences, second only to theology in Meliteniotes's classification.

The relevance of Meliteniotes's *Three Books on Astronomy* is that they led to the institutionalization of a specific form of knowledge that reflected the doctrinal rules of 1351 and secured a view on science that accorded with the hesychast agenda. It was therefore considered worthwhile studying the science of the stars on official theological grounds. Given that Palamas claims that the salvation of the soul is the essential aim of life, religious knowledge—that is, the knowledge of God in truth and of man's place before him—is therefore the most important knowledge to be attained. Religious knowledge is the highest form of knowledge, for only the teaching of the Holy Spirit can be considered free from all deception and error. Pre-Christian philosophical attempts had not succeeded in reaching this truth because they could not rely on the revelation of Christ, which allowed human beings to recognize the proper hierarchy of God, Man, and Creation. On this account, celestial bodies were deified or endowed with intelligence by pagans. Although astronomy *per se* could achieve only a partial and fallible knowledge of the created reality, it could be helpful in improving religious knowledge (Sinkewicz 1986, 340).

This institutionalization of knowledge likely generated a negative view of the science of the stars specifically when put in the service of astrology. It is an open question whether this view prevented possible developments in the science of the heavens in Byzantium, as astrology was a major motor of astronomical inquiry elsewhere. As the prologue in Byzantine literature is the place in which political statements should be put (Hunger 1964), Meliteniotes's claims serve the purpose of a hesychast cultural hegemony on sciences in the realm of the Orthodox Church. Despite this cultural climate, discordant voices were present. As previously mentioned, a Byzantine dialogue emerged from around the time of Meliteniotes's work—the *Hermippus Dialogue on Astrology*—which offered a defense of astrology as a discipline on the grounds that it extended the reach of divine realms by combining Christian and Platonic doctrines. This work was banned by hesychast Byzantine Orthodoxy, because it stated that astrology better allowed one to reach the contemplation than ascetism. At any rate, astrological practice was still cultivated in Byzantine society at large until its collapse in 1453 with the Ottoman conquest of Constantinople.

Meliteniotes's "abstractionist" approach toward celestial bodies allowed the *Persian Tables* to enter the program of the Patriarchal School and granted them legitimacy while insulating them from astrological concerns. The authoritative status of the *Persian Tables* was guaranteed by the genealogy that they outlined: from Ptolemy to Persian and Arabic scholars, all were considered worthwhile for having improved Ptolemy, the founding father of astronomy. Most Byzantine scholars after 1351 were trained in both Ptolemaic astronomy and the *Persian Tables*. These tables were so popular that Byzantine scholars took copies of them on their travels to Ferrara and Florence in the 1430s, at the time of the Council for the Union of the Churches. Cusanus records that he received a copy of the *Persian Tables* by Bessarion (Shank 2017, 93).

The Hesychast Ban on Astrology, the Salvation of the Soul, and the *Filioque*

The ban on astrology from the teaching of the Patriarchal School of Constantinople provides a strong statement on what is and is not firmly knowable about God through the science of the stars, what this science can tell us about God, and to what extent we should give credence to that knowledge. In light of the doctrine of Palamas, the knowledge of these limits was essential for the salvation of the soul and thus for the pursuit of becoming godlike. All of this echoes the motivation that lies behind Palamas's reaction to Barlaam: it was motivated by the risk implied in Barlaam's thesis of the non-demonstrability of the procession of the Holy Spirit, which for Palamas meant that nothing of God would be knowable. Meliteniotes's rejection is likely a consequence of this wave of Orthodox thinking. The urge to make a differentiation from a causalistic approach to God in which a *sympatheia* is implied was a political action triggered by two competing views on the salvation of the soul, but the impetus for this lay in the defense of the Orthodox view of the *filioque*.

We have seen how the roots of the Hesychast controversy and the theology of Palamas are in concepts related to the *filioque* question, which was the cause of the great schism between the two Churches in 1054. Meliteniotes's motivation for rejecting astrology is based on the radical hesychast view on sciences and the positions of Palamas toward science and salvation. Consequently, this suggests that Meliteniotes's conception of the science of the stars ultimately arises in accordance with the implications of the Byzantine Orthodox views on the *filioque*. This suggestion opens up a more complex scenario, which warrants its own study. Still, it is now possible to better comprehend Meliteniotes's rejection of astrology within its historical context: to be in favor of astrology, in the period after the Council of 1351, risked assenting to the possibility of there being an equivalence between the ascetic practice of hesychasm and the astrological approach to God. This had major consequences: (1) it undermined the authority of the hesychast party in the Eastern Church of Constantinople; (2) in light of the theologico-philosophical basis of hesychasm, the legitimization of astrology was not just an approval of an approach toward the knowledge of God resembling a form of gnosticism, which was irreconcilable with Orthodox faith, but it also meant going against the doctrine of Palamas on the knowability of God and thus on the salvation of the soul. Further, by implication, it opened up the philosophical possibility of accepting the Western Trinitarian view on the procession of the Holy Spirit and the salvation of the soul from a Latin perspective (and this would ultimately mean turning away from the reasoning behind the great schism and accepting the primacy of the Church of Rome); (3) the neglect of the physical properties of celestial bodies revealed radical hesychasm's distance from the realm of natural philosophy. On the one hand, this is not surprising, because hesychasm proposes a route to the divine realm through renouncing the unstable and corruptible realm of *physis*. On the other hand, given the nexus between this attitude and the Orthodox view on the *filioque*, as revealed by the controversy between Palamas and Barlaam, it would also be expedient to examine if, how, and to what extent the developments in astronomy and natural philosophy in Western Christianity are related to the conception of the Holy Trinity according to the Church of Rome. Unlike in Byzantine Orthodoxy, natural philosophy and material progress were not considered useless in the process of the salvation of the soul, as Harrison points out. It is likely that the Western conception of the salvation of the soul is one of the reasons why Western Christianity's approach to astrology was not characterized by the presence of competing epistemological views on the salvation of the soul, as was the case in the struggle between astrologers and hesychasts.

All of this suggests that Meliteniotes's ban on astrology reflects an historical turning point for the history of the science of the stars between Eastern and Western Christianity, in

which two different evaluations of the Incarnation of Christ correspond to different approaches to the science of the stars, with remarkable intellectual and political ramifications. While this calls for further inquiry, what is certain is that the historical development of the Western conception of the *filioque* and its theological and political implications did not lead to a radical mutual exclusivity between astrology and the Church of Rome, and for centuries to come the science of the stars in the West would contemplate the possibility of examining the physical properties of celestial bodies, both in astrology and in celestial physics. Notably, Regiomontanus, in accordance with his patron Bessarion, considered astrology the queen of sciences in his renowned Paduan lecture (Rutkin 2019, 369–373; Byrne 2006; Omodeo 2021; Bardi 2022), and Catholics as well as Lutheran astronomers, such as Galilei, Kepler, and Brahe, all still cast horoscopes for their patrons. Roger Bacon, Albertus Magnus, and Thomas Aquinas undertook extensive reflections on astrology and never rejected it as the hesychasts did. On the contrary, they embraced it as central to their investigations of nature and the divine realm.

Concluding Remarks

Meliteniotes's programmatic statements on the utility and value of studying astronomy, and on the banning of astrology, reflect major theological and political decisions on the part of the contemporary Orthodox Church of Constantinople. More research is required to assess to what extent they influenced further developments of the science of the stars in Eastern Orthodoxy. However, Meliteniotes's statements serve a certain discourse on science, which does not correspond to what happened with regard to astrology at the level of practice. At any rate, his statements represent a significant divergence from the history of science of the stars in Western Christianity.

Meliteniotes's rejection of astrology suggests that the radicalization of hesychast positions on the science of the stars deprived that field of potential inquiries into natural philosophy, thereby confining astronomy to the fictional realm. This radicalization was caused by following the emphasis on ascetism and the conceptions of Palamas on the pursuit of certain knowledge. These positions were ultimately produced by the controversy over the *filioque* question, triggered by the discussion between Barlaam and Palamas over the demonstrability of the procession of the Holy Spirit. At stake were foundational principles of the Orthodox faith and the role of the Incarnation of Christ, through which human beings might become godlike and save their souls. These views formed the impetus behind the hesychast struggle for cultural hegemony in the Orthodox Church. As a group of Byzantine scholars were in favor of a competent epistemological system for becoming godlike, i.e., astrology, this produced a clash, and Meliteniotes banned astrology on these grounds.

Another significant fact about Meliteniotes's *Three Books on Astronomy* is that they led to the institutionalization of a specific form of knowledge, reflecting the doctrinal rules of 1341 and 1351, and hence they secured a view on science that was in accordance with the hesychast agenda and the implications of the Orthodox views on the *filioque*.

Nicolaidis argues that hesychasm had no negative implications for education in the mathematical sciences at the Patriarchal School (Nicolaidis 2011, 118). But Meliteniotes's process of institutionalization likely generated suspicion toward the science of the stars when they were put into the service of astrology. This is likely to have prevented possible developments in the science of the heavens in Byzantium, as astrology was a major driver of astronomical inquiry elsewhere. On this account, I would avoid the categories of negative and positive, and instead consider the impact of radical hesychasm on mathematical astronomy as a limiting factor. In favor of this thesis, we might remember that it was not by accident that renowned post-1351 fosterers of the science of the stars and those in favor of astrology, such as Bessarion, had to avoid Constantinople. We need not recount how much

the developments of astronomy and the sciences in Western Christianity owe to this Byzantine polymath, and I have mentioned his views on astrology, as expressed by Regiomontanus, his most famous protégé.

Despite the ban on astrology, the second half of the Byzantine fourteenth century registered an increase in manuscripts of astronomy, alongside a significant increase in translations of Islamic and Jewish sources, likely due to the quest to produce more up-to-date tables than Ptolemy's, or to find easier forms of computation in order to make predictions and foresee eclipses. In this instance, the hesychast approach to the science of the stars is confirmed by the fact that the translated texts were only on mathematical astronomy, while it is likely that Byzantine scholars knew about treatises on the physical astronomy of Islamic tradition due to their relations with Islamic communities. This confirms my hypothesis that hesychasm prevented possible developments of the science of the stars in Byzantium.

The hesychast approach to the science of the stars, which is marked by a lack of interest in the physical properties of celestial bodies and a focus on their abstract properties, provides an explanation for an as yet unanswered question, one which is usually explained by the claim that the conception of astronomy in Byzantium was influenced by that aspect of Platonism which considers observation useless or a second-hand activity. As Anne-Laurence Caudano notes: "Overall, the most puzzling aspect of Byzantine astronomy is probably the lack of any direct observation and the exclusively mathematical approach that characterized their work" (Caudano 2020, 230). The present study suggests that the triumph of hesychasm is likely another reason for this approach to the science of the stars.

Nicolaidis argues that the views on sciences taken by Eastern Orthodoxy are due to their emphasis on the concept of *deification*. The present study provides some further suggestions about the different journeys undertaken by science in Eastern and Western Christianity. Meliteniotes's case shows that the concept of *deification* is embedded in the political struggles between hesychasts and anti-hesychasts, and that the hesychast decisions regarding the science of the stars set that field on a different path from that of the Western Church. On this account, one of the main areas of divergence in these historical processes is the conception of the Trinity, hence the controversy on the *filioque* and its implications. The historical nexus between sciences and the evaluation of the Incarnation of Christ in Western and Eastern Christianity calls for further examination. New historiographical accounts should certainly benefit from further investigations on all these topics.

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