


# Astral Iconography and the Byzantine Study of the Heavens<sup>1</sup>

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**Abstract:** Byzantine astral iconography developed from early Christian and ancient visual culture, with the latter via a profound process of Christianisation. In turn, the early Christian fascination with astral imagery went through stages of transformation prompted by various factors. Among these, the influence of neighbouring cultures and the widespread interest in astrology are solidly researched. But recent studies of Byzantine science, including astronomy and astrology, open new avenues of interpretation regarding astral iconography. Accordingly, this article considers the flourishing of astral, especially zodiacal, iconography in Byzantium's later centuries and in the post-Byzantine era as an outcome of scientific progress. Even so, a fuller understanding of the relevant iconography is impossible without the theological worldview of the Byzantines, which also legitimised the rebirth of the astral sciences.

**Keywords:** Astral Iconography; Byzantine Astrology; Byzantine Astronomy; Christian Worldview; Zodiacal Representations.

## ES Iconografía astral y el estudio bizantino de los cielos

**Resumen:** La iconografía astral bizantina se desarrolló a partir de la cultura visual paleocristiana y antigua, y esta última a través de un profundo proceso de cristianización. A su vez, la fascinación de los primeros cristianos por las imágenes astrales pasó por etapas de transformación impulsadas por diversos factores. Entre ellos, se investigan sólidamente la influencia de las culturas vecinas y el interés generalizado por la astrología. Pero estudios recientes de la ciencia bizantina, incluidas la astronomía y la astrología, abren nuevas vías de interpretación con respecto a la iconografía astral. En consecuencia, este artículo considera el florecimiento de la iconografía astral, especialmente zodiacal, en los últimos siglos de Bizancio y en la era posbizantina como resultado del progreso científico. Aun así, una comprensión más completa de la iconografía relevante es imposible sin la cosmovisión teológica de los bizantinos, que también legitimó el renacimiento de las ciencias astrales.

**Palabras clave:** Iconografía astral; astrología bizantina; astronomía bizantina; Christian Worldview; representaciones zodiacales.

**Contents:** 1. Introduction. 2. Byzantine explorations of the starry skies. 2.1 Astronomical treatises and astral iconography. 2.2 Byzantine theology and natural philosophy. 2.3 Byzantine astronomy and astrology. 3. Astral motifs in Byzantine iconography. 3.1 Stellar representations. 3.2 The "great luminaries." 3.3 Star fields. 3.4 Zodiacal representations. 4. Conclusions. 5. References.

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## 1. Introduction

The following discussion takes place at the crossing of the history of Christian iconography and the history of astronomy, which includes a brief foray in the fascinating field of archaeoastronomy, within the interdisciplinary framework of Byzantine studies and studies in religion. I set out to prove that a connection can be noted between developments in the Byzantine exploration of the heavens—specifically, astronomy and astrology—and the growing complexity of celestial motifs in church iconography. A clarification is in order here: Within this context, the distinction between astronomy and astrology is of no consequence. Indeed, following patterns established by ancient cultures,<sup>2</sup> the Byzantines did not dissociate the two ways of considering the starry sky—astronomy and astrology—even though sometimes they showed preference for either one or the other.<sup>3</sup> The same goes for the

West at the end of the Middle Ages.<sup>4</sup> What matters more is the fact that with the increasing interest of the Byzantines in astronomy and astrology, the early Christian reluctance about these activities gradually dissipated and, in direct proportion with this trend, the simple stellar iconography of previous centuries developed into complex celestial motifs, including representations of the zodiac.<sup>5</sup>

To be more specific, churches erected during Late Byzantium and after, from the Balkans to the Caucasus to what is modern Romania, display a strange iconographical pattern. It is Christ *Pantokrator* (παντοκράτωρ, “almighty,” or perhaps “he-who-holds-all-things,” by association with Colossians 1:17 and mentioned as such at Revelation 1:8) as the focal point of concentric circles of angels, sometimes also prophets and apostles, and the twelve zodiacal signs. At times, the zodiac and other celestial objects—the Sun, the Moon, and stars—can be seen next to Christ’s figure, not surrounding it, but they are



Fig. 1. Helios and the zodiac at Anlipsi, Astypalaia Island. Wikimedia Commons. Source: <https://tinyurl.com/w7jv7e8y> (accessed 10 January 2024). Credit: Zde.

<sup>2</sup> Neither the Babylonians nor the Greeks dissociated the two ways of studying the sky. See Hermann Hunger and John Steele, *The Babylonian Astronomical Compendium MUL.APIN*, Scientific Writings from the Ancient and Medieval World (London and New York: Routledge, 2019), 1-2, 13-14; Ivana M. Lemcool, “Developments and Trends in the History of Astrology and their Impact on the Popularisation of the Zodiac Motif in Visual Cultures of the Ancient World,” *Archaeology and Science* 13 (2017): 109-128, esp. 110, 111, 112; Lester Ness, *Written in the Stars: Ancient Zodiac Mosaics*, Marco Polo Monographs 1 (Warren Center, PA: Shangri-La Publications, 1999), 39-79, 81-105.

<sup>3</sup> See Alberto Bardi, “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,” *Transversal: International Journal for the Historiography of Science* 15 (2023): 1-15, <https://doi.org/10.24117/2526-2270.2023.i15.07>; Paul Magdalino, *L’Orthodoxie des astrologues: La science entre le dogme et la divination à Byzance (VIIe-XIVe siècle)*, Réalités Byzantines 12 (Paris: Lethielleux, 2006), 10-13; Paul Magdalino and Maria Mavroudi, “Introduction,” in *The Occult Sciences in Byzantium*, ed. Paul Magdalino and Maria Mavroudi (Geneva: La Pomme d’or, 2006), 11-38, esp. 13-14,

19, 21, 23, 26-27 etc. When astronomy and astrology were differentiated, it was in terms of the former’s theoretical nature and the latter’s practical one. See Anne Tihon, “Les Sciences Exactes à Byzance,” *Byzantion* 79 (2009): 380-434, esp. 420-425; Anne Tihon, “Astrological Promenade in Byzantium in the Early Palaiologan Period,” in *The Occult Sciences in Byzantium*, 265-290, esp. 266, 269, 271-272 etc. Magdalino noticed, however, a further specialisation of astrology as praxis and as a theoretical discipline. Thus, in the twelfth century, theory derived from praxis, whereas in the fourteenth century theory (including its mathematical expression) preceded praxis. See *L’Orthodoxie des astrologues*, 161-162.

<sup>4</sup> See Eugenio Garin, *Astrology in the Renaissance: The Zodiac of Life*, trans. June Allen et al. (London and Boston: Routledge and Megan Paul, 1983; first edn 1976), 25.

<sup>5</sup> Scholars tend to identify the Byzantine era with a lengthy span, stretching from the foundation of Constantinople, the Christian name of ancient Byzantium, in 324, to the conquest of the city by the Ottomans, in 1453. See Sarah Bassett, “Introduction” to *The Cambridge Companion to Constantinople*, ed. Sarah Bassett (Cambridge and New York: Cambridge University Press, 2022), 1-14, esp. 2.

unmissable. A history of artistic experimentation undergirds the emergence of these Byzantine astral images. As we shall see below, celestial motifs—such as single stars, groups of stars, and intricate fields of stars—were already present in the early Christian iconography, but the depiction of the *Pantokrator* together with the zodiac is a development pertaining to Byzantium's later centuries. The origin of this artistic motif is the Roman iconography of Jupiter, Mithras, and Sol Invictus, whose figures are surrounded by the zodiacal signs, which signifies the status of *kosmokrator* ("ruler of the universe") of these deities.<sup>6</sup> A composition of this kind is the fourth- or fifth-century CE mosaic of Analipsi, Astypalaia Island, where a central figure, possibly Helios or Sol Invictus, is framed by the zodiacal wheel and anthropomorphic representations of the four seasons (see Fig. 1).<sup>7</sup> The same Roman imagery is also encountered in several Late Antique synagogues,<sup>8</sup> which must have paved the way for its Christian assimilation, first in the West and then in the East.<sup>9</sup> In turn, Roman Egypt adjusted

this motif by placing amidst the zodiac the figure of Nut, the goddess of the starry sky, though this composition does not include the zodiac in the customary circular form (see Fig. 2).



Fig. 2. The goddess Nut and the zodiac. Lid of the coffin of Soter, which dates to the end of the first century CE (BM EA 6705). © The Trustees of the British Museum. Source: <https://tinyurl.com/3v3whksn%20> (accessed 20 January 2024).

By placing Jesus' figure at the centre instead of Roman deities, the Byzantine Christ *Pantokrator* circumscribed by the zodiac constitutes a Christian iteration of these ancient and late antique representations,<sup>10</sup> signifying that Jesus is creator of the stars and of the cosmos in its entirety, not only humankind's Saviour. This cultural process of transformation is to an extent surprising, given the uneasiness of early Christians—and their Byzantine progeny—about astrology and other occult sciences.<sup>11</sup> In time, this attitude became more nuanced, as we shall discover soon. One thing is

<sup>6</sup> See Philippa Adrych et al., *Images of Mithra*, Visual Conversations in Art and Archaeology (New York: Oxford University Press, 2017), 3-4, 37, 53, 119; Nicholas Campion, *Astrology and Cosmology in the World's Religions* (New York and London: New York University Press, 2012), 158, 175; Lemcool, "Developments and Trends," 112, 119, 121; Miško Tutkovski, "Representations of the Zodiac in Byzantine and Post-Byzantine Paintings from the Republic of Macedonia" (in Macedonian), *Patrimonium MK* 3:7-8 (2010): 277-288, esp. 278 (and fig. 2).

<sup>7</sup> Scholarly interpretations of this mosaic differ. For its interpretation in a Christian sense, see Eleni K. Papavasileiou, "Archaeological Remains of the Early Christian Period on Astypalaia (4th-7th century AD)" (in Greek), in *Vathy, Astypalaia: Ten Years of Research (2011-2020) on a Diachronic Palimpsest of the Aegean*, vol. 1: *Astypalaia in Time*, ed. Andreas G. Vlachopoulos (Athens: Ministry of Culture and Sports, 2023), 141-155, esp. 145-148 (and fig. 4b-d). Other authors assert its non-Christian origin. See Georgios Deligiannakis, *The Dodecanese and East Aegean Islands in Late Antiquity, AD 300-700*, Oxford Monographs on Classical Archaeology (Oxford University Press, 2016), fig. 184 at 202. For doubts whether a Christian or other origin can be ascertained, see Mary Charles-Murray, "The Christian Zodiac on a Font at Hook Norton: Theology, Church, and Art," *Studies in Church History* 28 (1992): 87-97, esp. 93 n. 18, doi:10.1017/S0424208400012390.

<sup>8</sup> See, for example, the pavement mosaics representing the wheel of the zodiac at the fourth-century CE Hammath Tiberias synagogue, available at <http://tinyurl.com/5fbkcyrr>, and the sixth-century CE Beth Alpha synagogue, available at <https://tinyurl.com/2wcjv7az> (accessed 15 October 2023). For exhaustive studies of these and similar synagogal zodiacs, see Rachel Hachlili, *Ancient Synagogues—Archaeology and Art: New Discoveries and Current Research*, Handbook of Oriental Studies 105 (Leiden and Boston: Brill, 2013), 256, 260, 339-388, 567-570 etc.; Rachel Hachlili, *Ancient Mosaic Pavements: Themes, Issues, and Trends* (Leiden and Boston: Brill, 2009), 36-48, 249-250 etc.; Ness, *Written in the Stars*, 1-38.

<sup>9</sup> For the emergence of Christian iterations of the zodiac from the ninth century onwards, especially in the West, see Dieter Blume, "Picturing the Stars: Scientific Iconography in the Middle Ages," in *The Routledge Companion to Medieval Iconography*, ed. Colum Hourihane (London and New York: Routledge, 2017), 310-321; Ivana Lemcool, "The Zodiac in Early Medieval Art: Migration of a Classical Motif Through Time and Space," in *Migrations in Visual Art*, ed. Jelena Erdeljan et al., Pontes academici (University of Belgrade, 2018), 55-68, esp. 56, 59-58; Valerie Shrimplin, "The Church of San Miniato al Monte, Florence: Astronomical and Astrological Connections," in *The Inspiration of Astronomical Phenomena*, vol. 6, ed. Enrico Maria Corsini, ASP Conference Series 441 (San Francisco: Astronomical Society of the Pacific, 2011), 151-160. In turn, Byzantine zodiacal representations in sacred precincts occurred only from the twelfth century (Lemcool,

"The Zodiac," 60-61). See also Shigebumi Tsuji, "The Starry Night: Art Before the Era of the Icon," *Convivium* 2:1 (2015): 148-165, esp. 151, <https://doi.org/10.1484/J.CONVI.5.111163>.

<sup>10</sup> This process of cultural conversion occurred in both Eastern and Western Christianities in the Middle Ages. See Manuela Incerti, "Lo sguardo di San Miniato al Monte in Firenze," in *Il dentro e il fuori del cosmo: Punti di vista per interpretare il mondo*, ed. Manuela Incerti (Bologna University Press, 2013), 113-123, esp. fig. 1 at 116.

<sup>11</sup> See Tim Hegedus, *Early Christianity and Ancient Astrology*, Patristic Studies 6 (New York: Peter Lang, 2007), 23-194; Lemcool, "The Zodiac," 56-58; Robert Ousterhout, "Architecture, Art and Comnenian Ideology at the Pantokrator Monastery," in *Byzantine Constantinople: Monuments, Topography and Everyday Life*, ed. Nevra Necipoğlu (Leiden and Boston: Brill, 2001), 133-150, esp. 143.

clear to me, that is, Byzantine zodiacal iconography is integral to the wider process of Christianising, for example, the prehistoric celebrations of the Northern hemisphere's spring equinox (ca 21 March) and winter solstice (ca 21 December) by establishing Easter and Christmas,<sup>12</sup> together with converting the Roman "Sun-Day" into the "Lord's Day."<sup>13</sup> As Maria Mavroudi observed, one of the "foundations of Byzantine culture" was "the adoption, continuous cultivation, and adaptation of the ancient heritage."<sup>14</sup> This assessment is applicable to the Byzantine arts as much as to the sciences developed during that era.

The present article undertakes, first, to review the surging interest of the Byzantines in matters of astronomy and astrology, and second, to introduce and to analyse examples of astral motifs in early Christian, Byzantine, and post-Byzantine iconography, including zodiacal imagery. My aim is to show that the growing interest of the Byzantines in the study of the starry sky for astronomical and astrological purposes, against the backdrop of theological cosmology, contributed to the flourishing of celestial representations, culminating in the zodiacal iconography of Byzantium's later centuries and their aftermaths. I will conclude by assessing the significance of astral iconography as a theological indicator of the interest of those societies in the study of the cosmos, which reverberated long after the end of the Byzantine era. In short, the present article brings to light the impact of astronomy and astrology on iconography—an assessment made possible by recent research in the area of Byzantine science—together with the role of astral iconography as a form of theological interpretation of the starry sky as understood by the available sciences.

## 2. Byzantine explorations of the starry skies

I have already pointed out that various factors led to the flourishing of Byzantine (and post-Byzantine) astral iconography, despite earlier apprehension. The images of ancient deities surrounded by the zodiacal cycle, together with their synagogal iterations, pertain to religious art. The impact of these representations upon Byzantine iconography has long been discussed by scholars, including by some whose work is referenced in the next sections of this article. Herein I focus, however, on a little studied factor, the strides of Byzantine natural philosophy, or science, in terms of exploring celestial phenomena under the guise of astronomy and astrology—in Basil Tatakis' terms, the "official" and the "apocryphal" sides of the study of the skies,

respectively<sup>15</sup>—against the backdrop of the growing interest of that entire society in reality's many layers, including the starry sky.<sup>16</sup>

For decades, the scholarship of Byzantine natural philosophy and technological innovation, including the study of the heavens, lagged behind other relevant areas of research. This accounts for the perpetuation of academic and popular stereotypes about the repetitive character and lack of consequence of the Byzantine era for the history of science.<sup>17</sup> The role Byzantine science played in the development of astral and zodiacal iconography is even less researched, if at all.<sup>18</sup> As we shall see further down, when scholars refer to this iconography, it is primarily through the lens of extraneous cultural influences and interests in the occult. This approach causes uneasiness among believing researchers, who, very possibly and not unlike certain Christians of past ages, consider this iconography an embarrassing abandonment of orthodoxy. In what follows, what I attempt is to show that celestial motifs in iconography flourished for various reasons, including developments pertaining to Byzantine theology and natural philosophy, or science, not only through cultural mimesis and a growing interest in the occult.

I do not intend to offer a comprehensive survey of either the advancements of Byzantine science and innovation, not even in terms of astronomy, or their scholarly reception today. Fortunately, a growing body of literature alerts us to long forgotten contributions to science and the role these played in the making of modern civilisation.<sup>19</sup> In turn, my

<sup>15</sup> See Basil N. Tatakis, *Christian Philosophy in the Patristic and Byzantine Tradition*, trans. George Dion. Dragas (Rollinsford: Orthodox Research Institute, 2007; first edn 1952), 290, 292-293, 294-295. See also the whole chapter "Byzantine Science" in *ibid.*, 283-298.

<sup>16</sup> See Mavroudi, "Occult Science and Society," 67-83.

<sup>17</sup> See Stavros Lazaris, "Introduction," in *A Companion to Byzantine Science*, ed. Stavros Lazaris, Brill Companions to the Byzantine World 6 (Leiden and Boston: Brill, 2020), 1-26, esp. 3-6; Magdalino, *L'Orthodoxie des astrologues*, 7-8; Mavroudi, "Occult Science and Society," 46-48; Apostolos Spanos, "'To Every Innovation, Anathema' (?) Some Preliminary Thoughts on the Study of Byzantine Innovation," in *Mysterion, strategike og kainotomia*, ed. H. Knudsen et al. (Oslo: Novus Forlag, 2010), 51-59, esp. 51-53; Georgios Steiris, "Science at the Service of Philosophical Dispute: George of Trebizond on Nature," *Philotheos* 12 (2012): 103-119, esp. 113. These points are not unwarranted. For example, the seven hundred pages of the recently released collection of essays, *Essays on Astronomical History and Heritage: A Tribute to Wayne Orchiston on His 80th Birthday*, ed. Steven Gullberg and Peter Robertson (Cham: Springer, 2023), includes only one reference to Byzantine science, that is, the study of earthquakes (at 687). That said, acknowledgments of the impact of Byzantine science are not altogether absent, albeit incidental. See Alistair Cameron Crombie, *Medieval and Early Modern Science*, vol. 1: *Science in the Middle Ages: V-VIII Centuries* (Garden City, NY: Doubleday, 1959), 18, 35-36 (I am grateful to Garry Trompf for pointing me to this source).

<sup>18</sup> An interesting study of the impact of ancient astrology upon Roman zodiacal iconography is Lemcool's "Developments and Trends," earlier quoted. It does not discuss, however, the role played by astronomy and astrology in the rise of Byzantine zodiacal iconography.

<sup>19</sup> Here is a sample of the relevant scholarship, to complement the sources mentioned above: Doru Costache, "Maximus the Confessor and John Damascene's Cosmology," in *The T&T Clark Handbook of Christian Theology and the Modern Sciences*, ed. John Slattery (Bloomsbury/T&T Clark, 2020), 81-91; Wayne Hankey, "Natural Theology in the Patristic Period,"

<sup>12</sup> Robert G. T. Edwards, "Travelling Festivals in Late Antiquity: How Christmas Came to the Greek East," *Journal of Ecclesiastical History*, First View (2023) 1-17, <https://doi.org/10.1017/S002204692300009X>.

<sup>13</sup> Uta Heil, "Introduction," in *From Sun-Day to the Lord's Day: The Cultural History of Sunday in Late Antiquity and the Early Middle Ages*, ed. Uta Heil, Cultural Encounters in Late Antiquity and the Middle Ages 39 (Turnhout: Brepols, 2022), 13-26.

<sup>14</sup> Maria Mavroudi, "Occult Science and Society in Byzantium: Considerations for Future Research," in *The Occult Sciences in Byzantium*, 39-95, esp. 54.

intention is to highlight the soaring interest of the Byzantines in all matters celestial, or cosmic, as a way of accounting for the rise of astral, including zodiacal, iconography.

## 2.1. Astronomical treatises and astral iconography

Before I address relevant matters, I must point out that Byzantine astronomy and its iconographical instantiations represent a break from the oldest traditions of humankind. Archaeoastronomy brings to light our archaic ancestors' profound scientific intuitions, based on a keen contemplation of the stary skies across the aeons, together with what scholars call—more or less suitably—cave art

and rock art as forms of recording astronomical information.<sup>20</sup> As David Graeber and David Wengrow observe, for archaic cultures, “images are not meant to illustrate or represent, but instead serve as visual cues for extraordinary feats of memory.”<sup>21</sup> A complex new picture of prehistory emerges, surprising us by the capacity of our supposedly inferior ancestors to observe celestial phenomena, to record, understand, and communicate astronomical information by way of sophisticated systems of oral culture, signs, imagery, and sacred topography.<sup>22</sup> Even what classical antiquity called the zodiacal cycle or wheel—as a form of organising knowledge about the universe in relation to the constellations traversed by the ecliptic and the precession of the equinoxes<sup>23</sup>—has its origin in the painted ceilings of caves such as Chauvet, Lascaux, and several others, which prehistoric cultures adorned with animal figures (Gr. ζῳδία, *zōdia*; see Fig. 3). These animal figures are visual metaphors of the stary sky.<sup>24</sup>

There is no room, here, for a detailed discussion of such matters. But it would be remiss of me not to mention the fact that, while ancient and medieval astronomy built upon the shoulders of prehistoric giants,<sup>25</sup> Byzantine culture abandoned the archaic pattern of recording scientific information in what can be called, for want of a better work, symbolic or sacred art. Specifically, the Byzantines drove a wedge between scientific research and sacred art, depriving the latter of its function as conveyor of natural philosophy, including astronomical information, and endowing it, instead, with theological connotations. This approach was not unprecedented. Already

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in *The Oxford Handbook of Natural Theology*, ed. Russell R. Manning (Oxford University Press, 2013), 38-56; Christopher C. Knight, “Natural Theology and the Eastern Orthodox Tradition,” in *The Oxford Handbook of Natural Theology*, 213-226; Stavros Lazaris, *Le Physiologus grec*, vol. 1: *La réécriture de l'histoire naturelle antique*, Micrologus Library 77/1 (Firenze: Sismel Edizioni del Galluzzo, 2016), 78-141; Jean Lempire, “Ptolemaeus Byzantinus: The Reception of Ptolemy's Astronomy in the Byzantine World,” in *Research Bulletin of the Centre for Hellenic Studies* (Harvard University, 2018), available at <https://tinyurl.com/4hm9r4jy> (accessed 15 March 2023); David C. Lindberg, “The Fate of Science in Patristic and Medieval Christendom,” in *The Cambridge Companion to Science and Religion*, ed. Peter Harrison (Cambridge University Press, 2010), 21-38; David C. Lindberg, *The Beginnings of Western Science: The European Scientific Tradition in Philosophical, Religious, and Institutional Context, Prehistory to A.D. 1450*, 2nd edn (Chicago and London: The University of Chicago Press, 2007); Andrew Louth, “The Six Days of Creation According to the Greek Fathers,” in *Reading Genesis after Darwin*, ed. Stephen C. Barton and David Wilkinson (Oxford University Press, 2009), 39-55; Gerasimos Merianos, “The Christianity of the Philosopher Christianos: Ethics and Mathematics in Alchemical Methodology,” *Arys* 20 (2022): 271-322; John Meyendorff, *Byzantine Theology: Historical Trends and Doctrinal Themes* (New York: Fordham University Press, 1979), 129-137; Efthymios Nicolaidis et al., “Science and Orthodox Christianity: An Overview,” *Isis* 107:3 (2011): 542-566; Efthymios Nicolaidis, *Science and Eastern Orthodoxy: From the Greek Fathers to the Age of Globalization*, trans. Susan Emanuel (Baltimore: The Johns Hopkins University Press, 2011); Emmanuel A. Paschos and Christos Simelidis, *Introduction to Astronomy by Theodore Metochites (Stoicheiosis Astronomike 1.5-30)* (Singapore: World Scientific, 2015); Emmanuel A. Paschos, “Byzantine Astronomy from A.D. 1300,” *Fermilab Technical Publications* DO-TH 98/18 (1998), available at <https://ss.fnal.gov/archive/other/do-th-98-18.pdf> (accessed 5 March 2024); Johannes Preiser-Kapeller, “Restless Skies at the Turn of the First Millennium AD: Climate Fluctuations, Astronomic Phenomena and Socio-Political Turbulences in 10th and 11th Century Byzantium and Japan in Comparative Perspective,” *De Medio Aevo* 13:1 (2024): 1-27, <https://doi.org/10.5209/dmae.92793>; Sandy Sakorrafou and Gerasimos Merianos, “John Kanaboutzes' Commentary on Dionysios of Halikarnassos: A Perception of Alchemy in a Fifteenth-Century Greek Text,” in *Scientific Cosmopolitanism and Local Cultures: Religions, Ideologies, Societies*, ed. Gianna Katsiampoura (Athens: National Hellenic Research Foundation, 2014), 86-94; George Steiris, “George of Trebizond's Contribution to the Development of Cosmology during the Renaissance,” in *Πεπραγμένα Ι' διεθνούς κρητολογικού συνεδρίου*, ed. Michalis Andrianakis (Chania: The Philological Society “Chrysostom,” 2010), 185-202; Anne Tihon, “Alexandrian Astronomy in the 2nd Century AD: Ptolemy and His Times,” in *The Alexandrian Tradition: Interactions between Science, Religion, and Literature*, ed. Luis Arturo Guichardet al., *Ricerche di cultura europea* 28 (Bern and Berlin: Peter Lang, 2014), 73-91; G. J. Toomer, “Ptolemy and his Greek Predecessors,” in *Astronomy Before the Telescope*, ed. Christopher Walker (London: British Museum Press, 1996), 68-91; D. S. Wallace-Hadrill, *The Greek Patristic View of Nature* (Manchester and New York: Manchester University Press and Barnes & Noble, 1968).

<sup>20</sup> That the concept of prehistoric art might not be a suitable way of referring to archaic cultures is discussed by Jean Clottes, *What Is Paleolithic Art: Cave Paintings and the Dawn of Human Creativity*, trans. Oliver Y. Martin and Robert D. Martin (Chicago and London: University of Chicago Press, 2016), 2-3, 7-19.

<sup>21</sup> David Graeber and David Wengrow, *The Dawn of Everything: A New History of Humanity* (Penguin Books, 2022), 388.

<sup>22</sup> Here are some useful references selected from a growing body of literature: Bennett Bacon et al., “An Upper Palaeolithic Proto-writing System and Phenological Calendar,” *Cambridge Archaeological Journal* 33:3 (2023): 371-389, doi:10.1017/S0959774322000415; Nicholas Campion, “The Value of Skyscape Archaeology,” *Journal of Skyscape Archaeology* 6.1 (2020): 94-97, <https://doi.org/10.1558/jsa.42311>; Cerasella Craciun et al., “Cosmic Art Inspiration with the Old Romanians,” *Romanian Astronomical Journal* 22:1 (2012): 55-75; Duane Hamacher et al., “The Archaeology of Orality: Dating Tasmanian Aboriginal Oral Traditions to the Late Pleistocene,” *Journal of Archaeological Science* 159 (2023): 105819, <https://doi.org/10.1016/j.jas.2023.105819>; Chantal Jégues-Wolkiewicz, *Lascaux et le ciel de la préhistoire: Arguments cosmographiques pour un art pariétal structuré* (Self-published, 2020); Genevieve von Petzinger, *The First Signs: Unlocking the Mysteries of the World's Oldest Symbols* (New York: Atria Books, 2016); Martin B. Sweatman and Dimitrios Tsikritsis, “Decoding Göbekli Tepe with Archaeoastronomy,” *Mediterranean Archaeology and Archaeometry* 17:1 (2017): 233-250, DOI: 10.5281/zenodo.400780.

<sup>23</sup> See Clive Ruggles, *Ancient Astronomy: An Encyclopedia of Cosmologies and Myth* (Santa Barbara, CA: ABC-CLIO, 2005), 345-347; Terry MacKinnell, *The Dawning: Shedding New Light on the Astrological Ages* (Bloomington, IN: Xlibris, 2011), 77-97.

<sup>24</sup> See Jégues-Wolkiewicz, *Lascaux et le ciel de la préhistoire*, 58-64, 131-135, 150-187.

<sup>25</sup> For an argument to that effect, based on a survey of relevant stances from ancient Babylon to the Renaissance, see Wolfgang Hübner, “Die Astrologie der Antike,” *Berichte zur Wissenschaftsgeschichte* 8 (1985): 7-24.



Fig. 3. A painted ceiling at Lascaux. The animals and the dots seem to indicate the course of time marked by the zodiacal cycle.<sup>26</sup> Wikimedia Commons. <https://tinyurl.com/3b5mk5n2> (accessed 22 November 2023). Credit: arzu çakır.

Mesopotamian and Greek astronomers devised rigorous forms of recording, analysing, predicting, and communicating astronomical information,<sup>27</sup> without the aid of sacred symbols. It is in this vein that Byzantine astral iconography ceased communicating astronomical data. The task of communicating rigorous information was relegated to scientific treatises, where imagery played a technical role.<sup>28</sup> After all, as Stavros Lazaris recently pointed out in regard to the biological and anatomical treatises of three medieval scholars, for the Byzantines, as for other cultures of the past, the text and the image cooperated towards communicating information.<sup>29</sup>

It is noteworthy that the illuminations found in Byzantine scientific manuscripts, including in copies of treatises from ages past, do not simply visualise ancient knowledge; they illustrate the state of the art in Byzantine science, bringing the information up to date, as it were, albeit tacitly. For example, Lazaris examined thirteen illuminated manuscripts of *Physiologus*—the first Christian book of natural science—discovering that most of the accompanying images account for Byzantine natural philosophy, not ancient knowledge.<sup>30</sup> The same goes for the astronomical diagrams included in a fourteenth-century Byzantine manuscript of Cleomedes' *The Heavens*, studied by Divna Manolova.<sup>31</sup> And so, the readers of ancient scientific treatises copied in Byzantine manuscripts catch glimpses of Byzantine science itself, of the Byzantine worldview. More important for my purposes, here, is the fact that, even though specialised and overall deprived of explicit theological meaning, the illuminations of Byzantine scientific manuscripts constituted a rich source of inspiration for church iconography. This is especially true about images of the zodiac (see Fig. 4).<sup>32</sup> Thus, the progress of astronomy and astrology,

<sup>26</sup> For the possible meaning of such strings of dots in cave art (including at Lascaux) as direction markers, timekeeping, and constellations, see Petzinger, *The First Signs*, 227-228, 230-231, 252, 256.

<sup>27</sup> See John Britton and Christopher Walker, "Astronomy and Astrology in Mesopotamia," in *Astronomy Before the Telescope*, 42-67; Toomer, "Ptolemy and his Greek Predecessors," 75-90. See also the recent study of a Hellenistic zodiac from Egypt, dated to ca 55 BCE, in Andreas Winkler and Michael Zellmann-Rohrer, "Zodiacs and Monuments: An Early Pictorial 'Horoscope' from Egypt," *Journal for the History of Astronomy* 54:2 (2023): 125-152.

<sup>28</sup> See, for example, the technical zodiacal images of MS Vat. gr. 1291 (Biblioteca Apostolica Vaticana, Vatican City), folios 2 verso and 9 recto. Available at [https://digi.vatlib.it/view/MSS\\_Vat.gr.1291](https://digi.vatlib.it/view/MSS_Vat.gr.1291) (accessed 15 March 2024). The manuscript includes the *Handy Tables* of Ptolemy, and was probably made in Constantinople, in the eighth or ninth century. For analyses, see Benjamin Anderson, *Cosmos and Community in Early Medieval Art* (New Haven and London: Yale University Press, 2017), 115-123; Sabine Feist, "Material Culture," in *A Companion to Byzantine Iconoclasm*, ed. Mike Humphreys (Leiden and Boston: Brill, 2021), 261-321, esp. 263-264 (and figs 5.1-2).

<sup>29</sup> See Stavros Lazaris, "Rôles et natures de l'image scientifique à Byzance: étude préliminaire à travers trois

érudits éponymes," *Les Cahiers de Saint-Michel de Cuxa* 54 (2023): 45-61.

<sup>30</sup> See Stavros Lazaris, *Le Physiologus grec*, vol. 2: *Donner à voir la nature*, Micrologus Library 77/2 (Firenze: Sismel Edizioni del Galluzzo, 2021), 25, 89, 93-94, 293-295, 336-339, 342.

<sup>31</sup> See Divna Manolova, "Space, Place, Diagram: Cleomedes and the Visual Program of Munich, Bayerische Staatsbibliothek, Cod.gr. 482," in *The Diagram as Paradigm Cross-Cultural Approaches*, ed. Jeffrey F. Hamburger et al. (Washington, DC: Dumbarton Oaks Research Library and Collection, 2022), 149-165 (and figs 6.3-5).

<sup>32</sup> For studies of this type of manuscript illuminations, see Anderson, *Cosmos and Community*, 107-143; Stavros Lazaris, "Scientific, Medical and Technical Manuscripts," in A



Fig. 4. Helios in his chariot, circled by anthropomorphic representations of the twelve months and the zodiacal cycle. *Vaticanus graecus* 1921 (folio 9r) is an eighth- or ninth-century Byzantine astronomical manuscript of Ptolemy's *Handy Tables*. Wikimedia Commons. Source: at <https://tinyurl.com/yp6n252e> (accessed 20 March 2024).<sup>33</sup>

including the technical illustrations that accompany scientific treatises, paved the way for the development of celestial motifs in church iconography, while these motifs communicated primarily theological, not scientific meanings. As for the Babylonians and the Greeks, scientific literature made redundant the effort to communicate science through the means of sacred art. In turn, astral iconography in sacred settings, whose patterns such as the zodiac derived from illuminations found in scientific treatises, echoed the interest of Byzantium's theologians in things cosmic. In a way, this iconography, which bridges the gap between scientific research and the theological interpretation of reality, amounts to an implicit illumination of theological treatises from the viewpoint of the available science, without the text being present.

## 2.2. Byzantine theology and natural philosophy

Be that as it may, Byzantine theologians were open to science, which will become clear in a moment. They were interested in natural philosophy and their interest legitimised scientific research, presenting it as integral to Byzantine culture, but this cannot be considered the only factor at play. What prompted the shift of that society from reluctance to enthusiasm for all things heavenly, including scientific research, including of the astrological kind, was the Christian

impetus to contextualise the human experience against the cosmic backdrop. The first impulses to that effect—obvious in the popular association of Jesus' birth with the new astrological age of Pisces, hence the acronymic and iconic reference to him as a fish, *ichthys*<sup>34</sup>—continued through the centuries and eventually won the battle against the arguments put forward in refutation of astrology.<sup>35</sup> Byzantine church architecture and iconography, with their decidedly geographical orientation, astral connotations, and cosmic symbolism, are the best expressions of this shift. In this light, the astrological and other occult interests of emperors, nobility, and the intelligentsia, discussed in what follows, are but the tip of the iceberg when it comes to this shift. In the remaining part of this section, I shall discuss matters of theological cosmology and the development of Byzantine astral sciences.

Overall, the early Christian theologians were averse to astrology, especially given the popular use of the zodiac for horoscopes and fortunetelling,<sup>36</sup> a

*Companion to Byzantine Illustrated Manuscripts*, ed. Vasiliki Tsamakda (Leiden and Boston: Brill, 2017), 55-113, esp. 62-69 (and figures 11-14 and 144, unnumbered pages towards the end of the volume).

<sup>33</sup> See Anderson, *Cosmos and Community*, fig. 63 at 124, and the analysis at 123-126; Leslie Brubaker and John Haldon, *Byzantium in the Iconoclast Era, ca 680-850: A History* (Cambridge University Press, 2011), 220-224.

<sup>34</sup> See Jean Daniélou, *Primitive Christian Symbols*, trans. Donald Attwater (London: Burns and Oates, 1964), 50-51; Tuomas Rasimus, "Revisiting the *ICHTHYS*: A Suggestion Concerning the Origins of Christological Fish Symbolism," in *Mystery and Secrecy in the Nag Hammadi Collection and Other Ancient Literature: Ideas and Practices*, ed. Christian H. Bull et al., Nag Hammadi and Manichaean Studies 76 (Leiden and Boston: Brill, 2012), 327-348, esp. 333, 334 n. 33, 337, 341 n. 58.

<sup>35</sup> See Doru Costache, "Transitions in Patristic Cosmology: From Cosmophobia to Universe-(Re)Making," *Religions* 15, special issue: *Patristics: Essays from Australia* (2024): 728, <https://doi.org/10.3390/rel15060728>.

<sup>36</sup> The practice was common in imperial Rome, with Augustus proceeding to consolidate his autocracy even symbolically, by way of calendric and zodiacal representations. See James R. Harrison, *Reading Romans with Roman Eyes: Studies on the*



Fig. 5. "Adoration of the Magi" (Matthew 2:1-2,9-10). The image is found on the sarcophagus of a Christian woman called Severa, kept at Museo civiltà romana, Rome. Wikipedia Commons.

Source: <https://tinyurl.com/35hvb8ms>(accessed 10 December 2023). Credit: Giovanni Dall'Orto.

practice whose pagan origin was considered as dangerous as the idea behind it, namely, the view that astral alignments condition human life and freedom. This idea was inconsistent with the patristic theodicy of free will. Mainstream theologians believed that, if astral determinism is inexorable, human freedom is out of the question and the creator becomes the source of evil.<sup>37</sup> Such a conclusion was unreasonable. Furthermore, because of its use in divination practices, many Byzantines saw the zodiac as opening the floodgates of demonic influence.<sup>38</sup> No wonder the monks of the first Constantinopolitan shrine adorned with a zodiac mosaic, Pantocrator Monastery, in the twelfth century, condemned all astrologers and beneficiaries of astrology, with the anathema being repeated again and again.<sup>39</sup>

Nevertheless, Christian theologians consistently promoted an optimistic cosmology anchored in the scriptural doctrine of creation as "good" and divinely attuned (see Genesis 1:1-2:4; Psalms 148-150; Colossians 1:15-18),<sup>40</sup> articulating a complex worldview that, on occasion, integrated the available scientific information.<sup>41</sup> Mainstream theologians accommodated data from the natural sciences, including astronomy, while they continued to reject the use of astrology for such trivial pursuits as horoscopes—though not for spiritual purposes, where it played a role in the theological interpretation of the universe. Aply, Tim Hegedus showed that, ultimately, it was the "Nativity Star" narrative in Matthew 2 that facilitated the acceptance of astrology.<sup>42</sup> The fact that Ignatius of Antioch identified the star with Christ, or at least a manifestation of his cosmic power that transforms the stars into a heavenly choir,<sup>43</sup> contributed to that end. Material culture—including an early visual representation of the "Adoration of the Magi," described in the next section (see Fig. 5), and the Byzantine zodiacal iconography of later centuries—supports this assessment. To give a few examples, the worldview of many early Christian authors, such as Ignatius, Aristides, Justin, and the anonymous author of *Letter to Diognetus*, was physicalist, evocative of the Aristotelian cosmos; no wonder their many references to cosmic order and

*Social Perspective of Paul* (Lanham and Boulder: Lexington Books and Fortress Academic, 2020), 32-34, 59 n. 40, 63 n. 102, 227, 304. The trend continued. For example, Hadrian issued a coin with *Aion* (the age) surrounded by the zodiac. See Henry Maguire, *Earth and Ocean: The Terrestrial World in Early Byzantine Art* (University Park and London: The Pennsylvania State University Press, 1987), 64; Stephan Heilen, "The Emperor Hadrian in the Horoscopes of Antigonus of Nicaea," in *Horoscopes and Public Spheres Essays on the History of Astrology*, ed. Günther Oestmann et al., *Religion and Society* 42 (Berlin and New York: de Gruyter, 2005), 49-68.

<sup>37</sup> Origen, the Cappadocians, Maximus, and John of Damascus were at the forefront of this argument. Good summaries of this stance can be found in Origen of Alexandria, *On the Principles* prologue.5 and Basil of Caesarea, *Homilies on the Hexaemeron* 6.5. See Henry Chadwick, "Christian Platonism in Origen and Augustine," *Origeniana tertia*, ed. Richard Hanson and Henri Crouzel (Roma: Ateneo, 1985), 217-230; Andrew Louth, *St John Damascene: Tradition and Originality in Byzantine Theology* (Oxford University Press, 2002), 61, 126; Bronwen Neil, "Divine Providence and Free Will in Gregory of Nyssa and His Theological Milieu," in *Cappadocian Legacy: A Critical Appraisal*, ed. Doru Costache and Phillip Kariatlis (Sydney: St Andrew's Orthodox Press, 2013), 315-328; Frances M. Young, "Atonement and Theodicy: Some Explorations," *Studia Patristica* 13:2 (1975): 330-333.

<sup>38</sup> An early Christian case is Tatian's. See Matthew R. Crawford, "The Hostile Devices of the Demented Demons: Tatian on Astrology and Pharmacology," *Journal of Early Christian Studies* 29:1 (2021): 31-60. For later stances, see Efstratios Theodossiou et al., "Astrology in the Early Byzantine Empire and the Anti-Astrology Attitude of the Church Fathers," *European Journal of Science and Theology* 8:2 (2012): 7-24, esp. 18-21; Tutkovski, "Representations of the Zodiac," 277.

<sup>39</sup> Ousterhout, "Architecture, Art and Comnenian Ideology," 145-146.

<sup>40</sup> See Paul M. Blowers, *Drama of the Divine Economy: Creator and Creation in Early Christian Theology and Piety* (Oxford University Press, 2012), 67-78; Paul M. Blowers, "Doctrine of Creation," in *The Oxford Handbook of Early Christian Studies*, ed. Susan Ashbrook Harvey and David G. Hunter (Oxford University Press, 2008), 906-931; Andrew Louth, "The Fathers on Genesis," in *The Book of Genesis: Composition, Reception, and Interpretation*, ed. Craig A. Evans et al., *Supplements to Vetus Testamentum* 152 (Leiden and Boston: Brill, 2012), 561-578.

<sup>41</sup> See Doru Costache, *Humankind and the Cosmos: Early Christian Representations*, *Supplements to Vigiliae Christianae* 170 (Leiden and Boston: Brill, 2021), 52-57, 128-136, 161-167, 229-241, 292-296; Matyáš Havrda, *The So-Called Eighth Stromateus by Clement of Alexandria: Early Christian Reception of Greek Scientific Methodology*, *Philosophia Antiqua* 144 (Leiden and Boston: Brill, 2016), 25-72.

<sup>42</sup> See Hegedus, *Early Christianity and Ancient Astrology*, 201-222. See also Dale C. Allison, Jr., *Studies in Matthew: Interpretation Past and Present* (Grand Rapids, MI: Baker Academic, 2005), 17-41.

<sup>43</sup> See Costache, *Humankind and the Cosmos*, 69-76.



the beauty of the starry sky.<sup>44</sup> While continuing this trend, later authors, such as Basil of Caesarea and Gregory of Nyssa, adopted Ptolemaic cosmography and showed amazement at the quest, the findings, and the theorisations of astronomers, including their prowess at using the zodiac.<sup>45</sup> Later still, against the backdrop of Origen of Alexandria's extensive dealings with the stars, a theologian of the caliber of John of Damascus openly integrated the zodiac into mainstream theological cosmology.<sup>46</sup> It should not come as a surprise, therefore, that many other authors referred to the cosmos as the natural backdrop of theology, with the skies above and their populations being an integral part of Christian comprehensive worldviews.<sup>47</sup>

There is but one step from this optimistic cosmology, together with its astrological dimensions, to the emergence of an ecclesiology of the liturgical space that considered the church temple an image of the universe. It is against this understanding that astral iconography became increasingly complex. I return to this in the next section. What matters at this juncture is that theological cosmology should be credited as an important source of both cosmic ecclesiology and astral iconography. Theological cosmology also contributed to the revival of scientific research in Byzantium, including the fields of astronomy and astrology. This revival, in exchange, accounts for the growing frequency of astral motifs in Christian art.

These developments hold together inextricably and should not be ignored in any analysis of Byzantine zodiacal iconography.

### 2.3. Byzantine astronomy and astrology

I must now turn to relevant developments in Byzantine science, especially in regard to the study of the starry sky. Until recently, scholars believed that Byzantine science consisted exclusively in copying ancient manuscripts and borrowing from foreign sources.<sup>48</sup> This perception has begun to change.<sup>49</sup> The imposing volume recently edited by Lazaris, *A Companion to Byzantine Science*, brought to light a range of scientific advancements—from astronomy and astrology to epistemology and biology, from geography and optics to physics and meteorology, and from chemistry to medicine. Anne Tihon notes that the contributions published in this volume indicate the fertile tension between Byzantines' faithfulness to ancient knowledge, awareness of the science of the Arabs, the Jews, and the Persians, and original research, namely, the astronomical calculations, observations, and theorisations of Byzantine scholars themselves.<sup>50</sup> Below, I offer a summary of Chapter Six in *A Companion to Byzantine Science*, by Anne-Laurence Caudano, which tackles matters of immediate relevance.<sup>51</sup> This chapter is representative for the current understanding of Byzantines' exploration of the sky. In summarising the information presented therein, I also refer to other sources—to provide a rounder view of the field and to challenge one of Caudano's conclusions.

While acknowledging the increasing number of editions of relevant treatises, Caudano begins by addressing the scarcity of detailed analyses of Byzantine astronomical and astrological texts as scientific contributions, not only philologically. She notes the wind of change in the field, however, especially in the wake of Paul Magdalino and Efthymios Nicolaidis' trailblazing research. Turning to the Byzantine astronomers themselves, Caudano points out that they did not dedicate their career exclusively to this undertaking. In her words,

<sup>44</sup> See Costache, *Humankind and the Cosmos*, 18, 55, 62, 74, 75; J. Rebecca Lyman, *Christology and Cosmology: Models of Divine Activity in Origen, Eusebius, and Athanasius*, Oxford Theological Monographs (Oxford: Clarendon Press, 1993), 22-25; F. H. Stander, "The Starhymn in the Epistle of Ignatius to the Ephesians (19:2-3)," *Vigiliae Christianae* 43:3 (1989): 209-214. The interest in Aristotle's physics was a constant of the Byzantine culture, until the end. See Steiris, "Science at the Service of Philosophical Dispute," 103, 106, 108-115.

<sup>45</sup> See Costache, *Humankind and the Cosmos*, 232, 322, 339, 367; George Karamanolis and Daniel L. Schwartz, "Basil of Caesarea (Kappadokia) (ca 365-379 CE)" and "Gregory of Nyssa (Nyssa) (ca 370-ca 395 CE)," in *The Encyclopedia of Ancient Natural Scientists: The Greek Tradition and Its Many Heirs*, ed. Paul T. Keyser and Georgia L. Irby-Massie (London and New York: Routledge, 2008), 189-190, 352; Nicolaidis, *Science and Eastern Orthodoxy*, 8-9; Jaroslav Pelikan, *Christianity and Classical Culture: The Metamorphosis of Natural Theology in the Christian Encounter with Hellenism* (New Haven and London: Yale University Press, 1993), 10-11, 27; Wallace-Hadrill, *The Greek Patristic View of Nature*, 9-21 (this chapter includes many more patristic praises of astronomy).

<sup>46</sup> See Dmitry Biriukov, "The Cosmology of John Damascene and Its Antique Context," *Scrinium* 12 (2016): 353-360; Costache, "Maximus the Confessor and John Damascene's Cosmology," 91; Louth, *St John Damascene*, 117, 126-127, 128-130; Alan Scott, *Origen and the Life of the Stars: A History of an Idea*, Oxford Early Christian Studies (Oxford: Oxford University Press and Clarendon Press, 1991).

<sup>47</sup> See, for example (in chronological order), Clement of Rome, *1 Corinthians* 20; Ignatius of Antioch, *To the Ephesians* 19.2; Justin Martyr, *Second Apology* 4.2; Theophilus of Antioch, *To Autolytus* 1.6; *Letter to Diognetus* 7.2; Athenagoras, *Plea for Christians* 13.2-3; Clement of Alexandria, *Stromateis* 2.51.1; Origen of Alexandria, *On the Principles* prologue.10, 1.7.2-4, 2.11.7; Athanasius of Alexandria, *Against the Gentiles* 27, 29, 35, 37, 44; Basil of Caesarea, *Homilies on the Hexaemeron* 1.4, 6.1, 6.3, 6.9; Gregory the Theologian, *Orations* 6.15, 14.23, and 32.8; Gregory of Nyssa, *On the Making of the Human Being* 1.5 and 3.2; Maximus the Confessor, *Difficulty* 7.12, 10.35, 37.6, 41.2; Gregory Palamas, *One Hundred and Fifty Chapters* 1-29.

<sup>48</sup> For this view, see Crombie, *Medieval and Early Modern Science*, 188, 209; Lindberg, *The Beginnings of Western Science*, 159-162; Otto Neugebauer, *A History of Ancient Mathematical Astronomy*, Studies in the History of Mathematics and Physical Sciences 1 (New York: Springer, 1975), 9-12. For a summary of this stance, see Tihon, "Les Sciences Exactes à Byzance," 380-381.

<sup>49</sup> See Magdalino, *L'Orthodoxie des astrologues*, 9-15; Maria Mavroudi, "Science, Byzantine," in *The Encyclopedia of Ancient History*, ed. Roger S. Bagnall et al. (Blackwell Publishing, 2013), 6063-6065, <https://doi.org/10.1002/9781444338386.wbeah03209>; Nicolaidis, *Science and Eastern Orthodoxy*, 69-93.

<sup>50</sup> See Anne Tihon, "Conclusion," in *A Companion to Byzantine Science*, 596-601. Already Spanos pointed out the need to assess Byzantine science and technology from within that culture, not through the lens of modern Western ideas ("Some Preliminary Thoughts on the Study of Byzantine Innovation," 57). For Theodore Metochites' openness to new knowledge and innovation, see Ioannis Polemis, *Theodore Metochites: Patterns of Self-Representation in Fourteenth-Century Byzantium*, New Directions in Byzantine Studies (London and New York: I. B. Tauris, 2024), 63-72.

<sup>51</sup> See Anne-Laurence Caudano, "Astronomy and Astrology," in *A Companion to Byzantine Science*, 202-230.



Fig. 6. Representation of the “seventh day” of creation at Genesis 1-2 in Ptolemaic fashion. Image from Hartmann Schedel’s *Nuremberg Chronicle (Liber Chronicarum)* of 1493, folio 5v. The zodiacal wheel features as the outermost layer of the visible cosmos. Source: The University of Sydney Library’s Rare Books and Special Collections.<sup>52</sup>

“Byzantine astronomers were generally conversant in other fields; astronomy was rarely their only activity.”<sup>53</sup> Their interests were encyclopaedic. Even so, they “understood and transposed [their knowledge of the sky] in mathematical terms, through geometrical models and arithmetical procedures,” leaving the nature of the heavens for philosophers to debate.<sup>54</sup> Long ago, Tatakis showed that the Byzantines’ application of mathematics to celestial mechanics and for the purposes of predicting eclipses was a remarkable development. It revolutionised the Aristotelian tradition of keeping the theoretical and the practical sciences apart.<sup>55</sup> I take this opportunity to point out that this development challenges the modern conviction that nothing significant happened

from Archimedes to Copernicus and Galileo in terms of applied mathematics. But what matters, here, is that precisely the mathematical articulation is what marks the difference between Byzantine astronomy (which derived from the Ptolemaic system of the world; see Fig. 6) and the worldviews of authors not involved in research, who entertained strange ideas about the universe.<sup>56</sup>

Caudano presents the Ptolemaic system as foundational to the Byzantine astronomical canon, both in its own right and accompanied by commentaries and mathematical refinements added in Late Antiquity, especially from Alexandrian and Athenian scholars.<sup>57</sup> It is an Alexandrian astronomer and thinker, John Philoponus, who composed the now oldest treatise on the use of the astrolabe<sup>58</sup> (and whose works contributed significantly to the

<sup>52</sup> Call number: Incunabula 93.4. Available at <https://tinyurl.com/26mfyfw5> (accessed 15 May 2024). Reproduced with permission. The image shows a geocentric universe which, by and large, is how Byzantine astronomers conceived of reality.

<sup>53</sup> Caudano, “Astronomy and Astrology,” 203.

<sup>54</sup> Caudano, “Astronomy and Astrology,” 204. For the use of mathematics in Byzantine astronomy, see Neugebauer, *A History of Ancient Mathematical Astronomy*, 2, 122-123; Steiris, “Science at the Service of Philosophical Dispute,” 105-108, 110, 119.

<sup>55</sup> See Tatakis, *Christian Philosophy*, 156-157, 286-290, 295-296. The same goes for Metochites’ stance on the practical technological applications of mathematical theory. See Tatakis, *Christian Philosophy*, 293-294. The sources of Byzantine mathematical astronomy were ancient. For a survey of these antecedents, from Hipparchus to Ptolemy, see Reviel Netz, *A New History of Greek Mathematics* (Cambridge University Press, 2022), 266-386, 436-454.

<sup>56</sup> See Caudano, “Astronomy and Astrology,” 210-211, 217. For the sixth-century case of Cosmas Indicopleustes, typical for nonscientific worldviews, see Maja Kominko, “The *Christian Topography* of Kosmas Indicopleustes,” in *A Companion to Byzantine Illustrated Manuscripts*, 395-406; Maja Kominko, *The World of Kosmas: Illustrated Byzantine Codices of the Christian Topography* (Cambridge University Press, 2013); V. N. Manimanis et al., “Cosmas Indicopleustes and His Model of the Universum,” *Publications of the Astronomical Observatory of Belgrade* 96 (2017): 413-418.

<sup>57</sup> Caudano, “Astronomy and Astrology,” 205-207.

<sup>58</sup> Caudano, “Astronomy and Astrology,” 207. See also Hervé Inglebert, “‘Inner’ and ‘Outer’: The Debate Between Faith and Reason in Late Antiquity,” in *A Companion to Byzantine Science*, 27-52, esp. 47.

Christian appropriation of astronomy).<sup>59</sup> The same goes for Byzantine astrology, considered a practical application of astronomy, which was based on Ptolemy's *Handy Tables* but modified by later authors.

The progress of astronomy and astrology slowed down during the iconoclast crises of the eighth and the ninth centuries, when relevant activities consisted mainly in absorbing Arab contributions.<sup>60</sup> That said, astrological skills were assiduously cultivated, with the trend continuing in the next couple of centuries, when emperors and nobility relied more and more on astrologers for personal horoscopes.<sup>61</sup> In the eleventh century and in the next one, the Byzantines rediscovered Ptolemy, whose worldview they reconsidered from the viewpoint of recently acquired knowledge, dubbed "modern."<sup>62</sup> New calculations were done for astronomical items and geographical locations. It is at this time that astronomical research—in its mathematical aspect—began to be conducted apart from astrological concerns. Furthermore, with Michael Psellos, astronomical research was incorporated into cosmological speculation,<sup>63</sup> while renewed suspicions were formulated in regard to divinatory astrology, though not about its use for medical purposes.<sup>64</sup> The thirteenth century marked a new low for Byzantine astronomy and astrology, caused by the fall of Constantinople to the crusaders. Mathematical astronomy was sidelined, whereas with Nikephoros Blemmydes and Theodore II Laskaris cosmological or metaphysical ideas flourished.<sup>65</sup> After 1261, Constantinople being restored as the Empire's capital city, astronomical studies proper, in conjunction with mathematics, developed at an unprecedented rate, both about bringing the field up to date (especially by engaging Jewish and Persian science) and in terms of education.<sup>66</sup>

This phase culminated in the contributions of Theodore Metochites, who returned to a rigorous study of Ptolemy and his interpreters, without attempting to bridge the gap between Greek and Persian science.<sup>67</sup> It is noteworthy that, as Ptolemy did

in Late Antiquity, Metochites considered the zodiac a universal constant, so to speak, against which he measured the movement of other celestial bodies, including the Sun.<sup>68</sup> The contributions of Metochites' disciple, Nikephoros Gregoras (who improved the astrolabe and wrote a treatise on its use), mark the beginning of a more active stage of development. The hallmarks of this stage are the critical engagement of Persian astronomy and the translation of treatises from that language, as well as the progress of Byzantine scholars in terms of predicting eclipses and the positions of the planets.<sup>69</sup> With Theodore Melitiniotes and his successors, Ptolemaic and Persian astronomy received equal attention, as a tacit acknowledgment of the imperfections of both systems. Tradition prevented most of these scholars from openly criticising Ptolemy, but they were able to make more accurate calculations than his *Tables* made possible. Exceptions from the customary reverence towards Ptolemy were not missing, however. Georgios Steiris discusses the critical approach of George of Trebizond to both Ptolemy and his commentators, old and recent alike.<sup>70</sup>

Caudano concludes with the statement that, overall, whereas Byzantine astronomy was mathematically grounded, it was not observational.<sup>71</sup> This conclusion requires nuancing. The many treatises on the use of the astrolabe the Byzantines wrote<sup>72</sup> and their references to eclipses<sup>73</sup> denote active observation of the sky. A very recent article by Johannes Preiser-Kapeller indirectly corroborates this point.<sup>74</sup> That the Byzantines were keen observers of the heavens is further confirmed by the cosmically

interest in astronomy, see Polemis, *Theodore Metochites*, 5-6, 26, 28, 33, 86, 148.

<sup>68</sup> See Theodore Metochites, *Stoicheiosis* 1.16, in Paschos and Simelidis, *Introduction to Astronomy*, 130-133. Manolova's analysis of the zodiac in the fourteenth-century manuscript of Cleomedes brought to light further aspects of this universal constant in late Byzantium (Manolova, "Space, Place, Diagram," 153-159).

<sup>69</sup> Caudano, "Astronomy and Astrology," 221-225. For Gregoras' interest in astronomy, see Polemis, *Theodore Metochites*, 30, 109, 161; Divna Manolova, "The Student Becomes the Teacher: Nikephoros Gregoras' *Hortatory Letter Concerning Astronomy*," in *Toward a Historical Sociolinguistic Poetics of Medieval Greek*, ed. Andrea M. Cuomo and Erich Trapp, Studies in Byzantine History and Civilization 12 (Turnhout: Brepols, 2017), 143-160; Divna Manolova, "Discourses of Science and Philosophy in the Letters of Nikephoros Gregoras," PhD dissertation (Budapest: Central European University, 2014). Caudano ("Astronomy and Astrology," 223-224) points out the fact that, as marginal notes on manuscripts make obvious, advancements in astronomy were understood as astrologically useful, albeit not in terms of predicting human destiny. Nevertheless, astrology flourished in the last centuries of Byzantium ("Astronomy and Astrology," 225-226). For other contributors in Byzantium's last centuries, see Magdalino, *L'Orthodoxie des astrologues*, 133-160.

<sup>70</sup> Steiris, "Science at the Service of Philosophical Dispute," 104-108.

<sup>71</sup> Caudano, "Astronomy and Astrology," 230.

<sup>72</sup> See Caudano, "Astronomy and Astrology," 207, 210, 214-215, 221, 222, 224-225, 226; Manolova, "The Student Becomes the Teacher," 146-147, 149-150.

<sup>73</sup> See Caudano, "Astronomy and Astrology," 203, 209, 210, 214, 215, 217, 218, 221, 223, 225-226, 227, 229; Manolova, "The Student Becomes the Teacher," 144, 146-149, 151-152, 155. Eclipses were not merely predicted; they served as a form of testing the accuracy of mathematical calculations through observation.

<sup>74</sup> Preiser-Kapeller, "Restless Skies," 14-18.

<sup>59</sup> I am grateful to a *DMAE* anonymous reviewer for this point.

<sup>60</sup> Caudano, "Astronomy and Astrology," 210-213. For astrological developments during this timeframe, see Magdalino, *L'Orthodoxie des astrologues*, 17-32, followed by an extensive study of Stephanos of Alexandria's contributions at 33-54.

<sup>61</sup> Caudano, "Astronomy and Astrology," 211, 213-214.

<sup>62</sup> Caudano, "Astronomy and Astrology," 213-218.

<sup>63</sup> Caudano, "Astronomy and Astrology," 215-216. For Psellos' contributions and the accounts of Anna Komnene, see Magdalino, *L'Orthodoxie des astrologues*, 91-107. For the formidable scientific patronage of Anna Komnene, see Peter Adamson, *A History of Philosophy Without Any Gaps*, vol. 6: *Byzantine and Renaissance Philosophy* (Oxford University Press, 2022), 72-78.

<sup>64</sup> Caudano, "Astronomy and Astrology," 216-217.

<sup>65</sup> Caudano, "Astronomy and Astrology," 218-219.

<sup>66</sup> The Byzantine engagement of Jewish astronomy and astrology reached its apogee in the relevant works of George Gemistos Plethon. See Caudano, "Astronomy and Astrology," 226-228.

<sup>67</sup> Caudano, "Astronomy and Astrology," 219-220. Steiris points out that Metochites explicitly "attempted to purify astronomy from its Arabic and Persian influences" ("Science at the Service of Philosophical Dispute," 110). For an assessment of Metochites' contributions at the nexus of astronomy and philosophy in *Stoicheiosis Astronomike* (with brief references to other Byzantine astronomers), see Paschos and Simelidis, *Introduction to Astronomy*, 1-7. For an analysis of the text of *Stoicheiosis* 1.5-30, see *ibid.*, 343-380. For Metochites'

and geographically oriented architecture of their churches, and by the astral iconography that adorned the shrines. And while this ecclesiastical confirmation has no value for the history of science, at least it denotes the widespread impact of astronomy and astrology upon Byzantine society.

Before turning to astral iconography, a question must be asked: Does the above discussion constitute a compelling proof of Byzantines' genuine progress in regard to exploring the starry sky? For me, the answer to this question is positive. The growing body of contemporary scholarship, including the very recent research of Caudano, Lazaris, Manolova, Preiser-Kapeller, and Steiris, confirms it. The Byzantines did not merely borrow ways of calculating distances, positions, and the movements of celestial objects from other cultures; they were great mathematicians and innovators who pushed forward the boundaries of knowledge. It is this progress, supported by a theological tradition of openness to research, that the Byzantine refugees—from the fourteenth century on—brought to the West, thus contributing to the birth of modern science. That said, the technological aids at their disposal, such as the astrolabe and the armillary sphere, could not lead to more significant discoveries. In this sense, despite the long history of ancient and medieval mathematical astronomy, all premodern science was of one piece and did not differ much from the aeons of prehistoric observations of celestial phenomena. Astronomical knowledge relied on naked eye observation. What matters for my purposes, however, is the widespread popularity of exploring the heavens in Byzantium, as either astronomy or astrology—considered vital for securing and deepening the human experience in the here and now—which made possible the development of astral iconography. This iconography, we shall see in what follows, no longer performed the crucial role of communicating astronomical knowledge, as it did in prehistory. Nevertheless, it denoted the significant role played by astronomical and astrological knowledge in articulating the human experience against the backdrop of a cosmos characterised by mathematical harmony.

### 3. Astral motifs in Byzantine iconography

We have seen above that, corresponding to the experience of prehistoric and ancient societies, which defined their rhythms against the cosmic backdrop, not on the lineaments of historical human agency,<sup>75</sup> the Byzantines viewed themselves as living within God's creation, the universe. This cosmic cast of mind is obvious in various expressions of their worldview, from astronomical and astrological treatises to theological and exegetical works to hagiography to liturgical texts to iconography and, why not, the daily rhythms of all walks of life. In what follows, I focus on the iconographical embodiment

of this worldview in sacred settings, especially the Byzantines' ways of picturing the starry sky. While drawing upon early Christian antecedents, the astral iconography of Byzantium became increasingly complex, and continued to develop in the post-Byzantine era. It includes images of isolated stars and other familiar items, such as the Sun and the Moon, sometimes heavily stylised; whole heavenly sceneries, especially rendered on ceilings; and structured representations such as the cycle of the zodiac, by itself and as integral to more complex compositions. It is in this very order that I will conduct my analysis—but not before pointing out that in most cases discussed here sidereal sceneries are theologically framed as pointers to Christ *Pantokrator's* cosmic dominion (see Fig. 7).

### 3.1. Stellar representations

I begin by discussing stellar imagery, more specifically the representation of single or small groups of stars. What seems to be the earliest Christian etching of a single star, on Severa's sarcophagus, dating to the third century (see Fig. 5), captures Matthew's "Nativity Star" narrative and the "Adoration of the Magi." Both the narrative and its artistic rendition make a clear connection between Christ and the cosmic object, the star guiding the astrologers to the Lord of all. As we know, from at least Ignatius of Antioch (see above), Christians took the star as Christ's celestial symbol. The prominence of this scriptural episode in the New Testament, together with recurrent assertions of Christ's cosmic status as Creator and Saviour,<sup>76</sup> gave occasion to a stream of celestial depictions, with or without Christ's star being present. Equally impactful must have been the apocalyptic motif of Christ holding seven stars in his hand.<sup>77</sup> From text to image there is but one step, as the rich history of manuscript illumination and other items of material culture prove it. Accordingly, early Christian artists adorned their depictions of sacred stories by stellar imagery, most times charged with theological and symbolic significance, either directly or indirectly. The star etched on Severa's sarcophagus is six-pointed, whose rays are irregularly drawn like a daisy's petals around what resembles a central flowerhead. Here, theology is in the composition in its entirety, with the star itself appearing as a mediator of the pilgrims' divine experience, not as the object of their attention. Similarly floral are the stars pictured in the sixth-century illumination of Abraham's vision in the Vienna Genesis, where they are exquisitely rendered (see Fig. 8).<sup>78</sup> Corresponding to the etching on Severa's sarcophagus, these stars do

<sup>75</sup> Mircea Eliade, *Cosmos and History: The Myth of the Eternal Return*, trans. Willard R. Trask (New York: Harper Torchbooks, 1959), 112-130; Mircea Eliade, *The Sacred and the Profane: The Nature of Religion*, trans. Willard R. Trask (New York: Harcourt, 1959), 17, 62; Frances Young, "Christian Teaching," in *The Cambridge History of Early Christian Literature*, ed. Frances Young et al. (Cambridge University Press, 2004), 91-104, esp. 100.

<sup>76</sup> See Colossians 1:15-18; Hebrews 1:1-3; John 1:1-3.

<sup>77</sup> Revelation 2:1. For an analysis of this apocalyptic motif, see Bogdan Gabriel Bucur, *Angelomorphic Pneumatology: Clement of Alexandria and Other Early Christian Witnesses*, Supplements to *Vigiliae Christianae* 95 (Leiden and Boston: Brill, 2009), 94-95.

<sup>78</sup> For technical analyses of this manuscript, see *The Vienna Genesis: Material Analysis and Conservation of a Late Antique Illuminated Manuscript on Purple Parchment*, ed. Christa Hofmann (Wien: Böhlau Verlag, 2020). A reproduction of Abraham's dream and "Joseph's Dream" is found at 213 (fig. 6).



Fig. 7. Christ *Pantokrator* at Saint Demetrius church, Mystras. Wikimedia Commons. Source: <https://tinyurl.com/jyzzr8z3> (accessed 10 December 2023). Credit: Holger Uwe Schmitt.



Fig. 8. "Abraham Promised Posterity" (detail), Vienna Genesis. Photo by Everett Ferguson. Source: <https://tinyurl.com/5vwa2t8j> (accessed 12 December 2023).

not seem to have an explicit theological meaning. They function as a cosmic backdrop for the encounter between the patriarch and God, being endowed with theological significance insofar as they mediate this encounter. In making this point, I am thinking of Clement of Alexandria who, before Severa's sarcophagus was made, asserted that what drove the patriarch's attention to God was his interest in the skies above.<sup>79</sup> The Vienna Genesis appears to echo Clement's understanding.

Sometimes, however, the theological and the symbolic meaning of the stars is immediately obvious. Yet another "Adoration of the Magi," sculpted on a fourth-century sarcophagus discovered in the Vatican cemetery, has the Nativity star rendered as the cosmic wheel with six spokes.<sup>80</sup> The cosmic wheel is borrowed from Roman imperial iconography, usually alluding to the yearly cycle or the completion of the universe, to rebirth and renewal.<sup>81</sup> As a Christian iteration of the Roman motif, the Vatican star might encode the "six days" of the Genesis "Creation" narrative; in so doing, it points to Christ as Maker and Master of the cosmos. In turn, a third-century Christian lamp found in Rome shows Christ as the "Good Shepherd" surrounded by the seven stars of Revelation, of which some are six-pointed, etched in the form of the Jewish "Star of David," while others appear as five- and eight-pointed objects.<sup>82</sup>

The presence of stars of different form evokes the Egyptian zodiac of Nut, which combines four-, five-, and eight-pointed items (see Fig. 2). Somewhat similar, the icon of Christ *Pantokrator* painted on the dome of the thirteenth-century cathedral church of Saint Demetrius, Mystras,<sup>83</sup> is surrounded by six-pointed and eight-pointed stars, the other two celestial bodies being the Sun and the Moon (see Fig. 7). More complex depictions feature among the murals of what passes for the oldest Christian art in sacred settings, the Dura Europos church, dating to the middle of the third century. One particular composition there—the myrrh-bearing women at Christ's tomb—shows two large stars on each side of the tomb, both eleven-pointed (see Fig. 9),<sup>84</sup> possibly corresponding to the number of apostles after Judas' downfall.<sup>85</sup> In all these instances, the celestial objects themselves seem to be charged with theological and symbolic significance.

Oftentimes stars appear, from the earliest days of Christian art to the close of the Byzantine era, as eight-pointed objects. This convention may have derived from the widespread Christogram, a symbol that resulted from the juxtaposition of the Greek letters X and P, the first two letters of the word "Christ," and the square cross, sometimes inscribed within a circle. The resulting image is the cosmic wheel with eight spokes,<sup>86</sup> where the eight radii signify, in the Byzantine worldview, together with the ancient ideas of rebirth and resurrection, the age to come or the consummation, the "eighth day" of the creation. For example, the fourteenth-century mosaics of Chora Monastery in Istanbul, restored with Theodore Metochites' funds, include a majestic depiction of the cosmic wheel with a core and ten concentric circles of different widths and ornamentation, from the centre of which springs forth a modified Christogram formed by the Greek letter X juxtaposed with the

<sup>79</sup> See Clement, *Stromateis* 2.5.20; 5.1.8.

<sup>80</sup> See Jeffrey Spier, "The Path to Salvation," in *Picturing the Bible: The Earliest Christian Art*, ed. Jeffrey Spier (New Haven and London: Yale University Press, 2007), 206-216, esp. 209. An identical representation can be found in the floor mosaics of the twelfth-century Pantokrator Monastery in Constantinople. See Ousterhout, "Architecture, Art and Comnenian Ideology," fig. 3 at 138. One of the earliest images of the cosmic wheel with six radii, but not circumscribed, is found in Armenia's Neolithic rock art of Gegham Mountains. See <http://astrotourism.aras.am/sites/rockart.php> (accessed 20 March 2024).

<sup>81</sup> In the fourth century, the variously called "calendar" or "chronograph" of 354 depicts Emperor Constantius II with a halo around his head, sitting on a throne under an arch, with two wheels being depicted in the upper tier of the image. The wheels have twelve and thirteen spokes, respectively, signifying the course of the year. A reproduction of this image can be found at <https://tinyurl.com/2npt2s93> (accessed 12 December 2023). For relevant studies, see Richard W. Burgess, "The New Edition of the *Chronograph of 354*: A Detailed Critique," *Zeitschrift für Antikes Christentum* 21:2 (2017): 383-415; R. W. Burgess, "The Chronograph of 354: Its Manuscripts, Contents, and History," *Journal of Late Antiquity* 5.2 (2013): 345-396; Stephen R. Zwirn, "Drawing of the Calendar of 354," in *Age of Spirituality: Late Antique and Early Christian Art, Third to Seventh Century*, ed. Kurt Weitzmann (New York: Metropolitan Museum of Art and Princeton University Press, 1979), 78-79.

<sup>82</sup> Jeffrey Spier, "Exegesis and the Earliest Christian Images," in *Picturing the Bible*, 171-202, esp. 172. The "Star of David" features again on the pavement mosaics of Blachernai Monastery in Constantinople, dating to the ninth century. See Henry Maguire, "The Medieval Floors of the Great Palace," in *Byzantine Constantinople: Monuments, Topography and Everyday Life*, ed. Nevra Necipoğlu (Leiden and Boston: Brill, 2001), 153-174, esp. fig. 6 at 165. The six-pointed stars that orbit the central cross of an apse of the Hagia Sophia church in Thessaloniki, a mosaic dating to the iconoclast era (ninth century), do not look like the "Star of David" though, nor do they resemble the floral stars of the "Nativity" images mentioned above. Available at <https://tinyurl.com/3uxbhxap> (accessed 10 December 2023). For a description of this image, see Brubaker and Haldon, *Byzantium in the Iconoclast Era*, 295-296.

<sup>83</sup> For information about this church, see Manolis Chatzidakis, *Mystras: The Medieval City and the Castle* (Athens: Ekdotike Athenon, 1994), 25-45; Uroš T. Todorović, *Modernism of the Frescoes of Mistra: From the Byzantine Frescoes of Mistra to the 20th Century Abstract Painting*, Contemporary Christian Thought Series 87 (Alhambra, CA: Sebastian Press, 2024), 17-20. Similar six-pointed stars (interspersed with a couple of five-pointed ones) are present in other thirteenth-century frescoes, such as the "Elevation of the Holy Cross" in the Church of the Virgin, Udabno Monastery, Gareji. See *Davidgareji Monasteries*, ed. Dimitri Tumanishvili et al. (Ministry of Culture, Monument Protection and Sport of Georgia, 2007), 60-61 (unnumbered pages).

<sup>84</sup> Available at <https://tinyurl.com/52mdk776> (accessed 10 December 2023).

<sup>85</sup> See Ellen Swift and Anne Alwis, "The Role of Late Antique Art in Early Christian Worship: A Reconsideration of the Iconography of the 'Starry Sky' in the 'Mausoleum' of Galla Placidia," *Papers of the British School at Rome* 78 (2010): 193-217 and 352-354, esp. 194-197.

<sup>86</sup> See Titus Burckhardt, *The Foundations of Christian Art—Illustrated*, ed. Michale Oren Fitzgerald (Bloomington, IN: World Wisdom, 2006), 39-40; Rasmus, "Revisiting the ICHTHYS," 337-340, 343-346; Spier, "Exegesis and the Earliest Christian Images," 200. The earliest source of this motif I could find is the MUL word in Old Babylonian, written as three eight-pointed stars and meaning, unsurprisingly, "stars." See Maria Teresa Renzi-Sepe, "Before the Zodiac: The Pleiades in Mesopotamian Divination and Their Legacy in Zodiacal Literature," *Zodiacblog*, Freien Universität Berlin (24 April 2023), available at <https://tinyurl.com/yscpdhdc> (accessed 10 January 2024).



Fig. 9. Myrrh-bearing women's procession to Christ's tomb includes a complex star. Dura Europos. Wikimedia Commons.

Source: <https://tinyurl.com/45h3hhnj> (accessed 10 December 2023).

cross.<sup>87</sup> This composition symbolises Christ as the Sun, the centre of the known universe, the latter signified by the celestial spheres.

Eight-pointed stars can be found in many other contexts, from the fifth-century mosaic of the "Good Shepherd" in the mausoleum of Galla Placidia in Ravenna<sup>88</sup> to "Joseph's Dream" in the Vienna Genesis,<sup>89</sup> and from the sixth-century Justinianic star at Hagia Sophia, Istanbul,<sup>90</sup> to the mosaic decoration flanking the portrait of tenth-century Emperor Alexander in the same Hagia Sophia,<sup>91</sup> to the stars that adorn the cosmic *mandorla* of Christ descending to hell at Chora Monastery's famous *Anastasis* fresco.<sup>92</sup> In fact, the Galla Placidia mosaics display entire fields of stars, all of which being eight-pointed, regardless of whether they are minutely stylised, like those that frame the "Good Shepherd" composition,

or rendered schematically, such as those that serve as a background for the cross at the centre of the four Evangelists, symbolically rendered by the faces of the heavenly beings of Ezekiel 1:10 (see Fig. 12).<sup>93</sup> The same goes for the earliest church ceiling painted as a field of white stars on an azure blue background, at Dura Europos,<sup>94</sup> where the eight-pointed stars also include eight dots between the beams (see Fig. 10).

There are intermediary representations too, which combine various motifs. For example, the beautifully executed "Nativity" panel of a sixth-century reliquary from Syria, currently at the Lateran Palace, Rome, shows an eight-pointed floral star as the cosmic wheel affixed to the ceiling of the cave.<sup>95</sup> Likewise, the (possibly) seventh-century Christian tomb of Karacaören Island has stars rendered as cosmic wheels with eight spokes; this is another example of a ceiling depicting celestial sceneries.<sup>96</sup> No wonder even much later, in the sixteenth century, clusters of eight-pointed stars are interspersed with various sacred figures on the dome and walls of Great Lavra's *katholikon* at Mount Athos.<sup>97</sup>

<sup>87</sup> See Robert Ousterhout, *The Art of the Kariye Camii* (London: Scala Publishers, 2002), 63.

<sup>88</sup> Available at <https://tinyurl.com/bddc4p9n> (accessed 10 December 2023).

<sup>89</sup> A reproduction of "Joseph's Dream" can be found in vol. *The Vienna Genesis*, 318 (fig. 29). For an analysis, see Herbert L. Kessler, "The Word Made Flesh in Early Decorated Bibles," in *Picturing the Bible*, 141-170, esp. 158-159.

<sup>90</sup> See Natalia B. Teteriatnikov, *Mosaics of Hagia Sophia, Istanbul: The Fossati Restoration and the Work of the Byzantine Institute* (Washington, DC: Dumbarton Oaks Research Library and Collection, 1998), fig. 4 at 10. For other eight-pointed stars at Hagia Sophia, see *ibid.*, figs 9-10 at 13-14.

<sup>91</sup> Paul A. Underwood and Ernest J. W. Hawkins, "The Mosaics of Hagia Sophia at Istanbul: The Portrait of the Emperor Alexander: A Report on Work Done by the Byzantine Institute in 1959 and 1960," *Dumbarton Oaks Papers* 15 (1961): 187-217, esp. 201-202.

<sup>92</sup> Available at <https://tinyurl.com/329cxxn6> (accessed 12 December 2023).

<sup>93</sup> See Swift and Alwis, "The Role of Late Antique Art," 199-205.

<sup>94</sup> See Tsuji, "The Starry Night," 156.

<sup>95</sup> Available at <https://tinyurl.com/2s3u97rw> (accessed 10 December 2023).

<sup>96</sup> Tsuji, "The Starry Night," fig. 9 at 160 (and the description of 153). Interestingly, the twelfth-century mosaic depiction of the cosmic wheel with eight spokes in the Aosta cathedral represents the Sun, not a star. See Xavier Barral i Altet, "Un programme iconographique occidental pour le pavement médiéval de l'église du Christ Pantocrator de Constantinople," *Convivium* 2:1 (2015): 218-233, fig. 10 at 228, <https://doi.org/10.1484/J.CONVI.5.111167>.

<sup>97</sup> See Sotiris Bogiatzis, *Το καθολικό της Ιεράς Μονής Μεγίστης Λαύρας στο Άγιον Όρος: Ιστορία και αρχιτεκτονική* (The main



Fig. 10. Starry skies at Dura Europos' baptistry. Wikimedia Commons.

Source: <https://tinyurl.com/mr3rvhra> (accessed 10 December 2023).

### 3.2. The “great luminaries”

Against this backdrop, images of the Sun and the Moon are frequently stylised. For example, the “Crucifixion” mural of the fourteenth-century Visoki Dečani Monastery has the two “great luminaries” of Genesis 1:17 as flying chariots inhabited by humanoid figures, flanking the crucified Christ and heading towards the image’s right side.<sup>98</sup> The attitude of the two celestial bodies signifies the succession of night and day. Without the nuance of temporal succession, similarly stylised celestial bodies appear in the same fourteenth century in relation to the zodiac of Lesnovo church (see Fig. 13),<sup>99</sup> and later, in a seventeenth-century addition to the murals of Svetitskhoveli Cathedral, Mtskheta (see Fig. 15), next to the crucified Christ, as semicircles casting beams of light towards him.<sup>100</sup>

Much earlier, without stylising the Sun and the Moon to such an extent, the fifth-century Codex Rabbula depicts them as personified witnesses of Christ’s Ascension. They contemplate the Lord’s glory through human eyes, from the upper corners of the composition, bathing him in fiery and silvery rays, respectively.<sup>101</sup> Less complex are the images of the “great luminaries” of the “Scroll of Heaven” composition, at Chora, in the fourteen century (see Fig. 11). There, the Sun, turned red and casting feeble rays, has anthropomorphic traits, while the Moon is in the waning crescent phase, horizontally, deprived of human features. All around them are delicately sketched eight-pointed golden stars, still visible against the greyish-white backdrop of the rolling scroll of the universe at the end of time.<sup>102</sup>

church of the Holy Monastery of Great Lavra at the Holy Mountain: History and architecture) (Athens: Kapon, 2019), fig. 5 at 14; fig. 43 at 34, figs 150-151 at 98.

<sup>98</sup> Available at <https://tinyurl.com/2e42vrjc> (accessed 8 December 2023).

<sup>99</sup> See Ivana Lemcool, “Astronomical Imagery in the Painting of the Lesnovo Narthex: Iconographic Innovations in Serbian Medieval Art,” in *Eight Century of Autocephaly of the Serbian Orthodox Church*, two vols (Belgrade, 2020), 2: 477-493, fig. 2 at 479 (and the analysis at 487-488).

<sup>100</sup> The representation is found on the ciborium of the “Life-Giving-Pilar,” west side. See Mariam Didebulidze, “Murals of Svetitskhoveli Cathedral in Mtskheta,” *Atinati* (7 July 2023),

available at <https://tinyurl.com/4hhy7677> (accessed 10 January 2024).

<sup>101</sup> Available at <https://tinyurl.com/2h7kajy2> (accessed 8 December 2023).

<sup>102</sup> See Ousterhout, *The Art of the Kariye Camii*, 112-113. While scholars do not associate any meaning to it (see, e.g., Lemcool, “Astronomical Imagery,” 488), a series of six concentric grey circles appear next to the zodiac at Lesnovo, which resemble the Chora “scroll” under the guise of a concentric universe. See <https://tinyurl.com/yjw5se> (accessed 10 January 2024). It is possible, however, that this suite of concentric circles is another rendition of the Sun, explicitly represented at Lesnovo as a ten-spoked wheel situated symmetrically to the concentric circles, on the other side of the zodiac. This symmetry appears to replicate,





Fig. 11. The "Scroll of Heaven." Chora, Kariye Camii. Wikimedia Commons.  
Source: <https://tinyurl.com/38h6ytv6> (accessed 8 December 2023).



Figure 12. Field of eight-pointed stars. Galla Placidia. Wikimedia Commons.  
Source: <https://tinyurl.com/aeuch8vn> (accessed 10 December 2023).<sup>108</sup>

The composition in its entirety evokes the image of a white hole that absorbs, rather than ejects, stellar matter. The main bodies, the Sun and the Moon, follow the pattern already set by the “Crucifixion” illumination of Codex Rabbula, where only the Sun has a face, while the Moon merely shares in its roundness.<sup>103</sup> Similarly, the Mystras *Pantokrator* mural has the Sun and the Moon as two circles next to Christ’s head (see Fig. 7); they present features that are now barely visible and by no means indicating minute elaboration. Much clearer are the depictions of the Sun and the Moon next to Christ’s figure in the dome of the Hosios Loukas church. While this composition does not hail from the eleventh-century, being added at a later stage, what makes it relevant here is the rendition of the “great luminaries” as physical objects surrounded by haloes of concentric circles. The initials IC XC superposed to the two celestial bodies create a wonderful effect: The Sun and the Moon bear the signature of their Maker.<sup>104</sup>

Alongside this group of sacred images, the “great luminaries” often feature in the *Physiologus*, the first Christian work of natural philosophy whose Byzantine copies sometimes include illuminations. In many manuscripts of this kind, mostly the Sun appears in anthropomorphic guise<sup>105</sup> possibly serving as a model for murals such as that of Visoki Dečani, earlier mentioned. One depiction, however, shows the Sun as a physical heavenly body, a circle from which shine five groups of three beams each; the disk includes what seems to be an imperial personification of the Sun itself.<sup>106</sup> This overlap between the Sun and the insignia of the Empire could have derived from earlier representations of the

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unconsciously perhaps, ancestral representations of the Sun, such as the Neolithic ones in Armenia’s mountains. See K. S. Tokhatyan, “Rock Carvings of Armenia,” *Communications of the Byurakan Astrophysical Observatory* 64/1 (2017): 61-83, esp. 66, 70. The same goes for the Iron Age ones at Carschenna, Switzerland. See <https://tinyurl.com/mvp383x4> (accessed 10 December 2023).

<sup>103</sup> Available at <https://tinyurl.com/mvp9255a> (accessed 8 December 2023).

<sup>104</sup> Available at <https://tinyurl.com/2wv3vj79> (accessed 8 December 2023).

<sup>105</sup> See Lazaris, *Le Physiologus grec*, vol. 2, fig. 11, fig. 13, and fig. 124 (descriptions of these images can be found at 109 and 186). In turn, fig. 108 shows the semicircle of a dark sky, bordered by a band of light—perhaps denoting the cycle of nights and days—with the anthropomorphic sun blazing towards the laborious ants (a description of this image can be found at 178). These examples give us a sense of the rich symbolisation of celestial bodies in Byzantine scientific manuscript illuminations.

<sup>106</sup> Lazaris, *Le Physiologus grec*, vol. 2, fig. 14 (a description of this image can be found at 110). Similarly, fig. 158 depicts the Sun as a king wearing a crown of rays (reminiscent of Mithras as a solar deity) and enclosed within a disk that faces downwards from behind the clouds (a description of this image can be found at 202). For a similar representation, see Cosmas Indicopleustes’ *Christian Topography* 6.11-12, in *Cosmas Indicopleustes: Topographie chrétienne*, vol. 1, ed. Wanda Wolska-Conus, Sources Chrétiennes 141 (Paris: Cerf, 1968), fig. 35 (reproduced from *Sinaiticus Graecus* 1186, eleventh century, fol. 140r) at 220. The representation of the Sun and the Moon as natural objects, not stylised, seems to have been favoured by Western iconography, such as the Aosta mosaic mentioned above, which represents the personification of the year at the centre of the zodiac. See Baral i Altet, “Un programme iconographique occidental,” 228 and fig. 10 at 229.

Sun in imperial attire, such as in *Vaticanus graecus* 1921 (see Fig. 4). The representation of the Sun and the Moon both as cosmic bodies and personified is not a Christian, let alone Byzantine, innovation; the classical Greek culture rehearsed this motif many times over.<sup>107</sup>

### 3.3. Star fields

Of course, the celestial representations mentioned above do not conjure in our minds the idea of a keen interest of early Christian, Byzantine, and post-Byzantine believers in the sciences, especially astronomy, though their fascination with the skies above is evident. In the main, apart from their artistic value, these images amount to theological statements about Christ as *Pantokrator* and the experience of believers within God’s creation, having no marked scientific connotations. Nevertheless, the growing interest of the Byzantines in astronomy and astrology, earlier discussed, led to more elaborated images, such as the zodiacal cycle.

Before I turn to the zodiac, however, it is noteworthy that, emulating the Dura Europos frescoes (see Fig. 10) and the Galla Placidia mosaics (see Fig. 12), from the reign of Emperor Justinian onwards many monumental churches replicated the night sky upon their complexly decorated ceilings. As Karl Lehmann showed long ago, this artistic development had ancient historical roots, and combined pagan and early Christian motifs.<sup>109</sup> Recently, Graeber and Wengrow pointed out that these roots must be looked for in prehistory. In their words, “More than almost any other form of human activity, painting on walls is something people in virtually any cultural setting seem inclined to do. This has been true almost since the beginnings of humanity itself.”<sup>110</sup> To understand fully the Byzantine impulse of painting walls, especially ceilings, I would need a deeper dive into the waters of prehistory, of Lascaux (see Fig. 3) and much older sites, but this will have to remain a task for another time.

To the point, now. Cyril Mango studied an abundance of sources that capture this trend in Byzantine architecture. One such source is a Syriac hymn that expresses awe at the dome of Edessa’s sixth-century cathedral church, as follows: “Its ceiling is stretched like the heavens—without columns, vaulted and closed / And furthermore, it is adorned with golden mosaic as the firmament is with shining stars. / Its high dome is comparable to the heaven of heavens.”<sup>111</sup> The anonymous hymn does not say that the ceiling is covered in depictions of

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<sup>107</sup> See Eva Parisinou, “Brightness Personified: Light and Divine Image in Ancient Greece,” in *Personification in the Greek World: From Antiquity to Byzantium*, ed. Emma Stafford and Judith Herrin (Aldershot: Ashgate, 2005), 29-43, esp. 30-31 and fig. 3.1a and 3.1b at 40.

<sup>108</sup> These stars are interconnected, like the four-pointed ones of both Nut’s dress (see Fig. 2) and of Akrotiri, Santorini (sixteenth-century BC). Available at <https://tinyurl.com/yy9p-wbvx> (accessed 10 December 2023).

<sup>109</sup> See Karl Lehmann, “The Dome of Heaven,” *The Art Bulletin* 27:1 (1945), 1-27, esp. 19-27, <https://www.jstor.org/stable/3046977>.

<sup>110</sup> Graeber and Wengrow, *The Dawn of Everything*, 439.

<sup>111</sup> Cyril Mango, *The Art of the Byzantine Empire 312-1453* (University of Toronto Press, 1986), 58. For the original Syriac of this hymn and an extensive analysis, see Kathleen E. McVey, “The Domed



Figure 13. The zodiac of Lesnovo. Wikimedia Commons.

Source: <https://tinyurl.com/59fhc79r> (accessed 10 January 2024).<sup>129</sup>

stars. Nevertheless, it echoes a view whose classical expression remains Maximus the Confessor's seventh-century treatise, *The Mystagogy* (see, e.g., chapters 2 and 7), where the church building is explicitly compared with the universe in the sense of a microcosm, a minuscule reproduction of the cosmos, visible and invisible alike. Scholars believe that Maximus, here, contemplates monumental buildings such as the temples of Saint Sophia in Constantinople and Edessa.<sup>112</sup> The understanding of the church as a model of the cosmos, we learn from Henry Maguire, permeated the Byzantine psyche.<sup>113</sup>

Returning to Mango's collection, we discover the sixth-century poet Paul Silentiarius, who described the church of Saint Sophia in Constantinople and its splendour during the ceremony of consecration.<sup>114</sup> Paul was amazed by the reflection of the many lights against the temple's vast dome, likening them to "the effulgent stars of the heavenly Corona close to Arcturus and the head of Draco."<sup>115</sup> The sentence denotes the astronomical insights of the Byzantine

poet, who indirectly confirms the purposeful setting of the church as an earthly replica of the night sky. It also gestures towards what scholars believe was a deliberate architectural strategy about the geographical setting of sacred spaces, which made possible an interplay of imagery, natural light, and artificial light that was conducive to complex sensorial experiences, in baptisteries and other shrines alike.<sup>116</sup>

Mango's collection supplies evidence to that effect, too. In describing the ninth-century church of the Virgin in Pharos, near Constantinople's imperial palace, Patriarch Photius noted the impression of the attendees that "it is as if one had entered heaven itself." People were dazed at the sight of the

Church as Microcosm: Literary Roots of An Architectural Symbol," *Dumbarton Oaks Papers* 37 (1983): 91-121.

<sup>112</sup> See Irina Dmitrievna Kolbutova, "The Cosmic Symbolism of the Church and the Mystical Liturgy of the Logos in Inauguration Anthems of Hagia Sophia and the *Mystagogia* of Maximus the Confessor," *Eikón Imago* 11 (2022): 215-232.

<sup>113</sup> See Henry Maguire, *Nectar and Illusion: Nature in Byzantine Art and Literature*, Onassis Series in Hellenic Culture (Oxford University Press, 2012), 126-130.

<sup>114</sup> Mango, *The Art of the Byzantine Empire*, 80-96. For an analysis of Paul Silentiarius' poem, see Emilie M. van Opstall, "On the Threshold: Paul the Silentiary's Ekphrasis of Hagia Sophia," in *Sacred Thresholds: The Door to the Sanctuary in Late Antiquity*, ed. Emilie M. van Opstall, Religions in the Graeco-Roman World 185 (Leiden and Boston: Brill, 2018), 31-64.

<sup>115</sup> Mango, *The Art of the Byzantine Empire*, 90.

<sup>116</sup> See Beat Break, "Art and Propaganda Fide: Christian Art and Architecture, 300-600," in *The Cambridge History of Christianity*, vol. 2: *Constantine to c. 600*, ed. Augustine Casiday and Frederick W. Norris (Cambridge University Press, 2007), 691-725; Vladimir Ivanovici, "Spazio e rituale battesimale," in *Il Battistero di San Giovanni a Riva San Vitale: Storia e restauri passati e recenti*, ed. Sergio Bettini and Marco Di Nallo (Mendrisio Academy Press, 2023), 15-18; Vladimir Ivanovici, *Manipulating Theophany: Light and Ritual in North Adriatic Architecture* (ca. 400-ca. 800) (Berlin and Boston: De Gruyter, 2016), 23-36, 115-120, 143-178; Alice Isabella Sullivan et al., "Space, Image, Light: Toward an Understanding of Moldavian Architecture in the Fifteenth Century," *Gesta* 60:1 (2021): 81-100. See also the contributions to *Natural Light in Medieval Churches*, ed. Vladimir Ivanovici and Alice Isabella Sullivan, East Central and Eastern Europe in the Middle Ages 88 (Leiden and Boston: Brill, 2023). The strategy was not new. Christian temples developed architectural strategies long rehearsed by the ancient temples. See Christina G. Williamson, "Filters of Light: Greek Temple Doors as Portals of Epiphany," in *Sacred Thresholds: The Door to the Sanctuary in Late Antiquity*, 309-340. Temples and churches alike, however, replicated cultural patterns established in the mists of prehistory, as discussed previously.



Fig. 14. The zodiac of Proboata. Credit: Paul Pătrășanu, 2023.

temple's "beauty in all forms shining all around like so many stars," which gave them the impression that "everything is in ecstatic motion, and the church itself is circling round."<sup>117</sup> The temple's ceiling emulated the starry sky, the sidereal movement of constellations, and the meaningful order of the creation. This kind of experience, associated with Maximus' idea of the church as microcosm, namely, as a replica of the night sky, entailed an educational component as well. Specifically, people's attention was drawn to the realisation of the inextricable nexus between the church and the cosmos, much the way the sciences brought to the fore the connection between the earthly rhythms and those of the heavens. In a way, therefore, the sumptuously arrayed domes embodied the theological interpretation of what the Byzantines knew about the sky from the astronomical and astrological research of their studious contemporaries. To paraphrase the Scriptures, "as in heaven, so on earth" (Matthew 6:10). It is against this backdrop that I now turn to zodiacal motifs in Byzantine iconography.

### 3.4. Zodiacal representations

Another factor that contributed to the flourishing of astral iconography in Byzantium's later centuries—and after—is undoubtedly the widespread use of *spolia*, materials retrieved from ancient monuments and repurposed for Christian temples.<sup>118</sup> Some of

these materials bear reliefs pertaining to the age of their provenance, including celestial, calendric, and zodiacal imagery.

The best example of reusing ancient materials for a Byzantine church is Athens' jewel, Panagia Gorgoepikoos, also known as the "Little Metropolis," probably erected in the twelfth century, though this date is disputed.<sup>119</sup> The temple is unique for the amount of *spolia* it incorporates.<sup>120</sup> What matters is the presence on its western side, at the entrance, on the wall's upper tier, of a Roman calendar frieze of the twelve months represented in both anthropomorphic and zodiacal manner, with crosses added by Christian sculptors at some point.<sup>121</sup> This motif proved to endure despite its

Bente Kiilerich, "Antiquus et modernus: Spolia in Medieval Art—Western, Byzantine and Islamic," in *Medioevo: il tempo degli antichi*, ed. Arturo Carlo Quintavale (Milano: Electa, 2006), 135-145; Helen Saradi, "The Use of Ancient Spolia in Byzantine Monuments: The Archaeological and Literary Evidence," *International Journal of the Classical Tradition* 3:4 (1997): 395-423.

<sup>119</sup> For the twelfth-century dating, see Charalambos Bouras, *Byzantine Athens, 10th-12th Centuries* (Milton Park and New York: Routledge, 2017), 57-58. A recent study pushes the date to after the middle of the fifteenth century. See Bente Kiilerich, "Making Sense of the Spolia in the Little Metropolis in Athens," *Arte Medievale*, NS, 4:2 (2005): 95-114, esp. 95, 108.

<sup>120</sup> Bouras, *Byzantine Athens*, 176, 179-183; Saradi, "The Use of Ancient Spolia," 406-409 (and figs 6-7), 413-416 (and figs 10-11), 419.

<sup>121</sup> Available at <https://tinyurl.com/bynbsfcy> (15 December 2023). For analyses, see Anderson, *Cosmos and Community*, 112 (and fig. 55), 113 (and fig. 56); Bouras, *Byzantine Athens*, 182 (and fig. 126); Kiilerich, "Making Sense of the Spolia," 98, 103, 106, 109 (and fig. 21), 110 (and fig. 24).

<sup>117</sup> Mango, *The Art of the Byzantine Empire*, 185.

<sup>118</sup> I am grateful to Jay Johnston for drawing my attention to the importance of repurposed ancient artwork. See, e.g.,



Fig. 15. The zodiac of Svetitskhoveli Cathedral, Mtskheta.

Source: <https://tinyurl.com/3f35xcjh> (accessed 10 March 2024).

obvious non-Christian provenance—so much so that even later churches emulated it. Such is the case of the the eighteenth-century Areopolis church in Mani, Peloponnese, where the signs of the zodiac are sculpted as a frieze on the outer walls of the apse.<sup>122</sup> That said, these representations are rare.

Different from Western Christianity, where zodiacal imagery abounds throughout the Middle Ages, the Byzantines were reluctant to reproduce it within sacred precincts.<sup>123</sup> The earliest known example of this kind is the twelfth-century zodiac of the Pantokrator church, Zeyrek Camii, Istanbul. It is a pavement mosaic at the entrance to the temple, damaged in parts (for protection, it is currently covered by wooden boards). The zodiac is accompanied by representations of the four seasons and the activities associated with them, together with geographical and zoological motifs.<sup>124</sup> In

a comprehensive study of its sources, Xavier Barral i Altet showed that this particular composition draws heavily upon Western models,<sup>125</sup> while it illustrates an interest in the natural sciences.<sup>126</sup> In regard to the last point, what facilitated the making of this zodiac was undoubtedly the renewed interest of the Byzantines in Ptolemaic science during the eleventh and the twelfth century, as Caudano discussed.<sup>127</sup> Specifically, the zodiac under consideration appears as a wheel, which suggests the repetitiveness of celestial and earthly rhythms. But, contrary to Roman custom (see Figs 1 and 4), no central figure serves as its axis. The absence of a central figure denotes the specialised astronomical and astrological sources that served as its model. As we already know, often, scientific manuscripts did not include stylised images, instead favouring technical schematics (a relevant case are folios 2v and 9r of *Vaticanus graecus* 1291, mentioned above). Even so, the presence of the zodiacal cycle within a church signifies the cosmic sense of the Christian experience but, without the clear marks of Christian appropriation, usually by depicting Christ's figure at the centre, this zodiac merely remains a precursor to later developments. It is true that manuscript illuminations from the same century include Christianised images of the zodiac,<sup>128</sup> but the Zeyrek Camii one does not. The first depiction of a Christianised zodiac in sacred settings occurred only in the fourteenth-century, at Lesnovo, being visible on the narthex' southern bay vault (see Fig. 13).

As Ivana Lemcool discovered, this representation is part of a complex illustration of Psalms 148-150,

<sup>122</sup> See Ramsey Traquair, "Laconia III: Medieval Churches—The Churches of Western Mani," *The Annual of the British School at Athens* 15 (1908/1909): 177-213, esp. 204-205 (and fig. 7). Photos of this zodiac are available at <https://tinyurl.com/59faxek3>, <https://tinyurl.com/4p6cc5ev>, and here <https://tinyurl.com/yckbz9yz> (accessed 10 April 2024).

<sup>123</sup> The end of the Byzantine era brought a change with it from this viewpoint. Lemcool ("Astronomical Imagery," 481) talks about several post-Byzantine church murals, but gives only a reproduction of the Dekoulou zodiac, discussed further down, and mentions another one at Mount Athos' Great Lavra (but located in a chapel, not in the main church), dating to the eighteenth century. For a description of the latter representation, see Günter Paulus Schiemenz, "The Painted Psalms of Athos," in *Mount Athos and Byzantine Monasticism*, ed. Anthony Bryer and Mary Cunningham (London and New York: Routledge, 2016), 223-236, esp. 226-228 (and fig. 171 at 227). For other zodiacs in Athos, see Schiemenz, "The Painted Psalms of Athos," 228, 232-233, 236. While browsing online repositories, I found another one at the Great Lavra, located at the gates of the monastery: <https://tinyurl.com/4skftdbd> (accessed 20 December 2023). An atypical zodiac features in the exonarthex of Sucevița Monastery, painted in the early seventeenth century, where two files of six signs are painted on arches that flank the image of Jesus as an infant sitting on his Mother's knees. Available at <https://tinyurl.com/kd2sz2mw> (accessed 20 December 2023).

<sup>124</sup> See Anderson, *Cosmos and Community*, fig. 54 at 111-113; Barral i Altet, "Un programme iconographique occidental," 244, and fig. 14 at 232; Lemcool, "Astronomical Imagery,"

481-482 (and fig. 6); Ousterhout, "Architecture, Art and Comnenian Ideology," fig. 4 at 139, 144-145. For a collection of studies dedicated to this monastic centre, see *The Pantokrator Monastery in Constantinople*, ed. Sofia Kotzabassi, Byzantinisches Archiv 27 (Boston and Berlin: De Gruyter, 2013).

<sup>125</sup> Barral i Altet, "Un programme iconographique occidental," 226, 228, 230, 231.

<sup>126</sup> Barral i Altet, "Un programme iconographique occidental," 228.

<sup>127</sup> See Caudano, "Astronomy and Astrology," 213-218.

<sup>128</sup> See Tutkovski, "Representations of the Zodiac," 278.

but only part of it has survived the test of time.<sup>129</sup> The existing parts of the composition show, to what must have been its centre, Christ the *Pantokrator* sitting on a throne of winged angelic beings and surrounded by a white circle of glory crossed by beams of light of various colours, circumscribed by a greyish circle populated by angelic hosts. To the right of this image features the anthropomorphic Moon, depicted as a naked male within the bosom of the celestial being, flanked by a much smaller, naturally rendered New Moon, whereas to the left is a stylised Sun, represented as three concentric circles, reddish, the smallest two of which resembling five-pointed stars (through whose juxtaposition resulting ten beams of light) and the largest one looking like a thick corona, but without emanating rays. The right side of the composition is badly damaged, but the left side displays a peculiar zodiac, whose twelve items are mainly anthropomorphic, reminiscent of the ancient Roman calendars. However, this zodiac is organised in three layers of four signs each, not as a wheel. Most of these figures bear in their hands staffs ending in what seem to be stylised zodiacal signs. Between the zodiac and the figure of the *Pantokrator* are found the six grey concentric centres mentioned earlier, as a miniature depiction of the geocentric universe or as another, physicalist, rendition of the Sun. The Lesnovo zodiac is an intermediary model, between the circular one of Zeyrek Camii, which does not show Christ as cosmic ruler, and later compositions that place his image amidst the zodiacal signs. Oddly, the representation of the twelve signs next to Christ's figure, not around it, is reminiscent of the Dendera zodiac that was flanked by a standing image of Nut.<sup>130</sup> I continue this section by addressing post-Byzantine compositions, all of which showing Christ as the centre of the ordered universe represented by the zodiac.

An equally strange zodiac features on the ceiling of the exonarthex of the sixteenth-century church of Probota Monastery, as part of a different narrative setting, the "Last Judgment" (see Fig. 14).<sup>131</sup> Here, the twelve signs are split in two groups of six signs each, flanking Christ. The composition looks like a cross formed by the horizontal greyish "Carpet of the Firmament," as Tereza Sinigalia calls it<sup>132</sup>—a variant of Chora's "Scroll of Heaven"—on which the zodiac is depicted between the Sun and the Moon, and the vertical golden axis of the opening heavens, with four flying angels literally opening a window for Christ, the "Ancient of Days," to emerge full

of fiery glory. Angels seem to play the role of a spiritual buffer zone between Christ and the material universe represented by the zodiac. That said, sidereal beings are by no means separated from their Maker: The Sun, the Moon (both shown as crescents with human faces and the usual rays, gold and silvery, respectively), and the zodiacal signs are clearly turned towards Christ, much the way the angels are.

This is a progress in terms of Christianising the zodiac in sacred settings, even though the cosmic wheel is still not present in this composition. Indeed, while the Lesnovo zodiac marks an important step to that end—compared to the *Pantokrator* one, which does not associate Christ with the zodiac at all—it leaves the twelve signs to hang on one side of the Maker and as looking elsewhere, not towards him. It is as though the scopes of theology and astral science do not overlap. In turn, the Probota zodiac is decidedly Christ-centred, albeit the Lord is depicted as the "Ancient of Days," an apocalyptic and eschatological motif, not as *Pantokrator*. The eschatological relocation of the zodiac within the context of the "Last Judgment" does not obscure the cosmic setting however: It suggests a rearrangement of the constellations, the universe, as it were, at the end time. The cosmos will not be abolished. The angels appear to unroll the "Carpet of the Firmament," not to roll it back. The universe will continue to exist, but in a different form, as a transparent locus of theophany, of divine manifestation. This amounts to a visual echo of Ignatius' choral star field. Implicitly, astral science, which studies the heavens, intersects with theology—an iteration of the generous framework of Byzantine culture, where theology, astronomy, and astrology held together. The zodiac of Probota inaugurated a strand of similar representations. A couple of decades later, an almost identical composition was painted on the exterior western wall of Voroneţ Monastery, as the highest tier of the "Last Judgement," found right under the eave.<sup>133</sup> This majestic mural rearranges the elements of Probota's "Last Judgment" without changing their appearance. The only major development is the displacement of the zodiac scene from the centre of the original composition.

The pattern inaugurated at Lesnovo, of illustrating Psalms 148-150, did not disappear either. Another composition of this kind is found in the seventeenth-century Svetitskhoveli Cathedral, this time round, unusually, near the sanctuary.<sup>134</sup> The large fresco has Christ the *Pantokrator* enthroned and flanked by the symbols of the four Evangelists, circled by a band of text, undoubtedly scriptural, then by angels and the signs of the zodiac, at the centre of a complex scene that depicts three cosmic regions—heavenly, earthly, and oceanic—with their respective inhabitants, both real and imaginary.<sup>135</sup> The zodiacal signs are represented

<sup>129</sup> Lemcool, "Astronomical Imagery," 479-480. For this and other iconographical representations of Psalms 148-150, see Günter Paulus Schiemenz, "Laud Psalms Paintings in the Palaiologan Realm? The Case of Hagios Nikolaos Zarnatas," *Revue des Études Sud-Est Européennes* 51 (2013): 185-210. Schiemenz' analysis concludes that the available evidence does not support the idea of mutual influence; the churches he studied render the Psalms in different ways (206-210).

<sup>130</sup> See Lehmann, "The Dome of Heaven," fig. 7 (unnumbered page between pages 4 and 5).

<sup>131</sup> See Tereza Sinigalia and Constantin Dina, *Probota Monastery* (Bucharest: Probota and Tipo Dec '95, 2009), 18-21 (and the figures at 20-21). See also Tereza Sinigalia, "Mănăstirea Probota: Biserica Sf. Nicolae" (Probota Monastery: Church of St Nicholas; undated), 1-68, available at <https://tinyurl.com/ms747hun> (accessed 20 January 2024). For the processional function of the full murals of the exonarthex of Probota and other medieval Moldavian churches, see Alice Isabella Sullivan, *The Eclectic Visual Culture of Medieval Moldavia*, Visualising the Middle Ages 15 (Leiden and Boston: Brill, 2023), 291-306.

<sup>132</sup> Sinigalia, "Mănăstirea Probota," 29.

<sup>133</sup> Available at <https://tinyurl.com/39nehs5t> (accessed 20 December 2023). For an analysis of this composition, see Virgil Vătăşianu, *Pictura murală din Nordul Moldovei* (The mural painting of Northern Moldavia; Bucureşti: Meridiane, 1974), 25-27 (esp. fig. 20). Sullivan, *The Eclectic Visual Culture of Medieval Moldavia*, 284.

<sup>134</sup> For a description of the cathedral's iconography, including the zodiac and its immediate setting, see Didebulidze, "Murals of Svetitskhoveli Cathedral."

<sup>135</sup> Available at <https://tinyurl.com/2j6kz2z4> (accessed 10 January 2024).



Fig. 16. Zodiac at Dekoulou Monastery in Itylo, Mani. Credit: Nikos Tsvivikis, 2022.<sup>136</sup>

simply, in traditional fashion, and are rendered with great accuracy. The topmost and the lowermost points of the zodiacal wheel are marked by naturalistic images of the Sun and the Moon, with many stars interspersed between the signs. The stars are five-, six-, and eight-pointed. The zodiacal wheel encloses a band of thirteen angelic figures, while the outer rim of the zodiacal cycle is marked by a grey circle of plaited ropes that might represent oceanic waves or the scriptural “firmament” of Genesis 1:6–8.<sup>137</sup> The thirteen angels shine against a dark backdrop, possibly signifying the mystery of their existence, and are bathed in sunbeams radiating from a narrow band of crimson text over white background, giving verses from the Psalms.

The right side of the composition is partially missing, but whatever is extant suggests a Christ-centred universe—a cosmos that has the Lord surrounded by representatives of its two sides, visible, the zodiac, and invisible, the angels, against the backdrop of the earthly and the oceanic realms and their inhabitants. The visible and the invisible populations of the universe possibly illustrate the first line of the Nicene Creed, recited during all Byzantine

liturgies, which affirms the creation as a twofold reality, heavenly and earthly. It is perhaps this faith context that shaped this concentric universe in a way that defies Ptolemaic cosmography. Ptolemy’s universe was geocentric and therefore anthropocentric. As such, and as the early and the medieval Christians, East and West, pictured it, the invisible had to be depicted as the remotest circle of reality (see Fig. 6). But, here, as for the artists of Probota and Voroneț, Ptolemaic cosmography was not normative. Svetitskhoveli’s is a theological universe, concentric, of course, but one that reinterprets Ptolemy’s worldview. At the core of this universe are Christ and the invisible world, not the earthly realm. The various cosmic regions find their ontological anchor and point of intersection in the spiritual centre of reality, represented by Christ and, again, the angelic buffer zone. But what secures this intersection, inescapably, is the zodiac, the symbol of nature’s rhythms and of cosmic order. As for the Probota and the Voroneț zodiacs, the twelve signs, here, denote the complementarity of astronomy and astrology, including its Ptolemaic components, and Christian theology. The starry skies the Byzantine scientists studied were not foreign to the Christian worldview, therefore. And the Svetitskhoveli composition communicates this wisdom with more clarity than the zodiacs of Probota and Voroneț, that is, by integrating the *Pantokrator* of Lesnovo and the scientific wheel of Pantokrator Monastery, but within the theological context of Probota and the Voroneț’s Christ-centred universe.

<sup>136</sup> I am grateful to Nikos Tsvivikis for the permission to use his photo here.

<sup>137</sup> I would not be surprised if this motif would be an iteration, over millennia, of the “Bitter River” (namely, the sea) that circles the Mesopotamian world in the British Museum’s famous clay tablet. See L. Sue Baugh, “Babylonian Map of the World,” *Encyclopaedia Britannica*, available at <https://www.britannica.com/topic/Babylonian-Map-of-the-World> (accessed 15 January 2024).

A very similar composition to Svetitskhoveli, and from the same seventeenth century, is at Dekoulou Monastery (see Fig. 16). It depicts Christ the *Pantokrator* as the centre of the visible and the invisible universe, including the zodiac and the angels, and does so on the church's ceiling (here, the west vault, above the narthex),<sup>138</sup> not on a side wall. In so doing, it echoes the ceiling of Probota, but by painting the zodiac wheel inside the temple, rather than outside, it shares another common ground with the Svetitskhoveli representation.

The composition is part of an intricate visual narrative of the earthly environment, represented by the animal, human, and plant populations—real as well as imaginary—of a stylised geography signified by mountains, clouds, and the four winds. This complex world orbits around a series of five concentric circles, with the broadest being a grey area of plaited ropes, similar to the Svetitskhoveli one.<sup>139</sup> The next circle has its outer and inner borders marked in orange and yellowish hues, and includes a zodiac whose twelve signs are clearly visible due to their large size. The classical order is strictly observed. The names of the twelve signs accompany them, and so do, too, the names of the months when the respective signs dominate the starry sky. The highest and lowest points of this circle are occupied by the anthropomorphic faces of the Sun and the Moon, looking in opposite directions. Brown and orange stars are interspersed with the twelve signs, against a white background similar to the Svetitskhoveli zodiac; some of these stars are eight-pointed while most of them present ten or more beams. The visual effect of this circle is of a planisphere showing the constellations traversing the heavens. The next narrower circle is of nine angels, marked by outer and inner borders painted crimson, suggesting the fiery nature of the immaterial realm. Their number represents the nine “celestial hierarchies” of the Dionysian universe.<sup>140</sup> The angels are anthropomorphic and smaller than the zodiacal signs; all hold staffs ending in crosses and orbs signed with the Christogram, IX, resulting in six-spoked cosmic wheels. Their figures are obscured by the dark blue background, signifying mystery, which, again, resemble the approach of the Svetitskhoveli artists. The next circle, marked by crimson borders that explode outwards by way of nine solar flares—perhaps indicating the divine proximity of the nine angelic orders—is quite narrow. It has the form of a rolled scroll that reads as follows: Πᾶσα πνοὴ αἰνεῖσάτω τὸν Κύριον (Psalm 150:6); αἰνεῖτε τὸν Κύριον ἐκ τῶν Οὐ(ρα)νῶν. αἰνεῖτε αὐτὸν ἐν τοῖς ὑψίστοις (Psalm 148:1); αἰνεῖτε αὐτὸν πάντες οἱ ἄγγελοι αὐτοῦ. αἰνεῖτε αὐτόν (Psalm 148:2).<sup>141</sup> Thus, the composition aligns to the tradition of illustrating Psalms 148-150 whose earliest known iteration is the Lesnovo mural. The final, innermost circle of the composition shows Christ enthroned, radiating an

ocean of vibrant crimson beams of light, flanked by the symbols and the names of the four Evangelists.

Originating in the same century, the zodiacs of Dekoulou and Svetitskhoveli share several elements in common, as we have seen just above, including the band of scriptural text and the circle of angelic beings, ultimately being integrated into a theological structure of circles that has Christ as their centre. In the footsteps of Lesnovo, both compositions frame the zodiac within grand visual narratives illustrating the Psalms of praise, against the complex backdrop of symbolic representations of the cosmic regions and their inhabitants. Nevertheless, unlike the Lesnovo pattern, where the zodiac is not a wheel and does not take Christ as its centre, they relate to the Probota pattern, which has Christ flanked by two groups of zodiacal signs that face him. However, the Dekoulou and the Svetitskhoveli compositions depict the zodiac as a wheel that mirrors the Zeyrek Camii mosaic, thus integrating the scientific pattern into a theological worldview of visible and invisible creations. This innovative integration marks a tremendous progress from Lesnovo, where only the angels circle the Lord's figure. The cumulative effect of this integration is that the *Pantokrator's* glory is revealed in the wise ordering of the universe, visible and invisible.

Given the close resemblance of the Dekoulou and Svetitskhoveli's representations, it stands to reason that they draw upon an earlier iconographical pattern where the circular zodiac of Zeyrek Camii and the traditional figure of the *Pantokrator* surrounded by angels, of Lesnovo and many other places, are combined. This pattern, which so far I was unable to locate, serves as a link between Lesnovo, where the *Pantokrator* is extrinsic to the zodiac, and Dekoulou and Svetitskhoveli, where Christ's figure is circumscribed by it. The murals of Dekoulou and Svetitskhoveli could not be the first exercise in juxtaposition. Given the many striking similarities between them, this is unlikely, as they are contemporary and separated by geographical distance. The intermediary pattern should be located, perhaps in Greece, towards the end of the Byzantine era or soon after the conquest of Constantinople by the Ottomans. The closest to a link in the history of this juxtaposition are the zodiacs of Probota and Voroneţ, where the *Pantokrator* is flanked by two groups of six astral signs each. But there, at Probota and Voroneţ, the composition takes the form of a large cross, not a circle. This divergence does not support the possibility of them being the missing link.

The above representations of cosmic objects, from isolated stars to whole celestial sceneries to the “great luminaries” to the zodiac, denote a deliberate contextualisation of the human experience against the backdrop of a theologically centred universe. Humankind and the cosmos, with all its populations, go hand in hand. In this light, astral iconography is integral to a consistent endeavour to translate visually a complex theological worldview. In the cases studied here, astral iconography does not have scientific importance, but the advancements of Byzantine astronomy and astrology must have facilitated its development. Not all these representations are completely deprived of practical dimensions, however. There is an element of utility to the Dekoulou zodiac,

<sup>138</sup> For a description of this church and its iconography, including the *Pantokrator* and the zodiac, see Traquair, “Laconia III,” 199-200 (and plate 13).

<sup>139</sup> These plaited ropes could be the same oceanic waves present at Svetitskhoveli, possibly inspired by the Babylonian “Bitter River.” In addition, the Dekoulou mural displays (see the description below) nine solar flares that resemble the eight triangular mountains of the Babylonian tablet. See, again, L. Sue Baugh, “Babylonian Map of the World.”

<sup>140</sup> See Pseudo-Dionysius the Areopagite, *The Celestial Hierarchy* 6.

<sup>141</sup> I am grateful to Nikos Livanos for deciphering the writing of this circle.



for example, where the names of the twelve zodiacal signs are accompanied by the names of the months to which they correspond. As such, similar to the Roman calendar friezes, the onlooker has a clear idea about what signs to expect in a given part of the year.

#### 4. Conclusions

In this article, I have focused upon the development of the Byzantine study of the starry sky against the backdrop of broader cultural phenomena that facilitated it, despite the early Christian reluctance towards astronomy and, especially, astrology. I have pointed out the fact that the interest in the heavens is a perennial feature of the human psyche, which permeates the aeons, from prehistory to the timeframe of relevance here. Instinctively, the early Christians acted upon this feature by associating Christ's birth with the beginning of a new astrological age, for example. This fuelled the rise of a vigorous theology of creation that, ultimately, helped Christians to overcome fear and encouraged them to turn with interest towards the universe, foremost the starry sky and its many patterns as seen from a human viewpoint. Surviving astrological traditions from the classical antiquity and contacts with other cultures conspired to that end, as made obvious by the continuous engagement of Byzantine natural philosophers with the available sciences—including new ideas about the cosmos—and by the growing interest of all walks of life in the practical applications of knowledge. Another factor that made possible—and indeed legitimised—this positive turn to the study of the heavens was a traditionally Christian theological worldview, illustrated by mainstream and peripheral contributors alike. This worldview not only integrated the available scientific knowledge of ages past and of other cultures; it encouraged a renewed interest in natural philosophy, including astronomy and astrology, leading to discoveries and new theories about reality. The most significant contributions are the development of mathematical astronomy and the perfection of instruments such as the astrolabe.

I have also pointed out that this dynamic backdrop facilitated the development of a rich astral iconography that moved from simple depictions of stars and celestial bodies such as the Sun and the Moon to fields of stars and to complex representations of the zodiac, all of which serving as symbolic visualisations of and pointers to the theological worldview mentioned just above. An interesting aspect about this iconographical development is the fact of being conditioned by the progress of astral sciences in Byzantium, which in turn found support in theological cosmology. A circle of mutual support can therefore be traced between natural philosophy, theology, and iconography, where one contributes to the other two and at the same time draws upon them. On this note, I have asserted that the way we cannot consider the progress of Byzantine science apart from the theological cosmology that encouraged and legitimised it, we cannot dissociate the flourishing of astral iconography from Byzantine astronomy and astrology either. The nexus between the Byzantine theological worldview and astral iconography is even clearer, with the latter drawing upon theological themes and in turn producing their visual interpretation. In the process, astral iconography generated visual renditions—in theological fashion—of

basic elements of Byzantine astronomy and astrology, such as symbolic depictions of stars and the zodiac. This is not the same as communicating scientific data by way of sacred artwork after the prehistoric fashion.

Related, I have noted that, given the history of delimitation of rigorous science from sacred representations in classical antiquity, there was no reason for the Byzantines to develop an astral iconography put in the service of natural philosophy; at least not within sacred settings. The task of communicating scientific data was relegated to the technical imagery and the schematics of specialised manuscripts. In turn, iconography was primarily a means of communicating theological ideas, including theological interpretations of elements pertaining to the astral sciences. The case discussed in the last section, of the zodiac of Pantocrator Monastery (Zeyrek Camii) as implementation of an astronomical motif within a sacred setting, shows that scientific treatises had a significant social impact, beyond the purview of specialists. Furthermore, the integration of the same zodiac into complex visual narratives, such as those of Dekoulou and Svetitskhoveli, through a process of Christianisation whose historical roots go deep, brings to light the ongoing interest of (post-)Byzantine believers in assimilating scientific information theologically. Thus, although not being tasked with communicating scientific data, astral iconography represents a measure of the impact of Byzantine science upon that society—and of that society's capacity for accommodating a complex worldview, at the crossing of astrology, astronomy, and theology. No wonder the ceilings of many Byzantine and post-Byzantine churches were designed as mirrors of the skies above, some of them depicting the zodiac at their apex but centred in Christ the *Pantokrator* and therefore serving as a vehicle for communicating theological wisdom to a society profoundly interested in all things heavenly.

In this light, while this article is not so much about science proper, it suggests that, at least from the vantage point of astral iconography in sacred settings, the Byzantine study of the sky was supported by many walks of life, including the ecclesial milieu, and that it influenced that society in profound and lasting ways.

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