


Was the Supernova of 1054 CE Recorded in Constantinople? A Historical and Astronomical Reassessment¹

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Abstract: This paper critically reexamines two candidate records of the supernova of 1054 CE (SN 1054) that allegedly came from Constantinople, integrating historical and astronomical analyses. East Asian records documented SN 1054 in detail and formed a basis for astronomical discussions about this supernova. In contrast, few reports of SN 1054 from Western Eurasia (Europe and West Asia) are known. The majority of such alleged reports have been rejected on the basis of philological and astronomical discussions. This study scrutinizes two potential accounts of SN 1054. The first is Ibn Buṭlān's account, as cited in a later work. The second is a specific class of Byzantine gold coin issued in Constantinople, which may have commemorated SN 1054. Our reanalysis of Ibn Buṭlān's record questions its connection to Constantinople. We also challenge speculation regarding the Byzantine coin, analysing contemporary historical and numismatic backgrounds. The paper also compares these accounts with the reconstructed SN light curve and modern astronomical calculations to assess the astronomical aspect of these records.

Keywords: Byzantine Empire; Historical Astronomy; SN 1054; Ibn Buṭlān; Byzantine Numismatics.

ES ¿Se registró la Supernova del año 1054 d.C. en Constantinopla? Una reevaluación histórica y astronómica

Resumen: Este artículo reexamina dos registros posibles de la supernova de 1054 CE (SN 1054) que supuestamente provienen de Constantinopla, integrando análisis históricos y astronómicos. Los registros provenientes de Asia oriental documentan SN 1054 en detalle y forman la base de la mayoría de las discusiones astronómicas de SN 1054. Por el contrario, se conocen pocos registros de SN 1054 provenientes de Eurasia occidental (Europa y Asia occidental). La mayoría de estos supuestos informes han sido rechazados basándose en discusiones filológicas y astronómicas. Este estudio examina dos posibles registros de SN 1054. El primero es el relato de Ibn Buṭlān, mencionado en un trabajo posterior. La segunda es un tipo específico de moneda de oro bizantina emitida en Constantinopla, que puede haber conmemorado SN 1054. Nuestro nuevo análisis del registro de Ibn Buṭlān pone en tela de juicio su conexión con Constantinopla. También nos oponemos a la especulación sobre la conexión entre SN 1054 y la moneda bizantina, después de analizar los antecedentes históricos y numismáticos contemporáneos. El artículo también compara estos relatos con la curva de luz reconstruida de la SN y los cálculos astronómicos modernos para evaluar el aspecto astronómico de estos registros.

Palabras clave: Imperio Bizantino; astronomía histórica; SN 1054; Ibn Buṭlān; numismática bizantina.

Contents: 1. Introduction. 2. Written record credited to Ibn Buṭlān. 3. Astronomical assessment of Ibn Buṭlān's report. 4. Numismatic history of Constantine IX Monomachos. 5. Conclusion. 6. References.

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1. Introduction²

In human history, supernova explosions have been one of astronomical spectacles. Supernovae (SNe) represent the explosive deaths of massive stars.³ When such explosions happen close enough to Earth, supernovae manifest as the temporary emergence of a “new” star in the night sky – or even during the daytime if they get sufficiently bright. Some nearby supernovae were bright enough to be visible to the naked eye of ground-based observers for considerable time – even more than months. Compared to other celestial phenomena, such as solar and lunar eclipses, comets, meteors, and aurorae, nearby supernovae are extremely rare within the chronology of historical astronomical observations. Within historical records, the scientific community has acquired five robust cases and four possible cases of naked-eye accounts of supernovae in this galaxy.⁴ As these events all took place before telescopic observations, historical records have played a major role in developing astronomical discussions on these supernovae.⁵

The supernova of 1054 CE (SN 1054) was one of such cases. This supernova exploded near ζ Tauri in the constellation of Taurus. Its remnant has been named the Crab Nebula (fig. 1). It was first observed in July 1054, and remained visible until April 1056. Remarkably, for a few weeks, this supernova was bright enough to be seen even during daytimes. Reliable and detailed records come from China and Japan. These records have been used for the astronomical assessments of SN 1054 conducted so far (see Section 3 below).⁶ Western scholars have

devoted significant effort to searching for records of this event in Europe.⁷ However, despite many candidate proposals, nearly all have been rejected. To date, there is no convincing evidence in Western European records indicating the observation of SN 1054.⁸ Outside East Asia, only one account has been widely associated with SN 1054. This is an Arabic report that was purported to represent an observation of SN 1054 in Constantinople.⁹ There is also a persistent claim, especially among numismatists, that the latter years of Byzantine Emperor Constantine IX’s reign (1042–1055) saw the minting of a gold coin commemorating SN 1054.¹⁰

This paper aims at revisiting these two records alleged to demonstrate an observation of SN 1054 in Constantinople, with an astronomical aspect and a historical aspect. In the following sections, we will sequentially examine the documentary and numismatic records purported to demonstrate an observation of SN 1054 in Constantinople. We conclude that neither record can be used as evidence of an observation in Constantinople.

2. Written record credited to Ibn Buṭlān

In 1978, Kenneth Brecher, Elinor Lieber, and Alfred E. Lieber drew attention of the scientific community to a possible reference to an SN observed in Constantinople, documented by Ibn Buṭlān (Abū al-Ḥasan al-Mukhtār ibn al-Ḥasan ibn ʿAbdūn ibn

² Unless otherwise noted, years mentioned in this paper refer to the Common Era (CE).

³ Athem W. Alsabti and Paul Murdin (eds.), *Handbook of Supernovae*, 3 vols. (Cham: Springer, 2017).

⁴ F. Richard Stephenson and David A. Green, *Historical Supernovae and their Remnants* (Oxford: Clarendon Press, 2002); F. Richard Stephenson and David A. Green, “A Reappraisal of Some Proposed Historical Supernovae”, *Journal for the History of Astronomy* 36, no. 2 (2005): 217–229, <https://doi.org/10.1177/00218286050360020>; David A. Green and F. Richard Stephenson, “Possible and Suggested Historical Supernovae in the Galaxy”, in *Handbook of Supernovae*. eds. Athem W. Alsabti and Paul Murdin (Cham: Springer, 2017), 179–191.

⁵ E.g. (other than those cited in the previous note), Katsuji Koyama, “Suzaku Results of SN 1006: Chemical Abundances of the “youngest” Galactic Type Ia Supernova Remnant”, *The 10th International Symposium on Origin of Matter and Evolution of Galaxies: From the Dawn of Universe to the Formation of Solar System. AIP Conference Proceedings* 1016 (2008): 361–366, <https://doi.org/10.1063/1.2943598>; Nathan Smith, “The Crab nebula and the class of Type II-n-P supernovae caused by sub-energetic electron-capture explosions”, *Monthly Notices of the Royal Astronomical Society* 434 (2013): 102–113, <https://doi.org/10.1093/mnras/stt1004>; Bradley E. Schaefer, “The path from the Chinese and Japanese observations of supernova 1181 AD, to a Type Iax supernova, to the merger of CO and One white dwarfs”, *Monthly Notices of the Royal Astronomical Society* 523 (2023): 3885–3904, <https://doi.org/10.1093/mnras/stad717>.

⁶ Stephenson and Green, *Historical Supernovae*, 117–149; David W. Pankenier, “Notes on Translations of the East Asian Records Relating to the Supernova of AD 1054”, *Journal of Astronomical History and Heritage* 9, no. 1 (2006): 77–82, <https://doi.org/10.3724/SP.J.1440-2807.2006.01.06>; Smith, “The Crab nebula”; Roger Blandford and Rolf Bühler, “Supernova of 1054 and its Remnant, the Crab Nebula”, in *Handbook of Supernovae*, eds. Athem W. Alsabti and Paul Murdin (Cham: Springer, 2017), 83–95.

⁷ E.g. Emanuela Guidoboni, Costantino Marmo and Vito F. Polcaro, “Do we need to redate the birth of the Crab Nebula?”, *Memorie della Società Astronomia Italiana* 65 (1994): 623–637; George W. Collins II, William P. Claspy and John C. Martin, “A Reinterpretation of Historical References to the Supernova of A.D. 1054”, *Publications of the Astronomical Society of the Pacific* 111 (1999): 871–880, <https://doi.org/10.1086/316401>; Vito F. Polcaro and Andrea Martocchia, “Supernovae Astrophysics from Middle Age Documents”, *Proceedings of the International Astronomical Union* 2005, no. 1, S230 (2005): 264–268, <https://doi.org/10.1017/S1743921306008416>; Antonella Ghignoli, Andrea Martocchia and Vito F. Polcaro, “Eleventh-century supernovae: another way to read the medieval sources?”, *Archaeologia Baltica* 10 (2008): 110–113.

⁸ F. Richard Stephenson and David A. Green, “Was the supernova of AD 1054 reported in European history?”, *Journal of Astronomical History and Heritage* 6, no. 1 (2003): 46–52, <https://doi.org/10.3724/SP.J.1440-2807.2003.01.05> provided a thorough survey. Since then, Vahe G. Gurzadyan, “The Supernova of 1054 AD, the Armenian chronicle of Hetum, and Cronaca Rampona”, *The Observatory* 132, no. 5 (2012): 338–339 drew our attention to Armenian Chronicle of Hetum (Ms. 1898 of Matenadaran) for “a bright star [appeared] within the circle of Moon” on May 14, 1054. He suggested that it has the same provenance as the *Cronaca Rampona* compiled in Bologna and called for astrometrical analyses for an observation not in Armenia but in Europe. As revealed by Stephenson and Green in 2003, the “bright star” in the *Cronaca Rampona* was most probably a corrupted quote referring to a close conjunction of Venus with the Moon on February 17, 1086.

⁹ Kenneth Brecher, Elinor Lieber and Alfred E. Lieber, “A Near-Eastern sighting of the supernova explosion of 1054”, *Nature* 273 (1978): 728–730, <https://doi.org/10.1038/273728a0>.

¹⁰ Philip Grierson, *Catalogue of the Byzantine Coins in the Dumbarton Oaks Collection and in the Whittemore Collection, Volume Three: Leo III to Nicephorus III, 717–1081*, 2 parts (Washington, DC: Dumbarton Oaks Research Library and Collection, 1973), 734–736; Most recently, Miroslav D. Filipović et al., “European Historical Evidence of the Supernova of AD 1054, Coins of Constantine IX and SN 1054”, *European Journal of Science and Theology* 18, no.4 (2022): 51–66.



Fig. 1. A James Webb Space Telescope picture of the Crab Nebula. Image courtesy of NASA, ESA, CSA, STScI, Tea Temim (Princeton University).

Sa‘Dūn ibn Buṭlān) (d. 1066).¹¹ Ibn Buṭlān, originally from Baghdad and a Christian by faith, was a physician who left behind numerous writings.¹² Ibn Buṭlān’s record concerning the star is preserved only in *The Best Accounts of the Classes of Physicians* (*‘Uyūn al-anbā’ fī ṭabaqāt al-aṭib-bā’*), a biographical collection written in the mid-13th century by the Arab physician Ibn Abī Uṣaybi‘ah (1203–1270).¹³ Within this work, two quotations, allegedly from Ibn Buṭlān himself, are cited:

Ibn Buṭlān journeyed from Egypt to Constantinople where he remained for a year. During this time many pestilential diseases occurred. I [i.e., Ibn Abī Uṣaybi‘ah] quote the following from what he wrote in his own hand about this matter:

“One of the famous calamities of our time was that which occurred when *the star leaving traces* [*al-kawkab al-āthārī*] rose in Gemini in the year 446 [i.e., 12 April 1054–1 April 1055]. By the autumn of this year fourteen thousand souls were buried in the Church of St. Luke after all the other burial grounds in Constantinople had been filled. By midsummer of the year 447 [i.e., 2 April 1055–20 March 1056] the Nile had not risen and most of the inhabitants of Fustat and Damascus died along with all the foreigners, except those whom God spared. The devastation then went on to the Iraq and destroyed most of its inhabitants, and it suffered ruin from the blows of aggressor armies. This continued until the year 454. In most of the lands people suffered from melancholic

¹¹ Brecher, Lieber and Lieber, “A Near-Eastern sighting”.

¹² For a detailed biography and background of Ibn Buṭlān, see Lawrence I. Conrad, “Ibn Buṭlān in Bilād al-Shām: The Career of a Travelling Christian Physician”, in *Syrian Christians under Islam. The First Thousand Years*, ed. David Thomas (Leiden-Boston-Köln: Brill, 2001), 131–158, https://doi.org/10.1163/9789004497467_008; Daniel Oltean, “From Baghdad to Antioch and Constantinople: Ibn Buṭlān and the Byzantines”, *Byzantinische Zeitschrift* 114, no. 1 (2021): 355–376; Antoine Pietrobelli and Marie Cronier, “Arabic Galenism from Antioch to Byzantium: Ibn Buṭlān and Symeon Seth”, *Mediterranea: International Journal on the Transfer of Knowledge* 7 (2022): 281–315, <https://doi.org/10.21071/mijtk.v7i.13665>.

¹³ Ibn Abī Uṣaybi‘ah, *The Best Accounts of the Classes of Physicians*, in *A Literary History of Medicine: The ‘Uyūn al-anbā’ fī ṭabaqāt al-aṭib-bā’ of Ibn Abī Uṣaybi‘ah*, eds. Emilie Sav-

age-Smith, Simon Swain and Geert Jan van Gelder, 3 volumes in 5 parts (Leiden-Boston: Brill, 2020), vol. 1, 1–122.

ulcers and swellings of the spleen, and there was a change in the pattern of paroxysms during fevers and the normal system of crises was disturbed. Consequently the ability to predict was affected".¹⁴

In this first passage, Ibn Buṭlān is described as having travelled from Egypt to Constantinople, where he stayed for one year. During this time, he noted the appearance of a star in the zodiacal sign of Gemini, an outbreak of plague in Constantinople, a decrease in the Nile River's water level indicating the absence of the usual summer flood, and finally mass deaths in Egypt and the Middle East. Here, he lists these events side by side without explicit linking them through causality.

Then, Ibn Abī Uṣaibi'ah offers a second quotation, in which Ibn Buṭlān relates the description of the same star but in a slightly different context with a slightly different description:

After this, Ibn Buṭlān continues: "Because this *star leaving traces* rose in the sign of Gemini, which is the ascendant of Egypt, the pestilence occurred in Fustat, with the Nile failing to rise during its appearance in the year 445 [i.e., 23 April 1053–11 April 1054], and Ptolemy's warning of woe to the people of Egypt when one of the comets ascends and becomes abundant in Gemini came true. When Saturn descended into the sign of Cancer, the ruin of Iraq, Mosul, and al-Ġazīra was complete, and Diyār Bakr, Diyār Rabī'a, Diyār Muḍar, Fārs, Kirmān, the lands of the West, the Yemen, Fustat, and Syria became desolate. The kings of the earth were in disarray, and war, inflation of prices, and pestilence proliferated, and Ptolemy's words that when there is a conjunction of Saturn and Mars in Cancer the world will be in upheaval proved true".¹⁵

In the second statement, Ibn Buṭlān links the appearance of the star in Gemini with the occurrence of a plague in Egypt and the reduced water level of the Nile, suggesting a causal relationship.

Based on the position in Gemini and the era mentioned by Ibn Buṭlān, Brecher *et al.* have interpreted this star to be SN 1054. One problem is the one-year discrepancy between the first and second quotations regarding the period of the star's appearance: 446 AH (12 April 1054–1 April 1055) and 445 AH (23 April 1053–11 April 1054). They have argued that the correct year for the appearance of the star is 446 AH, based on another section of Ibn Abī Uṣaibi'ah's text, which mentions that the Nile's water level was low in the year following 445 AH, namely in 446 AH, corresponding to the description of Ibn Buṭlān's first passage (the star's appearance occurred in the

same year); thus, the star appeared in 446 AH.¹⁶ On this basis, subsequent researchers have consistently suggested that Ibn Buṭlān himself observed a star in the direction of Gemini, likely SN 1054, around the summer of 1054 CE in Constantinople.¹⁷

In the following, we critically reexamine this account. First, let us clarify Ibn Buṭlān's activities around 1054. According to Ibn Abī Uṣaibi'ah's same text, Ibn Buṭlān was born in Baghdad and arrived in Fustat in Egypt in November 1049:

Ibn Buṭlān entered Fustat at the beginning of Jumādā II in the year 441 [i.e., November 1049] and remained there for three years. This was during the reign of al-Mustansir bi-Allāh, one of the Egyptian Caliphs [r. 1036–1094].¹⁸

Here, Ibn Buṭlān's stay in Fustat (Old Cairo) is documented as lasting three years. However, as persuasively argued by Lawrence Conrad, it is highly likely that Ibn Buṭlān moved to Syria (probably Antioch) by 1050, following an intense quarrel with Ibn Riḍwān (c. 998–c. 1061) that occurred a few months after his arrival in Fustat.¹⁹ The details of his subsequent movements are unclear, but Conrad posits that Ibn Buṭlān likely arrived in Constantinople between 442 AH/1050 CE and 443 AH/1052 CE.²⁰

After his time in Constantinople, Ibn Buṭlān eventually returned to Antioch and died in September 1066.²¹ The question of when he left Constantinople arises. Previous studies have been ambiguous on this point. According to Ibn Abī Uṣaibi'ah, Ibn Buṭlān's stay in Constantinople lasted about one year (see above).²² However, as Conrad points out, the three-

¹⁴ Ibn Abī Uṣaibi'ah, *The Best Accounts of the Classes of Physicians*, vol. 2-1, chapter 10.38.4 (Arabic text); vol. 3-1, chapter 10.38.4 (English translation adopted here). Italics are by the authors.

¹⁵ Ibn Abī Uṣaibi'ah, *The Best Accounts of the Classes of Physicians*, vol. 2-1, chapter 10.38.4 (Arabic text); vol. 3-1, chapter 10.38.4 (English translation adopted here). Italics are by the authors.

¹⁶ Brecher, Lieber and Lieber, "A Near-Eastern sighting", 729. This argument might be supported by John Skylitzes' *History*, which reports a severe plague in Constantinople sometime between September 1053 and August 1055: *Ioannis Scylitzae Synopsis historiarum*, ed. Johannes Thurn (Berlin: De Gruyter, 1973), 477; John Skylitzes, *A Synopsis of Byzantine History 811–1057*, transl. John Wortley (Cambridge: Cambridge University Press, 2010), 445. On the other hand, al-Maqrīzī mentions that the Nile's flow was low not only in 446 AH but also in 444 AH/1052–1053 CE (and the year 447 AH/1055–1056 CE mentioned by Ibn Buṭlān, as well). This suggests that the Nile's water levels were low not just in 446 AH but in the surrounding years, possibly including 445 AH. See Ioannis G. Telelis, *Μετεωρολογικά φαινόμενα και κλίμα στο Βυζάντιο*, 2 vols. (Αθήνα: Ακαδημία Αθηνών, 2004), vol. 2, 531–536; Ronnie Ellenblum, *The Collapse of the Eastern Mediterranean: Climate Change and the Decline of the East, 950–1072* (Cambridge: Cambridge University Press, 2012), 147–159.

¹⁷ Brecher, Lieber and Lieber, "A Near-Eastern sighting", 729. Note that Guidoboni, Marmo and Polcaro, "Do we need to redate the birth of the Crab Nebula?", 627 considers that Ibn Buṭlān observed the supernova around the turn of the year 445 AH to 446 AH.

¹⁸ Ibn Abī Uṣaibi'ah, *The Best Accounts of the Classes of Physicians*, vol. 2-1, chapter 10.38.3 (Arabic text); vol. 3-1, chapter 10.38.3 (English translation adopted here).

¹⁹ *The Medico-Philosophical Controversy between Ibn Buṭlān of Baghdad and Ibn Riḍwān of Cairo: A Contribution to the History of Greek Learning among the Arabs*, eds. Joseph Schacht and Max Meyerhof (Cairo: Egyptian University, Faculty of Arts, Publication, 1937).

²⁰ Conrad, "Ibn Buṭlān in Bilād al-Shām", 142–146.

²¹ Conrad, "Ibn Buṭlān in Bilād al-Shām", 146.

²² Another biography of Ibn Buṭlān written by Ibn al-Qifṭī (c. 1172–1248) omits his visit to Constantinople. See *Ibn al-Qifṭī's Ta'rikh al-Hukamā', auf Grund der Arbeiten Aug. Müller's*, ed. Julius Lippert (Leipzig: Dieterich'sche Verlagsbuchhandlung, 1903), 294; Schacht and Meyerhof (eds.), *The Medico-Philosophical Controversy*, 51–52.

year period of Ibn Buṭlān's stay in Fustat given in Ibn Abī Uṣaibi'ah's text is unreliable, so it would be risky to uncritically accept that the duration of his stay in Constantinople was one year. Nevertheless, in a later section, Ibn Abī Uṣaibi'ah implies that Ibn Buṭlān was in Constantinople at least in 1054:

Ibn Buṭlān wrote the following treatises: [...] *The banquet of the physicians* [K. Da'wat al-aṭibbā'], which he composed for the emir Naṣr al-Dawlah Abū Naṣr Aḥmad ibn Marwān. I quote from Ibn Buṭlān's own hand where he says at the end of it, "I, the compiler, being Yawānīs the physician known as al-Mukhtār ibn al-Ḥasan ibn 'Abdūn, at the monastery of the Munificent King Constantine on the outskirts of Constantinople, completed copying this at the end of 'Aylūl of the year 1365". These are his words, and according to the Islamic calendar this was in the year 450.²³

Ibn Buṭlān is said to have authored the work at a certain monastery in Constantinople,²⁴ dated with two different years: 1365 and 450. In fact, these dates are inconsistent with each other. The former date is indicated in the Seleucid Era (or *Anno Graecorum*), which is approximately September 1054 CE.²⁵ The latter, the Hijri year 450, spans from 2 February 1058 to 17 February 1059.²⁶ It seems that the date 1365 SE/AG ≈ 1054 CE is correct, as it is quoted from Ibn Buṭlān's own narration, which implies that the calendar conversion by Ibn Abī Uṣaibi'ah is incorrect. Additionally, Another work of Ibn Buṭlān, which discusses interactions between the papal legation and the Patriarchate of Constantinople in 1054 according to the request of Patriarch Michael Keroularios, further supports his presence in Constantinople during this period.²⁷ In summary, while the exact time of Ibn Buṭlān's departure from Constantinople remains unclear, it is certain that he was there from around 1052 to the fall of 1054.

Let us now consider the star mentioned by Ibn Buṭlān. His presence in Constantinople at the time of SN 1054 does not necessarily imply that he witnessed the star in Gemini from that location. Indeed, Ibn Buṭlān does not clarify the site from which he observed the star's emergence. In the initial quote, he recounts the outbreak of a plague in Constantinople "when" (*'ind ṭulu*) the star appeared, whereas in the subsequent quote, he attributes the appearance of the star as the "cause" (*li'anna*, i.e. "because") of the reduction of the Nile's water level and the plague in Fustat, even asserting that this phenomenon corroborated Ptolemy's warning of woe to the people of Egypt. This suggests that the star's appearance in Gemini is more closely associated with the conditions in Egypt than with those in Constantinople in the descriptions of Ibn Buṭlān.

As previously mentioned, Ibn Buṭlān left Fustat around 1050 and never returned to Egypt before his death. This implies that any information he had about the Nile's water levels or the plague in Egypt in 1054 was secondhand. Therefore, it would be natural to infer that Ibn Buṭlān's information about the star's appearance, which is strongly tied to his description of Egypt, also originated from there. At the least, Ibn Buṭlān's descriptions do not prove that the star was observed in Constantinople.

Another point of discussion is the translation of the "star" mentioned by Ibn Buṭlān. The original Arabic term is "الكوكب الأثاري" (*al-kawkab al-āthārī*), a somewhat unusual expression. The adjective "الأثاري" is derived from the noun "أثر" (*athar*), meaning "trace", "sign", or "impression" in general. Its combination with "star" (*al-kawkab*) is rare.²⁸ Brecher *et al.* have stated that "athar" implies a novel astronomical or meteorological phenomenon, noting that the supernova of 1006 was described by Ibn Riḍwān in this manner.²⁹ Thus, they translated the expression as "a spectacle star", implying a supernova.³⁰

On the other hand, Paul Kunitzsch provided a more literal translation of this word as "the star leaving traces", and his proposition has been followed by the recent editors of Ibn Buṭlān's description in Ibn Abī Uṣaibi'ah's work, as quoted above.³¹ While choosing this translation, the editors provide conflicting notes on Ibn Buṭlān's descriptions. In the first passage, the editors merely annotate that the star apparently refers to the supernova without a clear explanation.³² However, for the second quote from Ibn Buṭlān, they suggest that he (and/or Ibn Abī Uṣaibi'ah) did not clearly distinguish between comets, meteors, and

²³ Ibn Abī Uṣaibi'ah, *The Best Accounts of the Classes of Physicians*, vol. 2-1, chapter 10.38.6 (Arabic text); vol. 3-1, chapter 10.38.6 (English translation adopted here). Italics are by the authors.

²⁴ Oltean, "From Baghdad to Antioch and Constantinople", 362–363 proposes the monastery of St Mokios as the candidate.

²⁵ The first year of the Seleucid Era generally corresponds to 1 October 312 BCE. Cf. Ludger Bernhardt, *Die Chronologie der Syrer* (Wien: Österreichische Akademie der Wissenschaften. Philosophisch-Historische Klasse, Sitzungsberichte 264.3, 1969): 110–112. However, further analysis is needed to ascertain whether the Seleucid Era used by Ibn Buṭlān adheres to this principle.

²⁶ The discrepancy in the dates has already been pointed out by Felix Klein-Franke (Ibn Buṭlān, *Das Ärztebankett*, transl. Felix Klein-Franke [Stuttgart: Hippokrates Verlag, 1984], 17), but it is not widely known. Previous research is divided between those that date the manuscript of *The Banquet of the Physicians* to 1054 and 1058. Former date: e.g., Viktor R. Rosen, *Император Василий Болгаробойца, Извлечение из летописи Яхьи Антиохийского* (Санктпетербург: Типография Императорской Академии Наук, 1883), 47–48. Latter date: e.g., Conrad, "Ibn Buṭlān in Bilād al-Shām", 144–145; Pietrobelli and Cronier, "Arabic Galenism from Antioch to Byzantium", 287; Schacht and Meyerhof (eds.), *The Medico-Philosophical Controversy*, 65–66.

²⁷ Georg Graf, "Die Eucharistielehre des Nestorianers Al-Muhtār ibn Buṭlān (11. Jahrh.)", *Oriens Christianus* 13 (1938): 44–70 and 175–191; here 51–55.

²⁸ For the expression of celestial phenomena in Medieval Arabic literature, see Paul Kunitzsch and Jan Knappert, "al-Nudjūm", in *Encyclopaedia of Islam, New Edition*, Vol me VIII, eds. Clifford E. Bosworth, Emeri van Donzel, Wolfhart P. Heinrichs and Gérard Lecomte (Leiden: Brill, 1995), 97–105.

²⁹ Bernard R. Goldstein, "Evidence for a Supernova of A.D. 1006". *Astronomical Journal* 70, no. 1 (1965): 105–114. The observation is mentioned in his commentary on Ptolemy's *Tetrabiblos*. See also an Italian translation: Claudio Tolemeo, *Il secondo libro del Quadripartito con il commento di 'Alī Ibn Riḍwān*, transl. Giuseppe Bezza (Lugano: Agorà & Co., 2014), 110.

³⁰ Brecher, Lieber and Lieber, "A Near-Eastern sighting"; Stephenson and Green, *Historical Supernovae*, 140.

³¹ Kunitzsch and Knappert, "al-Nudjūm", 103.

³² Ibn Abī Uṣaibi'ah, *The Best Accounts of the Classes of Physicians*, vol. 3-1, chapter 10.38.4 note 8.

novae (*sic*),³³ assuming that Ibn Buṭlān contrasted this star with Ptolemy's "comets" (*al-kawākib dhawāt al-dhawā'ib*, which literally means "stars possessing wisps of tails"). Among the possible subjects of this description, the editors speculate that "the star leaving traces" might be a meteor shower in Gemini.³⁴ The reason the editors limit the candidate for *al-kawkab al-āthārī* to a meteor shower is unclear. If we pay attention to the fact that Ibn Buṭlān's two descriptions, at least the second one, were written in the context of astrology, it might be appropriate to translate *al-kawkab al-āthārī* as "the star bringing misfortune", signifying a harbinger of disaster, as Viktor Rosen once interpreted.³⁵

Thus, the translation of *al-kawkab al-āthārī* is philologically subject to different interpretations. Given the lack of sufficient examples of this word, the translation must remain as faithful as possible to the overall context of the text.³⁶ In this sense, it is important to emphasize that Ibn Buṭlān's second quote correlates the appearance of *al-kawkab al-āthārī* with the emergence of Ptolemy's "comets" (*al-kawākib dhawāt al-dhawā'ib*). Although this particular type of warning has not been identified in Ptolemy's works,³⁷ the expression of *al-kawākib dhawāt al-dhawā'ib* is an established translation of Greek κομήται.³⁸ This indicates that Ibn Buṭlān did not distinctly recognize *al-kawkab al-āthārī* as different from a comet.³⁹ This

might suggest that he actually saw a comet in 1054,⁴⁰ whereas this speculation is not necessarily supported in the astronomical perspective. At least, as we have previously suggested, we can confidently consider that he did not have firsthand knowledge of the star he described.

It is almost impossible to determine who the presumed informant from Egypt might have been or whether the astrological interpretation in the second quote was Ibn Buṭlān's own or also stemmed from the same informant.⁴¹ The latter case leads to doubts about whether the event observed in Egypt was indeed SN 1054.

Our examination cast caveats on the existing discussions on Arabic SN 1054 record in Constantinople. While these philological discussions do not completely negate the traditional acceptance of this "supernova record," further debate is necessary to accept it as a reliable account.

3. Astronomical assessment of Ibn Buṭlān's report

In this assessment we explore Savage-Smith *et al.*'s alternate identifications of Ibn Buṭlān's *al-kawkab al-āthārī* as comets, meteors, and novae from an astronomical perspective. As discussed earlier, this ambiguous expression permits a range of interpretations regarding the nature of the "star".

First, it is challenging to associate Ibn Buṭlān's report with a meteor shower. This is because the event was described singularly as *al-kawkab* and its position was specified only in the constellation of Gemini, while the term "meteor showers" describes "a number of meteors with approximately parallel trajectories and a meteoroid stream as a number of meteoroids with nearly identical orbits", in the classic definition, or "a group of meteors produced by meteoroids of the same meteoroid stream" in a new definition.⁴² It is certainly not impossible to link Ibn Buṭlān's account with a single bright meteor, particularly a bolide or a superbolide. However, such an event should have crossed a relatively wide region of the sky, in contrast with Ibn Buṭlān's descriptions. Given that this phenomenon was observed solely in Gemini, the celestial object in question would likely have exhibited a stable position and a longer duration than meteors, bolides, or superbolides.

It is also challenging to assert that Ibn Buṭlān reported a nova in Gemini. There are certainly some cases of nova observations in historical records.⁴³ Here, the significantly different physical natures of novae and supernovae should be clarified. Supernovae

³³ Here, the editors seem to confuse "novae" with supernovae. However, see the section 3 below.

³⁴ Ibn Abī Usaibī'a, *The Best Accounts of the Classes of Physicians*, vol. 3-1, chapter 10.38.4 note 12. For the designation of meteor showers in Arabic, see Wafiq S. Rada and F. Richard Stephenson, "A Catalogue of Meteor Showers in Medieval Arab Chronicles", *Quarterly Journal of the Royal Astronomical Society* 33, no. 1 (1992): 5–16.

³⁵ Rosen, *Император Василий Болгаробойца*, 44.

³⁶ Recent studies on SN 1006 encourage further investigations of Supernova records in the Islamic world: Wafiq Rada and Ralph Neuhäuser, "Supernova SN 1006 in two historic Yemeni reports", *Astronomische Nachrichten* 336, no. 3 (2015): 249–257, <https://doi.org/10.1002/asna.201412152>; Ralph Neuhäuser, Carl Ehrig-Eggert and Paul Kunitzsch, "An Arabic Report about Supernova SN 1006 by Ibn Sinā (Avicenna)", *Astronomische Nachrichten* 338, no. 1 (2017): 19–25, <https://doi.org/10.1002/asna.201613200>. In these articles, Neuhäuser *et al.* listed five technical terms including "*kawkab atharī*" (*sic.*) and "*athar*" (this term was actually not used for SN 1054; see our Section 2) for supernova (p. 20) and associated both of them with SN 1054. Rada and Neuhäuser speculated "trace (*athar*)" of this term (*atharī kawkab* [*sic.*, which is in reality, *al-kawkab al-āthārī*]), which was allegedly used for SN 1006 and SN 1054 as "something like a persistence effect (*sic.*) in the eye due to the strong brightness and/or strong scintillation" (p. 249). However, for SN 1054, they took this term out of the context from Ibn Buṭlān's subsequent mention to the comet in the same term.

³⁷ Cf. Claudius Ptolemaeus, *Apotelesmatika: Post F. Boll et Ae. Boer secundis curis*, ed. Wolfgang Hübner (Stuttgart-Leipzig: Teubner, 1998), Book II.10 and 14. It is possible that the corresponding statement is to be found in Arabic commentaries on Ptolemy's works or in the works attributed to Ptolemy: cf. also Jean-Patrice Boudet, "Les comètes dans le *Centiloquium* et le *De cometis* du pseudo-Ptolémée", *Micrologus* 24 (2016): 195–226.

³⁸ Kunitzsch and Knappert, "al-Nudjūm", 102.

³⁹ Gotthard Strohmaier, "Reception and Tradition: Medicine in Byzantine and Arab World", in *Western Medical Thought from Antiquity to the Middle Ages*, ed. Mirko D. Grmek (Cambridge, MA: Harvard University Press, 1998), 139–167: 160 proposes an alternative translation "meteorological star", implying that the phenomenon was placed in the sublunary sphere like a comet.

⁴⁰ Note that no comet seems to have been recorded around Egypt or the Mediterranean in 1054 CE. See the section 3 below.

⁴¹ Elements such as knowledge of Ptolemy's works and the manner of describing the star (*athar*) lead us to conjecture that much of this information may have originated from Ibn Ridwān or someone associated with his circle.

⁴² Tadeusz J. Jopek *et al.*, "New nomenclature rules for meteor showers adopted", *New Astronomy Reviews* 96 (2023): 101671, <https://doi.org/10.1016/j.newar.2022.101671>; cf. Gary W. Kronk, *Meteor Showers: An Annotated Catalog*, Second Edition (New York: Springer Science+Business Media, 2014).

⁴³ E.g., Michael M. Shara *et al.*, "Proper-motion age dating of the progeny of Nova Scorpii AD 1437", *Nature* 548 (2017): 558–560, <https://doi.org/10.1038/nature23644>.

are explosions of massive stars at the end of their lives.⁴⁴ In contrast, novae are surface explosions of white dwarves that absorb hydrogen from a companion star in the same binary, causing increased mass and heat beyond the threshold, and igniting a thermonuclear runaway.⁴⁵ If we consider that Ibn Buṭlān reported a nova, we need to find a candidate white dwarf with a binary star in Gemini or, more aptly, recurrent nova activity in Gemini. However, Stephenson and Green found no recurrent reports of guest stars within 20° of SN 1054.⁴⁶ This means that there was no known recurrent nova activity around Gemini.

Philologically, it might be tempting to consider possibility to associate this “star” with a comet, as Ibn Buṭlān himself contextualised this star with Ptolemy’s “comets”. However, this hypothesis does not have astronomical supports. Firstly, the star location was only described as in Gemini, without any mentions to its motion or angular extent. This is more consistent with supernovae than with comets, according to Stephenson and Green’s criteria.⁴⁷ In contrast, comets have a considerable angular width (especially for dust tail[s]) and notably change their position during the visibility period. Comets are also globally seen in the night sky and make us expect independent observations from various places. However, during 445 AH (23 April 1053–11 April 1054) or 446 AH (12 April 1054–1 April 1055), no comets were reported. According to existing catalogues, the nearest comet sighting occurred in 1053.⁴⁸ This was associated with a Korean report of a “broom star” measuring approximately 10° in the morning sky on 25 February 1053. Given the latitudinal difference, this comet might have been visible around midnight in Constantinople or Fustat. However, this comet does not align chronologically with Ibn Buṭlān’s account (even if 445 AH is the correct date). Therefore, the known comets do not match Ibn Buṭlān’s report.

Based on the available evidence, nothing in Ibn Buṭlān’s report directly contradicts the possibility that he described a supernova from an astronomical perspective, in line with traditional interpretations.⁴⁹ His account can be aligned with existing

discussions of SN 1054, and the corrected year of his observations is consistent with modern reconstructions of the SN 1054 light curve, including its daytime visibility for 23 days, and its naked-eye visibility for 653 days.⁵⁰ During its daytime visibility, SN 1054 was located westward of the Sun. Over this interval, SN 1054 gained the highest altitude in the local morning at Constantinople and Fustat. Given their longitudinal similarity, this SN should have been significantly more visible before sunrise and should have been visible in the early daytime at a sufficient altitude in both sites. In Fustat, the visibility duration was longer, especially around the peak of the SN 1054 light curve. After its daytime visibility, SN 1054 was visible from around midnight to morning at these sites. In this regard, Fustat was more favourable for SN 1054 observation than Constantinople, but their longitudinal similarity and the supernova’s daytime visibility do not enable rejection of the possibility that Ibn Buṭlān saw SN 1054 in Constantinople, from the astronomical perspective.

In any case, Ibn Buṭlān’s brief description does not suggest that he or his informant conducted systematic observations of this supernova, as the report merely notes visibility during 446 AH, contrasting with the detailed Chinese accounts from 1054 to 1056. Thus, while there are no elements of Ibn Buṭlān’s report that outright negate an astronomical connection, neither are there compelling factors that actively support such an association.

4. Nomisma histamenon of Constantine IX Monomachos

Another theory posits that SN 1054 is depicted on a class of contemporary Byzantine gold coins (nomisma histamenon) minted at Constantinople during the reign of Emperor Constantine IX Monomachos (June 1042–January 1055). Michael F. Hendy suggested that two stars on the emperor’s shoulders on “Class IV” histamenon represent SN 1054 (fig. 2). Unlike the other three classes, all Class IV coins (subclasses IVa, IVb, and IVc), with a lower gold content, depict the emperor in a stylized manner with a star above each shoulder.⁵¹ Hendy inferred that Class IV was issued later than the other classes because it was less fine. Based on his association of the star design with the supernova, he dated the issue of this class between the first observation of SN 1054 in China in July 1054 and Constantine IX’s death in January 1055.⁵² This hypothesis has gained popularity, especially among astronomers and coin collectors.⁵³

⁴⁴ Alsabti and Murdin (eds.), *Handbook of Supernovae*.

⁴⁵ Bradley E. Schaefer, “Comprehensive Photometric Histories of All Known Galactic Recurrent Novae”, *The Astrophysical Journal Supplement Series* 187 (2010): 275–373, <http://dx.doi.org/10.1088/0067-0049/187/2/275>; Massimo Della Valle and Luca Izzo, “Observations of Galactic and Extragalactic Novae”, *Astronomy and Astrophysics Review* 28 (2020): 3, <https://doi.org/10.1007/s00159-020-0124-6>.

⁴⁶ Stephenson and Green, *Historical Supernovae*, 143.

⁴⁷ Stephenson and Green, “A Reappraisal of Some Proposed Historical Supernovae”, 218–219.

⁴⁸ Gary W. Kronk, *Cometography: A Catalog of Comets, Volume 1: Ancient–1799* (Cambridge: Cambridge University Press, 1999), 173. See also David Cook, “A Survey of Muslim Material on Comets and Meteors”, *Journal for the History of Astronomy* 30, no. 2 (1999): 131–160. Wafiq S. Rada, “A Catalogue of Medieval Arabic and Islamic Observations of Comets during the Period AD 700–1600”, *Zeitschrift für Geschichte der Arabisch-Islamischen Wissenschaften* 13 (1999/2000): 71–91, gives an account that a comet appeared in Egypt from 29 September 1053 to 28 January 1054 (p. 82, no. 27). If the report is true, the comet here may be identified with Ibn Buṭlān’s star. However, this report is from a work published in the end of the 19th century, which does not offer its source.

⁴⁹ Brecher, Lieber and Lieber, “A Near-Eastern sighting”; Stephenson and Green, *Historical Supernovae*, 140.

⁵⁰ Smith, “The Crab nebula”; cf. Stephenson and Green, *Historical Supernovae*, 128 and 142–143.

⁵¹ Grierson, *Catalogue of the Byzantine Coins... Volume Three*, 742.

⁵² Comments of Michael Hendy presented in Grierson, *Catalogue of the Byzantine Coins... Volume Three*, 734–736.

⁵³ E.g., David R. Sear, *Byzantine Coins and Their Values* (London: Seaby, 1974), 310 (no. 1831); Linda Zimmerman, “Precious records, gold and silver coins of the ancient world chronicle celestial events”, *The Celator* 8, no. 7 (1994): 36–37; for other references, see Bradley E. Schaefer, “The Crab Supernova in Europe: Byzantine Coins and Macbeth”, *Quarterly Journal of the Royal Astronomical Society* 36, no. 4 (1995): 377–384, <https://adsabs.harvard.edu/full/1995QJRAS...36..377S>.



Fig. 2. Class IV Nomisma histamenon of Constantine IX Monomachos (left: obverse, right: reverse). The stars are depicted on both sides of the emperor's face (right). Classical Numismatic Group, Inc. (www.cngcoins.com), ID=216379.

The “supernova hypothesis” of Class IV Byzantine gold coins was thoroughly rebutted by Bradley E. Schaefer in 1995. After examining numerous coins of this class, he identified three key problems. The first addresses the depiction of two stars: the Crab Nebula, which is associated with SN 1054, had no nearby stars or planets of comparable brightness visible from the earth.⁵⁴

The second issue pertains to the short interval between the first robust observation of SN 1054 on 4 July 1054 and the death of Constantine IX on 11 January 1055. This six-month period is considered insufficient for the design, engraving, minting, and distribution of the coins, including the production of subsequent subclasses. Schaefer contends that Class IV coins were likely minted well before the supernova event.⁵⁵

The third point challenges the depiction of star pairs on Byzantine coins. Schaefer notes that stars, both single and pairs, appear on the coins of 31 Byzantine emperors, suggesting that the frequent presence of stars on such coins increases the probability of a coincidental match with a supernova. Specifically examining Byzantine coins, he calculates a conservative probability of more than 25% that a coin series would coincidentally align with the timing of a historical supernova. Schaefer argues that what seems like evidence of the Crab Nebula's commemoration on Byzantine coins is more likely due to chance than intentional commemoration.⁵⁶

Schaefer's challenges to the supernova hypothesis are logical, demanding a response to all issues for any future affirmative claims. Despite his rebuttals, the hypothesis continues to hold sway. Some economic historians and numismatists, particularly from a chronological perspective, harbour doubts but maintain an ambivalent stance.⁵⁷ In the numismatics community, for instance, CNG, one of the leading coin auction houses, lists about ten Class IV histamenon coins from Constantine IX's era on its website, with all but one accompanied by descriptions adopting the (appealing) supernova hypothesis. This illustrates the enduring appeal and influence of the hypothesis, even amidst scholarly scepticism.⁵⁸

Upon revisiting Schaefer's rebuttals, the second and third points seem particularly decisive. However, Miroslav D. Filipović *et al.* have recently analysed the variation in the size of the star motif on 36 known Class IV coins and argued that it represented the dimming of a supernova between July 1054 and January 1055, acknowledged Schaefer's 1995 work but largely disregarded the problems he raised.⁵⁹ Beyond Schaefer's points, this article could be critiqued for several reasons.

- 1) Filipović *et al.* assumed that the emperor's portrait on the reverse side of the coin represents the sun, with the star on the left (east) being Venus and the star on the right (west) indicating SN 1054,

⁵⁴ Schaefer, “The Crab Supernova in Europe”, 380.

⁵⁵ Schaefer, “The Crab Supernova in Europe”, 380. For the star motif in general, see also Philip Grierson, *Catalogue of the Byzantine Coins in the Dumbarton Oaks Collection and in the Whittemore Collection, Volume Two: Phocas to Theodosius III, 602-717*, 2 parts (Washington, DC: Dumbarton Oaks Research Library and Collection, 1968), 109-110; Grierson, *Catalogue of the Byzantine Coins... Volume Three*, 170 (Virgin with stars).

⁵⁶ Schaefer, “The Crab Supernova in Europe”, 380-381.

⁵⁷ Costas Kaplanis, “The Debasing of the “Dollar of the Middle Ages””, *Journal of Economic History* 63, no. 3 (2003): 768-801, here 785. Franz Füeg, *Corpus of the Nomismata from Basil II to Eudocia 976-1067* (Lancaster, PA-London: Classical Numismatic Group, Inc., 2014), 26-27 and 70 modifies the issue date of the Class IV to September 1053.

⁵⁸ Here we indicate the ID numbers of these coins provided by CNG: nos. 35796, 53586, 82496, 93851, 140759, 150621, 216379, and 232014. See <https://www.cngcoins.com> (last access: January 15, 2024).

⁵⁹ Filipović *et al.*, “European Historical Evidence”.

corresponding to the sky's appearance in 1054.⁶⁰ They further proposed that these two stars covertly symbolize the split between the Eastern Orthodox and Western Catholic churches in 1054 (the so-called Schisma). According to them, the eastern star represents the stable Venus and the Orthodox Church, while the western star represents the short-lived "new star" and the "fading" Catholic Church.⁶¹ However, as discussed at the end of this section, the premise that the two stars represent the Schism between the East and West is unlikely to hold. Moreover, if their explanation were correct—that the right (west) side star, or the dimming SN 1054, was depicted in real time on the coin to signify the transience of the Roman Church—it would imply that contemporaneous Byzantines were certain that SN 1054 would dim and eventually disappear. This seems highly improbable.

- 2) It is also questionable why we can assume these two stars are SN 1054 and Venus, as it is difficult to make both of Venus and SN 1054 readily visible in the sky to naked-eye observers. For ground-based naked-eye observers, Venus is certainly the brightest in the sky, except for the sun and the moon. However, as an inferior planet, Venus cannot stay away too far from the sun. Venus is visible to the naked eye, mostly before sunrise and after sunset. It is difficult to find Venus in broad daylight by naked eye, without an ideal combination of a sufficient apparent elongations of the Sun and Venus, sufficient brightness of Venus, clean atmospheric conditions, and observer's good eyesights.⁶² It is unrealistic to assume such an excellent combination lasting for almost half a year, as claimed in Filipović *et al.*'s Figure 4. In early July, Venus and SN 1054 were certainly in the west and east of the sun, as Filipović *et al.* pointed out. In this case, Venus set after the sun. Therefore, in this season, Venus was visible mostly after the local sunset. However, upon/after local sunset, SN 1054 was already well below the horizon and out of the visibility. It is difficult to make Venus and the SN 1054 simultaneously visible to casual naked-eye observers at that time.

- 3) In addition, the argument that the variation in star size represents gradual dimming is questionable, as a chronology within Class IV coins has not been established, making it uncertain whether the star size truly decreases over time. In any

case, their proposed chronology deviates significantly from Grierson's subclass classification. As is well known, Class IV is broadly divided into concave (IVa) and flat (IVb) types. It is believed that the issuance periods of these two types do not overlap due to differences in their manufacturing methods, while Filipović *et al.*'s chronology jumbled these two types together.⁶³

Filipović *et al.*'s contribution might instead be their demonstration of the variability in the size of the star motif across specimens, which suggests frequent reissues of Class IV coins. Contrary to their theory, this arguably provides strong evidence that the issuance period of this class was significantly longer than six months.

In addition to what Schaefer raised, there are two further aspects to consider. The first pertains to the reason that these coins are sometimes referred to as *stellati*. Grierson introduced a contract document from May 1059 in Trani (in Puglia), where the price of some properties was fixed at forty-seven *nomismata*, consisting of eighteen *skifati*, sixteen *stellati*, and thirteen *romanati*.⁶⁴ He suggested that the term *stellati* here refers to Constantine IX's Class IV histamenon.⁶⁵ While no other evidence is available, Grierson's identification holds a certain persuasive power, as no other contemporary gold coins with star motifs are known. Although he did not elaborate further, if these *stellati* indeed refer to Class IV histamena, the document implies that Class IV was not a commemorative issue but circulated in a significant quantity.

Another point of interest is the depiction of the emperor with the hilt of a sword on Class IV histamena, portraying him as a warrior-emperor (fig. 2). Discussing the uniqueness of Class IV requires the simultaneous consideration of both the star and sword motifs, as the sword motif is attested only in Class IV among Constantine IX's histamena. Constantine IX is known for reintroducing the depiction of an emperor with military elements on coins for the first time in over 300 years.⁶⁶ On the silver miliaresia he issued, the emperor is confirmed to be wearing a military costume, with scale armour and a military cloak, and to be holding a

⁶⁰ For this point, see Miroslav D. Filipović, Jeffrey L. Payne, Thomas Jarret, Nick F.H. Tothill, Dejan Urošević, Patrick J. Kavanagh, Giuseppe Longo, Evan J. Crawford, Jordan D. Collier, and Miro Ilić. "European Historical Evidence of the Supernova of AD 1054: Sky above Europe on 4th July 1054". *European Journal of Science and Theology* 17, no.3 (2021): 147–160.

⁶¹ Filipović *et al.*, "European Historical Evidence", 51 and 53.

⁶² Edward L. Ellis, "Naked-eye observations of Venus in daylight", *Journal of the British Astronomical Association* 105 (1995): 311–312; Junhyeok Jeon, Young-Joo Kwon and Young-Sam Lee, "A new interpretation of the historical records of observing Venus in daytime with naked eye: Focusing on the meteorological factors in the astronomical observation records", *Advances in Space Research* 61 (2018): 2116–2123, <https://doi.org/10.1016/j.asr.2018.01.028>.

⁶³ Filipović *et al.*, "European Historical Evidence", 55–60; Grierson, *Catalogue of the Byzantine Coins... Volume Three*, 742. For the concave type, see Franz Füeg, "The Beginning of the Concavely Struck Histamena", *Travaux et Mémoires* 16 (2010): 273–276.

⁶⁴ *Le carte che si conservano nello Archivio del Capitolo Metropolitanano della città di Trani (dal ix. secolo fino all'anno 1266)*, ed. Arcangelo di Gioacchino Prologo (Barletta: Tipografia Editrice V. Vecchi et Soci, 1877), 53–55 (no. 16). The text reads (at p. 54): "...hoc sunt aureos solidos bonos pesantes adipsa decaennea numero quadragintaseptem. decem et octo ex illis skifati. et sedecim ex eis stellati. et ipsos reuos tredecim romanati".

⁶⁵ Philip Grierson, "Sterling", in *Anglo-Saxon Coins: Studies Presented to F. M. Stenton on the Occasion of His 80th Birthday 17 May 1960*, ed. Reginald H. M. Dolley (London: Methuen, 1961), 266–283; Grierson, *Catalogue of the Byzantine Coins... Volume Three*, 59 (cf. also 52–54).

⁶⁶ Christopher W. Malone, "Soldier-Emperors and the Motif of Imperial Violence in the Byzantine Empire", in *The Routledge Handbook on Identity in Byzantium*, eds. Michael E. Stewart, David A. Parnell and Conor Whately (London-New York: Routledge, 2022), 59–80, here 69.

sword pointed downwards.⁶⁷ Grierson tentatively links the introduction of this silver coin to the rebellion of Leon Tornikios in 1047.⁶⁸ As various other wars and rebellions occurred during the reign of Constantine IX, the argument linking the appearance of military attire specifically to the 1047 rebellion is not conclusive.⁶⁹ However, the association of these coins with a military event remains an interesting possibility when determining the period of our coins.

While not presented in formal academic publications, the explanatory text attached to an auction catalogue in 1995 argued that Class IV coins represent victories in two military events of 1043, with the sword and the two stars symbolizing these triumphs, implying their issuance from 1043 onwards. This account refers to the rebellion of the renowned general George Maniakes against Constantinople in 1043, leading to a decisive battle in Thrace where he was killed, and the siege of Constantinople by Russian Prince Jaroslav in the same year, ending in the near destruction of the Russian fleet on the Bosphorus. The text concluded that the *stellati* coins might represent these twin victories of 1043, depicting Constantine as a victorious warrior-emperor, with its lower fineness reflecting the fiscal impact of these conflicts.⁷⁰ This wider timeframe would aptly explain the numerous different castings of Class IV. In fact, examples of similar “twin victories” could be conjectured elsewhere during the reign of Constantine IX⁷¹ and there is no *a priori* reason to limit the scope of the “twin victories” to a single year (of CE), making it difficult to declare the date of 1043 conclusive. However, as a direction for consideration, this analysis seems to be the most comprehensive in current scholarship.⁷²

Before concluding, we would like to assess another popular theory in relation to the Class IV histamenon: the “Schism propaganda hypothesis”. This seems to have been first suggested by Schaefer, according to whom the two stars on a Class IV coin represented the Catholic and Orthodox Churches, split by the so-called Great Schism in the summer of 1054.⁷³ Certainly, the “Schism” of 1054 has sometimes been treated as a definitive event in the relationship between the Eastern

and Western Churches, as symbolized in the writing of Edward Gibbon.⁷⁴ However, as historians have recognized at least since the mid-20th century, the event in 1054 was a mutual excommunication between Constantinople's Patriarch Michael Keroularios and Pope Leo IX's legate, Humbertus, which contemporary observers did not consider significant. Rather, Emperor Constantine IX was keen to foster stable relations with Rome in light of the contemporaneous Norman advancements in Southern Italy.⁷⁵ Under these circumstances, it is unlikely that the emperor would issue gold coins (serving as international currency) with designs symbolizing the “split” between East and West.

On the other hand, the “Schism” is occasionally mentioned as a reason SN 1054 was “not recorded” in Europe. In other words, there is a claim that SN 1054, appearing at the same time as the Schism and feared to be understood as a portent, was covered up by the censorship of the Catholic Church.⁷⁶ However, the Schism of 1054 did not hold significant meaning at the time, even within the Catholic Christendom,⁷⁷ making this explanation likely unsupported.

In any case, it is highly probable that the stars on these coins are unrelated to SN 1054. While the appealing supernova hypothesis might persist, its adoption within the scientific community seems untenable.

5. Conclusion

Our examination reveals that the supposed observations of SN 1054 in Constantinople are not supported. As discussed in this paper, textual descriptions and visual representations of stars are not isolated; they must be analysed in relation to the context within and outside the sources. While our findings suggest a potential need to revisit the absence of reliable records from Western Eurasia (Europe and West Asia), caution remains paramount, particularly when reasoning from silence. The exact appearance of the sky from Constantinople in 1054 continues to elude researchers, leaving a celestial mystery that beckons future studies to unravel.

⁶⁷ Grierson, *Catalogue of the Byzantine Coins... Volume Three*, 745–746 (nos. 7a–7c).

⁶⁸ Grierson, *Catalogue of the Byzantine Coins... Volume Three*, 736.

⁶⁹ See the comprehensive list of rebellions provided by Jean-Claude Cheynet, *Pouvoir et contestations à Byzance (963–1210)* (Paris: Publication de la Sorbonne, 1990), 57–65 (nos. 61–74).

⁷⁰ Peter L. Lampinen's explanatory text to a *stellati* histamenon: *A Mail Bid Auction Sale of Classical Coins 33: Featuring the Property of American, Canadian & European Consignors* (Lancaster, PA-London: Classical Numismatic Group, Inc., 1995), 126–127 (anonymised and reproduced at: <https://www.cngcoins.com/Article.aspx?ArticleID=266>). Cf. Kaplanis, “The Debasement”, 785.

⁷¹ For example, see Cheynet, *Pouvoir et contestations*, 61–63 (nos. 66–71).

⁷² Since the end of the 20th century, several electrum coins of Alexios I Komnenos (r. 1081–1118), bearing a star motif very similar to that of Constantine IX's Class IV histamena, have been reported. In these instances, the emperor is holding a *mappa* or *akakia* instead of a sword, necessitating examination under a different context, yet they should serve as a reference for future research. See examples in auction catalogues below (not exhaustive). CNG: Auction 49 (1999), no. 1990; Triton III (1999), no. 1340; Triton V (2002), no. 2310. NAC: Auction 75 (2013), no. 822; Auction 100 (2017), no. 722.

⁷³ Schaefer, “The Crab Supernova in Europe”, 381–383.

⁷⁴ Edward Gibbon, *The History of the Decline and Fall of the Roman Empire, Volume the Fifth (1788) and Volume the Sixth (1788)*, ed. David Womersley (London: Penguin Books, 1995), 659. See also Deno J. Geanakoplos, “Edward Gibbon and Byzantine Ecclesiastical History”, *Church History* 35, no. 2 (1966): 170–185, here 174–175.

⁷⁵ Steven Runciman, *The Eastern Schism: A Study of the Papacy and the Eastern Churches during the XIth and XIIth Centuries* (Oxford: Clarendon Press, 1955). For recent developments on this matter, see, for example, Jean-Claude Cheynet, “Le schisme de 1054: un non-événement?”, in *Faire l'événement au Moyen Âge*, eds. Claude Carozzi and Huguette Taviani-Carozzi (Aix-en Provence: Presses universitaires de Provence, 2017), 299–312; Anthony Kaldellis, “Keroularios in 1054: Nonconfrontational to the Papal Legates and Loyal to the Emperor”, in *Byzantium and the West. Perception and Reality (11th–15th c.)*, eds. Nikolaos G. Chrissis, Athina Kolia-Dermitzaki and Angeliki Papageorgiou (London-New York: Routledge, 2019), 9–24.

⁷⁶ Lawrence Zalcman, “The Great Schism and the Supernova of 1054”, *Physis: Rivista internazionale di storia della scienza* 21 (1979): 55–59; Collins II, Claspy and Martin, “A Reinterpretation of Historical References” (with further bibliography). Filipović *et al.*, “European Historical Evidence” develops their theory partly based on this explanation.

⁷⁷ E.g. Axel Bayer, *Spaltung der Christenheit: Das sogenannte Morgenländische Schisma von 1054* (Köln: Böhlau, 2002).

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