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The *Libro de las tablas alfonsíes*: New Documentary and Material Sources

Introduction

The original manuscript of the Alfonsine Tables has unfortunately not been preserved;[1] however, we have precise information about why the tables were compiled and their authorship thanks to MS 3306 at the National Library in Madrid (BNE).[2] The book, a composite paper manuscript made up of several scientific treatises, belonged to the library of Juan Fernández de Velasco (1550–1613), VI Condestable de Castilla,[3] and was

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1 I use the term 'Alfonsine Tables' only to refer to the astronomical tables created in Toledo by two Jewish astronomers under the commission of Alfonso X, which is the equivalent of the Castilian Alfonsine Tables according to the nomenclature proposed by José Chabás and Bernard R. Goldstein, *The Alfonsine Tables of Toledo* (Dordrecht: Kluwer, 2003).

2 It is a composite and multiple text manuscript, acephalous, which includes an unknown astrological text of Arabic origin partially written in Latin and partially in Castilian (ff. 1^{r}–34^{v}), the canons of the *Libro de las tablas alfonsíes* (ff. 34^{v}–72^{r}), a Castilian translation of John of Saxony's canons that I discuss later (ff. 74^{r}–87^{v}), a fragmentary treatise on the astrolabe (ff. 88^{r}–94^{v}), and a partial copy of several treatises of the Alfonsine *Libro del saber de astrología* (ff. 98^{r}–302^{v}). The texts are from different periods and hands, although the one we are dealing with can be dated to the beginning of the sixteenth century (after 1515). A digital copy is available at: http://bdh-rd.bne.es/viewer.vm?id=0000011059&page=1. Chabás and Goldstein, *The Alfonsine Tables*, pp. 12–15; they also include a transcription of the Castilian canons and a detailed astronomical commentary. Laura Fernández Fernández, *Arte y ciencia en el* scriptorium *de Alfonso X el Sabio* (Seville/El Puerto de Santa María: Universidad de Sevilla/Cátedra Alfonso X, 2013), pp. 207, 269–71, 335.

3 The library, along with Condestable's goods, was inventoried and priced in 1608 (for a partial inventory of the library made *c.* 1600 see Madrid, BNE MS 7840). In 1608, our book was registered as follows: 'Un libro de astrología, escrito de mano, en lengua castellana antigua, cubierto de terciopelo morado tasado en 30 r'; (A book of astrology, written by hand in old Castilian, and covered with purple velvet priced at 30 r). Madrid, Archivo de Protocolos, legajo 24850, ff. 260–521^{v}. José M. Fernández Pomar, 'Manuscritos del VI Condestable de Castilla en la Biblioteca Nacional', *Helmantica*, XVIII (1967), 89–108; Gregorio de Andrés, 'La biblioteca manuscrita del Condestable Juan Fernández de Velasco († 1613)', *Cuadernos bibliográficos*, 40 (1980), 5–22; Fernández Fernández, *Arte y ciencia*, pp. 269-71.

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bought by the librarian Juan de Iriarte for the Royal Library in 1736.[4] It is well known that this manuscript includes the sole extant copy of the canons of the *Libro de las tablas alfonsíes* (ff. 34^{v}–72^{r}).

According to the prologue of the canons, work on the Alfonsine Tables started in 1263, when Judah ben Moses ha-Cohen and Isaac ben Sid began observations in the city of Toledo with the aim of improving on and correcting a precedent work, the Toledan Tables. These were compiled in Toledo about two hundred years previously, by a group of astronomers led by Ṣāʿid al-Andalusī (1029–70), which included Azarquiel (d. 1100). How Judah ben Moses ha-Cohen and Isaac ben Sid were entrusted with this mission and where they made the observations is complicated to ascertain; moreover, what 'observation' meant at this time is also difficult to define, but both authors were familiar with practical astronomy.

Judah ben Moses, the main collaborator of the Alfonsine scientific workshop, was mentioned in the *Lapidario* as 'muy entendudo en el arte de la astronomía' (very knowledgeable in the art of astronomy);[5] undoubtedly he was not merely a translator, but a scientist who knew the practical side of his activity. The first news we have of him is his participation in the Latin translation of Azarquiel's *Book of the Azafeha*, together with the Christian translator, Guillelmus Anglicus, between 1225 and 1231. In this book, he is named 'Iuda filius Mosse Alchoen, professione t[…]ex merito sciencie astronomus dictus'[6] and is quoted as translating under the vigilance of a supervisor, which indicates a certain working structure; the fact that he was assigned to the same task for so many years shows his status as a beginner. Apart from this isolated event concerning which we have no further information, Judah worked at the service of Alfonso X for the rest of his life. From 1243 to 1250, he translated the *Lapidario* with Garcí Pérez, a cleric, and in 1254 he began the *Libro conplido en los iudizios de las estrellas*. In 1256, he translated the *Libro de las figuras de las estrellas fixas* for the first time with the cleric Guillén Arremón Daspa, and following this, on 6 February 1259, he finished the first translation of the *Libro dell alcora* together with Johan Daspa, also a cleric. On 26 February 1259, he completed the *Libro de las cruzes*, working again with Johan Daspa, and in 1276 he made a second revision of the *Libro de las figuras de las estrellas fixas* with another Jewish collaborator named Samuel and two Italian

4 This information can be consulted in the Royal Library's book of accounts, *Libro de asiento de los libros que se compraban para Ia Biblioteca desde el año 1716 hasta el 1738*, BNE, MS 18841, f. 310^{v}. Our book was registered then as follows: 'Libro de astrología sin nombre de autor. Itt. cánones de las Tablas Alfonsíes compuestos por el bachiller Francisco de Morales. Libro del espera, del astrolabio, del quadrant etc. mandados escrivir por el rey Dn. Alonso el Sabio'.

5 The *Lapidario* is a collection of four 'lapidaries', concerning the magical properties of stones, books that all can be credited to the Alfonsine milieu. Although the general prologue of the work dates the translation to 1243–50, the royal manuscript today preserved in the Escorial Library, RBME MS h-I-15, was probably made at the beginning of the 1270s. Ana Domínguez Rodríguez, *Astrologia y arte en el "Lapidario" de Alfonso X el Sabio* (Madrid: Edilan, 1984); Fernández Fernández, *Arte y ciencia*, pp. 135–210.

6 The word that begins with 't' has been interpreted in different ways: Millás Vallicrosa suggested *tabulae* or *traductor*, and Hilty suggested *tabib*, whose meaning in Arabic would be akin to doctor or physician. José M. Millás Vallicrosa, *Estudios sobre Azarquiel* (Madrid-Granada: CSIC, 1943–50), pp. 453–54; Gerold Hilty, 'El libro conplido de los iudizios en las estrellas', *Al-Andalus*, 20 (1955), 1–74, (p. 16). Three copies of this manuscript are preserved, two of which cite only Guillelmus Anglicus, MS BnF, lat. 7195 and MS BnF, lat. 16652, and in the other, from the cathedral of Toledo, currently MS BNE 10053, the entire translation is attributed to Judah. This fact has also triggered different hypotheses, including the assignment of the work exclusively to Judah by Norman Roth, 'Jewish translators at the court of Alfonso X', *Thought. A Review of Culture and Ideas*, 60 (1985), 439–55 (p. 442).

collaborators, Joan de Mesina and Joan de Cremona. Some authors have suggested that, in addition to these titles, he was also involved in the redaction of the *Libro de las formas et las ymágenes* and that he was responsible for the translation into Castilian of Ptolemy's *Quadripartitum*, the *Libro de la mágica de las signos* (the famous *Picatrix* in its Latin version), and even the *Cánones de Albateni* in collaboration with Isaac ben Sid. As we can see, Judah ben Moses remained in the King's team of scientific collaborators throughout his life, working for Alfonso X even before he ascended the throne and remaining with him until his death. This loyalty put Judah in the favour of the monarch, who distinguished him as his 'alfaquim e su merced' and made him a beneficiary of Jerez de la Frontera's estate by bequeathing a house to him in 1266.[7]

With regard to Isaac ben Sid, also known as Rabiçag de Toledo, we hardly have any data except for the information provided by the prologues of his works. However, we have enough to picture him as a competent astronomer, well acquainted with the use of observation instruments. He recorded the solar eclipses that took place in 1266 and 1267, and the lunar eclipse of 1263, phenomena probably related to the observation for the Alfonsine Tables.[8] In fact, the prologue of the canons asserts, 'e rectificamos muchos eclipsis de los solares y de los lunares', suggesting they observed many solar and lunar eclipses. He was the translator and/or author of several treatises for the *Libro del saber de astrología*, a vast compendium completed in 1278 (*Libro del astrolabio redondo*, *Libro del astrolabio llano*, *Libro de la lámina universal*, *Libro del quadrante señero*, *Libro de las armellas*, *Libro del relogio de la piedra de la sombra*, *Libro del relogio del agua*, *Libro del relogio del argento vivo*, *Libro del palacio de las horas*), translated the *Cánones de Albateni* and the *Tablas de Azarquiel*, and he wrote the *Libro del quadrante con que rectifican* in 1277.[9] In addition to the translation of Arabic scientific texts into Castilian, Rabiçag de Toledo also collected and copied Arabic sources in which the practical side of his work is evident.[10] Rabiçag, referred to by the King on several occasions as 'nuestro sabio' (our wise man), was respectfully referenced

7 For further information and a bibliography of the production of Judah ben Moses, see Fernández, *Arte y ciencia*, pp. 59–63.

8 This information was left by a young student named Isaac Israeli, who in 1310 established an astronomical treatise in which he relates that Rabiçag, whom he quotes as Rabbi Isaac ha-hazzan b. Sîd, made the observations of the eclipses in the city of Toledo under the orders of King Alfonso, observations he recorded in his own handwriting. David Romano, 'Le opere scientifiche di Alfonso X e l'intervento degli ebrei', in *Oriente e Occidente nel Medioevo: filosofia e scienze* (Roma: Academia Nazionale dei Lincei, 1971), pp. 677–711 (pp. 689 and 703); Norman Roth, 'Jewish Collaborators in Alfonso's Scientific Work', in *Emperor of Culture: Alfonso X the Learned of Castile and His Thirteenth-Century Renaissance*, ed. by Robert I. Burns (Philadelphia: University of Pennsylvania Press, 1990), pp. 59–71, (p. 68); Chabás and Goldstein, *The Alfonsine Tables*, p. 141.

9 For further information about the production of Isaac ben Sid, see Fernández Fernández, *Arte y ciencia*, pp. 63–65.

10 Evidence of this activity is MS Or. 152, preserved at the Biblioteca Medicea Laurenziana in Florence. It is a unitary miscellaneous codex written in Arabic. According to the colophons, two of its treatises were copied in Toledo, in 1265 and 1266, and on page 75 there is an interesting note written in Arabic with Hebrew script where Isaac ben Sid talks about the process of copying of one of the treatises and explains how he was able to make a few instruments, proposing better construction. Further information can be found in Donald R. Hill, 'A Treatise on Machines, by Ibn Muādh Abū Abd Allāh al-Jayyānī', *Journal for the History of Arabic Science*, 1 (1977), 33–46; Abdelhamid I. Sabra, 'A Note on Codex Biblioteca Medicea-Laurenziana, Or. 152', *Journal for the History of Arabic Science*, 1 (1977), 276–83; Joan Vernet, 'Un texto árabe de la corte de Alfonso X el Sabio', *Al-Andalus*, 43 (1978), 405–21; Mª Victoria Villuendas, 'A Further Note on a Mechanical Treatise Contained in Codex Medicea Laurenziana Or. 152', *Journal for the History of Arabic Science*, 2 (1978), 395–96; Julio Samsó, *Las ciencias de los antiguos en al-Andalus* (Almería: Fundación Ibn Tufayl, 2011), pp. 249–57.

by other astronomers such as Abraham Zacut and Judah ben Asher II as the author of the Alfonsine Tables.[11]

The prologue of the canons of the Alfonsine Tables specifies that the observations were made between 1263 and 1272; therefore, the final version of the *Libro de las tablas* had to have been made after that period. As a matter of fact, Rabiçag was using the solar parameters of the new tables in 1277 when he was writing the *Libro del quadrante con que rectifican*[12] and the *Libro del astrolabio llano*;[13] hence, the royal manuscript, which was the final part of the project, must have been made during the 1270s, probably during the second half of the decade, contemporaneous with other important scientific works produced in the royal *scriptorium*.[14]

The aim of this paper is to trace, as much as possible, the elaboration of the Alfonsine Tables and their dissemination in other territories, historical periods, and intellectual milieus through documentary and material sources.

1. The making of the Alfonsine Tables

In addition to the BNE MS 3306, the oldest source that documents the origin of the Alfonsine Tables is the *Historia eclesiástica de la imperial ciudad de Toledo*, a work written by the Jesuit Jerónimo Román de la Higuera (1538–1611).[15] This author places a team of scholars at the service of the King working on the *Palacio de Galiana*, Toledo, the royal palace where Alfonso was born. This residence, originally the Palace of Yahya al- Ma'mūn (d. 1075), the Muslim King of Toledo, was later converted into the residence of the Christian sovereigns in the city. Although Román de la Higuera misunderstood important data or directly invented others, this work is a relevant piece in the historiography of the Alfonsine Tables.[16] On the one hand, the author says that the original book of the *Tablas*

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11 Chabás and Goldstein, *The Alfonsine Tables*, pp. 20, 139, 226, 236; José Chabás, and Bernard R. Goldstein, *Astronomy in the Iberian Peninsula: Abraham Zacut and the Transition from Manuscript to Print* (Philadelphia: American Philosophical Society, 2000), p. 49.

12 Julio Samsó, 'Alfonso X and Arabic Astronomy', in *De Astronomia Alphonsi Regis*, ed. by Mercè Comes, Roser Puig, and Julio Samsó (Barcelona: Instituto Millás Vallicrosa, 1987), pp. 23–38.

13 José Chabás, 'Were the Alfonsine Tables of Toledo First Used by Their Authors?', *Centaurus*, 45 (2003), 142–50.

14 According to the data provided for the prologues and the manuscripts preserved, the *modus operandi* of the royal *scriptorium* consisted of working with the texts, and probably with the images, in copies conceived as draft material. Once the sources had been translated, revised and the new texts written, the final versions were copied into illuminated manuscripts. Unfortunately, we do not have all the works made in the royal *scriptorium*; a few are preserved in manuscripts commissioned by the King, others are known only from later copies, and others only because they have been cited in other texts. The Alfonsine manuscripts related to scientific matters currently preserved are the *Libro de las cruzes*, MS BNE 9294, the *Libro conplido en los iudizios de las estrellas*, MS BNE 3065, the *Lapidario*, MS RBME h-I-15, the *Libro de las formas et las ymágenes*, RBME MS h-I-16, the *Libro del saber de astrología*, Biblioteca Histórica Marqués de Valdecilla MS 156, the *Compendio tabular*, Bibliothèque de l'Arsenal MS 8322, and the *Libro de astromagia*, BAV MS Reg. lat. 1283pt.A. The entire corpus of Alfonsine scientific manuscripts and their later copies is discussed in Fernández Fernández, *Arte y ciencia*.

15 Madrid, BNE MS 1289, libro 22, capítulo 12, ff. 122–23; a digital copy can be found in: http://bdh-rd.bne.es/viewer.vm?id = 0000014636&page = 1.

16 Part of this text was copied by other authors such as Nicolás Antonio, *Bibliotheca hispana vetus sive Hispanorum* (Rome: Typographia Antonii de Rubeis, 1696), T. I, liber VIII, cap. V, p. 55, and José Rodríguez de Castro, *Biblioteca española: tomo primero que contiene la noticia de los escritores rabinos españoles* (Madrid: Imprenta Real de la Gazeta,

Alfonsíes had previously been kept in Toledo at the library of the Monastery of San Juan de los Reyes,[17] but he does not give any information about the later disposition of the book. Higuera also asserts that the book was held by Juan de Herrera (1530–97), architect of Felipe II (1527–98). This is a significant point to consider, because as we will see later, Juan de Herrera was closely linked to Alfonsine production, specifically to the Alfonsine Tables.[18] And, immediately after mentioning this, Román de la Higuera, without naming his source, provides the prologue of the missing book of the *Libro de las tablas*:

> Los homes dados a la sapiencia cuydaron que si n<o> conmunicauan los sus aueres, e facia<n> que los demas touiessen en ello parte, menguarian sus fechos, e por esso ouieron sabor de facer libros, que non moriesen con ellos, e desta guissa eran de pro, assi a los homes de su tiempo cuemo a los que enpos dellos auían de uenir, e por esso la poca remenbrança e oluidança de lo que con luene tiempo auían adquirido, facían que después de mucho tiempo e después de lueñe afán se perdíe lo ya sauido, e catado que se sauia mucho (BNE MS 1289, ff. 122^{v}–123^{r}).[19]

In the 1860s Rico y Sinobas asserted that Román de la Higuera was here recreating a modern *topos* instead of copying a thirteenth-century text and claimed that he had not been able to find a similar sentence in any Alfonsine scientific manuscript.[20] However, this idea of the responsibility of bequeathing knowledge by copying books fits with the general tone present throughout the Alfonsine cultural project.

1781), II, pp. 643–44, and accepted without doubt by modern bibliography until Moritz Steinschneider, *Die hebräischen Übersetzungen des Mittelalters und die Juden als Dolmetscher* (Berlin: Kommissionsverlag des Bibliographischen Bureaus, 1893), pp. 616–26, drew attention to the contradiction in the data provided by Román de la Higuera. Manuel Rico y Sinobas also analysed this material in his well-known edition, *Los Libros del Saber de Astronomía del Rey D. Alfonso X de Castilla*, 5 vols. (Madrid: Tipografía de Don Eusebio Aguado, 1863–67). Nevertheless, none of the modern scholars cite the complete version of Higuera and thus they miss part of the details provided by him. For this reason, it is worth pursuing a complete analysis of this source.

17 This book collection was compiled with fonds of the old Toledan Franciscan Library and new acquisitions for the new Royal Foundation. The Monastery of San Juan de los Reyes was directly promoted by Queen Isabel 'la Católica' (1451–1504) as a key piece in the religious topography of the reign, and its library became an important intellectual centre. Among its books there were scientific manuscripts; in fact, Román de la Higuera mentions a few of them. This library sadly disappeared during the Spanish War of Independence (1808–14). It was burnt on the night of 19 December 1808, when the French army occupied the monastery, and unfortunately most of its manuscripts disappeared. Among the lost books was the inventory of the library; therefore, it is impossible to check Higuera's information. Antolín Abad Pérez, 'La biblioteca franciscana de Toledo (1284–1808)', *Anales toledanos*, 20 (1984), 9–36, and 'Relación sobre el incendio de San Juan de los Reyes (1808) y vicisitudes posteriores hasta 1864', *Toletum: Boletín de la Real Academia de Bellas Artes y Ciencias Históricas de Toledo*, 4 (1969), 169–88; Fernández Fernández, *Arte y ciencia*, pp. 249–50.

18 Rico y Sinobas believed that the manuscript that Higuera referred to in his *Historia eclesiástica de la imperial ciudad de Toledo* was the *Libro del saber de astrología*, another Alfonsine manuscript, not the *Tables*. In previous works, I agreed but as we discuss later, Juan de Herrera knew the *Alfonsine Tables* and had materials relating to them in his library. This fact suggests that Román de la Higuera was maybe providing accurate information about the manuscript.

19 Because of the punctuation and the use of a few words, it seems that Román de la Higuera's model was not the original text but a later copy. I thank Francisco Bautista for his help with this transcription. A translation would be: 'Men, given knowledge, thought that if they did not communicate and share what they possessed with others, they would be doing wrong, and therefore they were interested in making books which would not die with them and thus would be useful both to the individuals of their time and to those who would come after them; and so the poor memory and the forgetfulness of what they had acquired over the course of time meant that after a long time and a lot of work, what was already known was lost, and it was considered that much was known'.

20 Rico y Sinobas, I (1863), p. LXXVII; V (1867), p. 44.

Furthermore, Higuera was the first author to mention the 'legendary' meeting of scientists in Toledo; according to information he provides, the group was made up of Muslims, Jews, and sages from Gascony (France) and Paris, sent for by the King, and the text specifies that when they finished, they went back to their territories.

There is no information about French people working at the *scriptorium* or the chancellery of Alfonso X; however, the King's interest in having scientists and scholars from other territories at his service is clear.[21] We do know the identity of several Italian collaborators whose presence at the court was linked both to the *scriptorium* and to the chancellery. Among them were Buenaventura de Siena, Joan de Mesina, Joan de Cremona, Aegidio de Tebaldi, and Pietro de Regio. As for the Muslims who may have worked at court, although it is very common to find comments on this subject in the abundant bibliography of this period, the truth is that the only written reference we have is the participation of Master 'Bernardo el Arábigo', the Arab who in 1277 participated in the second translation of the *Libro de la açafeha* together with Abraham, a Jew. He was probably a convert from Islam; in fact, he was cited as '*christiano novo*' in the Repartimiento of Murcia.[22] The King also wanted to recruit the scientist Muhammad b. Ahmad al-Riqūtī al-Mursī from Murcia, although he failed in the attempt; and recently, Julio Samsó has considered the possibility of a connection with scientists from Cairo.[23] In fact, the embassy of Mamluk Sultan Baybars (1223–77), who arrived in Seville in 1260 with numerous gifts for Alfonso X, is well known.[24] In any case, the Islamic context, especially with regard to the sources used, is essential to understanding some of the approaches present in the Alfonsine Tables, as is the role of the Jewish astronomers.[25]

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21 The Partida II, law 31, describes the creation, organization, and structure of the 'Estudios generales', the equivalent of a university college. The text specifies that the teachers and pupils were 'extraños e de lugares departidos' (foreigners and from different places). Alfonso X, *Las Siete Partidas, Volume 2: Medieval Government: The World of Kings and Warriors*, ed. by Samuel Parsons Scott and Robert I. Burns (Philadelphia: University of Pennsylvania Press, 2001), pp. 527–31. In Seville in 1254 the 'Estudio de latín e arábigo' (Latin and Arabic college) was founded and in 1260 (not in 1254 as many authors say), the King demanded the archbishop and the city council establish some mosques near the *Alcázar* he had given them in the partition of the city, because he planned to dedicate them 'para morada de los físicos que vinieron de allende, y para tenerlos más cerca é que en ellas fagan la su enseñanza á los que les hemos mandado que nos lo enseñen por el su gran saber, ca por eso los hemos ende traido' (for the lodging of the physicians who came from afar, to have them nearer, and for them to teach those of us who have commanded them to teach us through their great knowledge; that is why we have brought them). It is interesting to note that the same year, 1260, an embassy arrived in Seville from Cairo. Diego Ortiz de Zúñiga, *Anales eclesiásticos y seculares de la muy noble y muy leal ciudad de Sevilla* (Madrid: Imprenta Real, 1677), p. 90.

22 Evelyn S. Procter, 'The Scientific Works of the Court of Alfonso X of Castille: The King and his Collaborators', *The Modern Language Review*, 40 (1945), 12–29; Julio Samsó, 'Dos colaboradores científicos musulmanes de Alfonso X', *Llull*, 4 (1981), 171–79; Fernández Fernández, *Arte y ciencia*, pp. 68–72.

23 Julio Samsó, *On Both Sides of the Straits of Gibraltar. Studies in the History of Medieval Astronomy in the Iberian Peninsula and the Maghrib* (Leiden: Brill, 2020), pp. 827–58. I am grateful to Julio Samsó for sending me this chapter before it was published.

24 Pedro Martínez Montávez, 'Relaciones de Alfonso X de Castilla con el sultán mameluco Baybars y sus sucesores', *Al-Andalus*, 27 (1962), 343–76.

25 Apart from the many coincidences between these canons and the Toledan Tables, identified by Chabás and Goldstein, *The Alfonsine Tables*, Samsó has pointed out that chapters 36 and 53 'make sense only in an Islamic context'. Samsó, *On both sides*, p. 835. In a recent paper, Samsó has also pointed out the connection of the Parisian Alfonsine Tables and the Andalusī-Maghribī tradition; see Julio Samsó, 'Ibn Ishāq and the Alfonsine Tables', *Journal for the History of Astronomy*, 50 (2019), 360–65.

It seems that Román de la Higuera does more than simply reproduce historical data (it is not clear from where or whom he obtained the information); he creates or disseminates a legend about that episode. Moreover, it is very likely that the appearance of French astronomers in Higuera's narrative is a result of their role in the process of assimilation of the Alfonsine Tables in Paris rather than their involvement with the actual development of the work. As we will see, the fame of one set of astronomical tables promoted by Alfonso X was quite widespread in the sixteenth century; indeed, Román de la Higuera refers to this book as 'unas tablas tan famosas como todos saben' (such famous tables, as everybody knows).

Beyond the veracity of the information provided by Higuera, what is unquestionable is that his words respond to an intellectual and scientific milieu in which the memory of the Alfonsine Tables played a prominent role. However, this information does not mesh well with the poor material record we have of the Alfonsine Tables and it raises an important question: why were not more copies of that work preserved than the one found in BNE MS 3306? In the following pages, I present new data to further analyse this problem.

2. The dissemination of the Alfonsine Tables and their arrival in Paris

How the Alfonsine Tables began their dissemination outside the Crown of Castile is still not clear, but knowledge of this material in other territories can be documented at least in the first decades of the fourteenth century. It seems that the Castilian set arrived in Italy first,[26] but its arrival in Paris before 1321 was particularly significant for the history of medieval astronomy and for the survival of the Alfonsine work in the coming centuries.[27] We do not know what arrived in Paris, if it was the whole work, canons and tables, or just the tables. John of Murs in his *Expositio Regis Alfonsii circa tabulas ejus, c.* 1321, said he had the tables but not the canons, which, according to Samsó, could be the reason for the need to write new canons. As a matter of fact, Samsó suggests in a recent book that there may have been two different versions of the tables with two different computational

26 In his 1318 work *Theorica planetarum,* Thadeus of Parma provided data that certainly originated from the Castilian Tables. In 1363, Andalò di Negro (1260–1334) mentioned that the Alfonsine Tables were made in 1272; this information was not present in the texts of the Parisian tradition, so it must have found its way to Andalò di Negro through another channel of transmission directly linked with the information provided by the Alfonsine Tables in an original version. Johan L. E. Dreyer, 'On the Original Form of the Alfonsine Tables', *Monthly Notices of the Royal Astronomical Society*, 80 (1920), 243–62 (p. 252); Richard I. Harper, 'Prophatius Judaeus and the Medieval Astronomical Tables', *Isis*, 62/1 (1971), 61–68; John D. North, 'The Alfonsine Tables in England' in *Prismata: Festschrift für Willy Hartner*, ed. by Y. Maeyama and W. G. Salzer (Wiesbaden: Franz Steiner, 1977), pp. 269–301, (p. 270); Olaf Pedersen, 'The 'Theorica Planetarum' and its Progeny', in *Filosofia, scienza e astrologia nel trecento europeo*, ed. by Graziella Federici Vescovini and Francesco Barocelli (Padua: Il poligrafo, 1992), pp. 53–78; Chabás and Goldstein, *The Alfonsine Tables*, p. 248; Chabás, *Computational Astronomy,* p. 238; C. Philipp E. Nothaft, 'Critical Analysis of the Alfonsine Tables in the Fourteenth Century: The Parisian *Expositio tabularum Alfonsii* of 1347', *Journal of History of Astronomy*, 46 (2015), 76–99 (p. 82).

27 According to Chabás and Goldstein, in *The Alfonsine Tables*, pp. 246–47, the French physician and astrologer Geoffrey of Meaux (*c.* 1310–*c.* 1348) in 1320–21 was the first documented source in Paris to refer to the Alfonsine material (in BnF, MS lat. 7281, f. 160^{v}, and Biblioteca Capitular de Toledo, MS 99–5, f. 14^{r}). See Nothaft, 'Critical Analysis', p. 89.

systems, an initial version with computed sidereal positions whose content would have been reflected in the Castilian canons preserved in the BNE MS 3306, and a second recension that gave tropical positions and would correspond to the material later adapted in the Parisian tables. This second version would represent the evolution towards tropical astronomy due to the influence of al-Battānī's tables and their assimilation by Jewish astronomers since the twelfth century.[28] Samsó's suggestion about the existence of two versions of the tables would fit perfectly with the *modus operandi* of the *scriptorium* of Alfonso X. All the outstanding works of the cultural project promoted by the monarch were subject to constant revision and thus came in several versions as new sources and materials became known and incorporated; so this hypothesis would make sense in this framework. According to this argument, the translation of the al-Battānī canons in the Alfonsine circle would have inspired this new version of the tables made by Jehuda and Rabiçag.[29]

Regardless of whether there could have been two versions of the tables, it is important to consider the linguistic channel used for their transmission, irrespective of the content, to other territories. We do not know if the Alfonsine Tables, initially written in Castilian (old Spanish), were translated into Latin during the rule of Alfonso X,[30] or if the Latin translation was done in Paris or elsewhere, or even if it actually existed. Unfortunately there is no linguistic study concerning the canons of the versions of the tables written in Latin that might help us to identify traces of Castilian vocabulary or other lexical peculiarities that shed light on this issue. What it is clear is that if the work received in Paris at the beginning of the fourteenth century was written in Castilian, the scholars involved in the assimilation process must have been proficient in this language, perhaps not enough so as to translate but sufficiently to comprehend the content and to write a Latin version that included the updates obtained in Paris. This detail could help us to understand why Parisian astronomers wrote new canons, preserving the memory of King Alfonso as the main promoter of the work and consequently keeping the Alfonsine era (31 May 1252) and radix position given for the meridian of Toledo, but erasing the references of the Jewish authors, an element that they were not interested in maintaining. Had the tables arrived in Paris without canons, which is another possibility to be taken into account, the astronomers involved in their reception and revision would have had full freedom to write new canons without the information concerning the Jewish authors but keeping the essential data of the tables from Castille.

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28 Samsó, *On Both Sides*, pp. 827–58.

29 Alfonso X, *Los cánones de Albateni,* ed. by George Bossong (Tübingen: Max Niemeyer, 1978).

30 Julio Samsó considers that a Latin translation of the Castilian text could have been produced under the policy of the *fecho del Imperio*, i.e. the imperial candidacy of Alfonso X, as had happened with other scientific works, such as the Latin translation of the *Cuadripartito* and the *Libro conplido en los iudizios de las estrellas* (there is also a Latin translation of the *Libro de la mágica de los signos*, the famous *Picatrix*, but we cannot know if the translation was commissioned by the King or was done later). Julio Samsó, 'La ciencia española en la época de Alfonso el Sabio' in *Alfonso X, Toledo* (Madrid: Ministerio de Cultura, Dirección General de Bellas Artes y Archivos,1984), pp. 89–102 and *On Both Sides*, p. 858. If this were so, the Latin version of the Alfonsine Tables would have been written between 1272, when the observations were completed, and 1275, when the project of the *fecho del Imperio* formally ended, thus practically at the same time as the Castilian version was written. On the other hand, this chronology fits with their presence within the reign of the Italian collaborators, Pietro de Reggio and Egidio de Tebaldis, who produced the aforementioned Latin translations.

In any case, what is indisputable is that in Paris important astronomers assimilated and adapted the tradition of the Alfonsine Tables, whatever their content, with great success, producing new material would circulate to other European territories (Italy, England, Germany, and Poland) and generate the so-called Parisian Alfonsine Tables.[31] Among these were John of Murs, John of Vimond, John of Lignères, John of Genoa, and John of Saxony. The latter made new canons in 1327 for this Parisian version, canons that were selected by Erhard Ratdolt, the Venetian editor, who in 1483 first printed a version of the Parisian Alfonsine Tables.[32]

As we have seen, we do not know precisely when or how the Alfonsine Tables arrived in Paris, but it is interesting to point out that the Crown of Castile had strong ties to the French monarchy and that diplomatic embassies frequently travelled to the neighbouring court.[33] The exchange of books between both kingdoms can be ascertained thanks to Alfonso X's will.[34] In this document, two manuscripts gifted by the King of France, Louis IX (1214–70), to his cousin Alfonso are explicitly mentioned: a moralized Bible, the *Biblia de Toledo* or *Biblia de San Luis*,[35] and a copy of Vincent of Beauvais's (*c.* 1190 - *c.* 1267) *Speculum Historiale*.[36] If Alfonso received books from his French homonym, it seems plausible that he also gifted books to his relatives.[37] Unfortunately, there is no documentary trace to confirm this possibility, although as we shall see later, there must have been an exchange of books between the courts at some point. Concerning the documented embassies between these kingdoms, it may be noteworthy that on 20 May 1280, three members of the court travelled to Aix-en-Provence to meet Charles of Salerno (1254–1309) to solicit his mediation between Alfonso X and Philippe III (1245–85) concerning the problem of

31 Chabás and Goldstein, *The Alfonsine Tables*, pp. 243–306. Chabás, *Computational Astronomy,* pp. 238–39.

32 For printed editions of the Parisian Alfonsine Tables see 'The Legacy of Alfonsine Astronomy' in Chabás and Goldstein, *The Alfonsine Tables*, pp. 243–306; Laura Fernández Fernández, 'Las Tablas Astrónomicas de Alfonso X el Sabio. Los ejemplares del Museo Naval de Madrid', *Anales de Historia del Arte*, 15 (2005), 29–50; Fernández Fernández, *Arte y ciencia*, pp. 339–41.

33 According to the documentary data provided by George Daumet, *Mémoire sur les relations de la France et de la Castille de 1255 à 1320* (Paris: Fontemoing et C^{le}, 1913) and thanks to the references mentioned by other authors such as Jerónimo Zurita (1512–80), we can document at least twelve Castilian embassies in France between 1266 and 1305 with different aims and purposes. I thank Oscar García Villaroel for sharing this information with me.

34 Manuel González Jiménez, *Diplomatario Andaluz* (Seville/El Monte: Caja de Huelva y Sevilla, 1991), pp. 559–60.

35 Toledo, Tesoro de la Catedral, three volumes without shelfmarks; New York, Morgan Library MS M. 240.

36 '[…] e los cuatro libros que llaman Espejo istorial que mandó fazer el Rey Luis de Francia […] E mandamos otrosi que las dos Biblias et tres libros de letra gruesa, cobiertas de plata, e la otra en tres libros hestoriada, que nos dio el rey Luis de Francia'. González Jiménez, pp. 559–60. ([…] and the four books called Historical Mirror that King Louis of France ordered to be made […] And we also send the two Bibles and three books of thick lettering, covered with silver, and the other in three books with images, that King Louis of France gave us).

37 The French translation of the *Escala de Mahoma* under the commission of the King could also be evidence of this exchange. The *Mi'rāǧ* was translated into three different languages. First into Castilian as the *Escala de Mahoma* (now lost), by a Jew named Abraham; then into Latin as *Liber de mundo et coelo* (BnF MS lat. 6064 and BAV MS Vat. lat. 4072); and into French as *Livre de l'echelle* (Bodleian Library, MS Laud. Misc. 537). Both translations were produced by Buenaventura de Siena, an Italian member of the Castilian chancellery and scribe of King Alfonso. In the prologue of the French translation, Buenaventura acknowledges in 1264 that he is not an expert in French and that the text has errors, and he asks French people not blame him for he considers it better to have with mistakes than not at all. Consequently, this translation was done with the desire that it would be read by a French audience. And it is also significant to point out that the Latin and French translations introduce the King as '*Romanorum rex*', '*Rois des Romeins*', not just the King of Castile, therefore signifying an international projection. Fernández Fernández, *Arte y ciencia*, pp. 56–58.

succession of the throne of Castile.[38] The negotiation was a success and they went on to Paris with Charles.[39] The group included Pelayo Pérez, Archdeacon of Astorga, Bellus de Arculis [*Bellum de Archulis*], 'miles et porterius' of the King's chamber, and Pietro de Reggio, 'Magister Petrus de Regio domini Alfonsi regis Castelle protonotarius', member of the chancellery and one of the collaborators in the royal *scriptorium*, specifically in the scientific team.[40]

As members of those royal embassies, important bishops also travelled to Paris. We should not forget the scholarly relationships between episcopal centres as a potential channel of transmission for the Alfonsine Tables. In 1286 and in 1292, the Archbishop of Toledo, Gonzalo Pérez Gudiel (*c.* 1238–99), a pertinent scholar who also collaborated with the intellectual project of Alfonso X, travelled to France in order to negotiate peace with the neighbouring kingdom on behalf of Sancho IV (1258–95).[41] I would also like to underline the embassies organized in 1296 and 1306, the former on behalf of Sancho IV and the latter for Fernando IV (1285–1312). On both occasions, Nicolás, doctor and advisor to the royal house from the time of Alfonso X, 'medicum et consiliarium', travelled.[42] This official, trained in Montpellier and apparently more famous for his political skills than his scientific efforts, boasted at court of his knowledge of astronomy and music; the idea of Nicolás flattering the French monarch with a copy of the Alfonsine Tables might well fit his personality.[43]

Along with the movements of members of the Castilian court into French territory, we should also consider the presence of emissaries from the neighbouring kingdom in the Peninsula. In 1276, Alfonso spent a long period in the city of Vitoria because of his illness. There, the monarch met with Count Robert of Artois (1250–1310), who, on behalf of King Philip III (1245–85), signed a treaty on 7 November 1276.[44]

As we can see, several participants played important roles in both territories; one of these movements could have been used as channel of transmission of books and new ideas.

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38 The unexpected death of the heir of Castile, Fernando de la Cerda (1255–75), while fighting the Merinids, induced the problem of succession. The legal regulations of the reign established that the line of succession should be that of Alfonso de la Cerda, son of Fernando (and nephew of Philippe III, King of France), but the Castilian nobility generally agreed that the new heir should be Alfonso X's second son, Sancho, who was officially proclaimed the heir in 1278. This action triggered a series of events that involved French diplomacy and ended with Sancho's rebellion against his own father. See H. Salvador Martínez, *Alfonso X, the Learned: A Biography* (Leiden/Boston: Brill, 2010), pp. 257–91; for the embassies see Daumet, pp. 167–69; Procter, p. 26; Antonio Ballesteros Beretta, *Alfonso X el Sabio* (Barcelona: El Albir, 1984), p. 924.

39 'The embassy was successful, and its envoys accompanied Charles from Aix-en-Provence to Paris where their presence was noted and their names duly reported to Edward I [King of England, 1239–1307] by his agent, Maurice de Craon'. Procter, p. 26.

40 Pietro di Reggio [Petro de Regio], in collaboration with Egidio de Tebaldi [Aegidius de Tebaldis, Aegidio de Tebaldi], produced one of the Latin translations of the *Libro conplido en los iudizios de las estrellas* (see note 59).

41 Gonzalo Pérez Gudiel was Bishop of Cuenca, Burgos, and, finally, Toledo. He was also a member of the Royal Chancellery. In 1273 (when he was Archdeacon of Toledo) and in 1280 (as part of the Curial court in Viterbo), Pérez Gudiel commissioned an inventory of his possessions, including his books — a rich collection with numerous scientific manuscripts. The inventories can be consulted in Ramón Gonzálvez Ruiz, *Hombres y libros de Toledo* (Madrid: Fundación Ramón Areces, 1997), pp. 461–549; Francisco J. Hernández and Peter Linehan, *The Mozarabic Cardinal. The Life and Times of Gonzalo Pérez Gudiel* (Florence: Sismel-Edizioni del Galluzo, 2004), pp. 476–505.

42 Daumet, pp. 120, 122, 132, 133, 214, 218–24, 227–28.

43 Juan Torres Fontes, 'Un médico alfonsí: Maestre Nicolás', *Revista Murgetana*, 6 (1954), 9–16.

44 Martínez, p. 382.

With regard to the circulation of books and scholars, it is worth quoting the words of a Parisian astronomer, recently identified as Geoffrey of Meaux,[45] who claimed to have seen a Castilian version of the *Book of the Fixed Stars* taken from the King's bookshelves and also a celestial globe made for Alfonso himself.[46] As Chabás and Goldstein pointed out,[47] it is unclear whether this book was seen, in Castile or in Paris, although Nothaft guesses that the book was seen in Paris.[48] The source is not sufficiently explicit to confirm this claim, but it shows the transmission of Alfonsine works from Castile (provably Seville) to Paris.

In Paris, before 1373, King Charles V of France (1338–80) commissioned a French translation of the Alfonsine Tables. The inventory of the Royal Library in the Louvre, written by Gilles Mallet in 1373, introduces this French copy, which, according to the document, was very well written, in two columns, and *enluminees d'or*, meaning it was a rich, illuminated manuscript with golden elements. The book had to have played an important role in the royal collection, not just for its luxury appearance, but because it was signed by the monarch himself:

> 595. Les Tables Alphons, roy de Castelle, translatees en francois du commandement du roy Charles le quint, et sont en un cayer de parchemin sanx aiz, royees par dessus de vert et de jaune, tres bien escriptes de lettre de forme, à deux coulombes et enluminees d'or. Comm.*: dessus dictes*[49]. Fin*: table du moyen*. Et sont signées au dos dudit derrenier foillet Charles.[50]

Unfortunately, the French copy is lost (according to the inventories, it disappeared after 1413); therefore it is impossible to know its content precisely. Nor do we know who produced the French translation. The manuscript seems incomplete, as the inventory records just one quire without binding, but its features are those of a finished book, not a work in progress. We could think that the quire contained just the tables, but Gilles Mallet specifies the kind of writing as *lettre de forme* and the *mise en page* being in two columns; clearly he is describing a folio with text, not with tables, presumably the canons. The question is: which canons? The information provided is not enough to specify whether the manuscript contained the Castilian or the Parisian version. Nevertheless, when in the

45 Nothaft, pp. 88–89.

46 'Vidi namque librum stellarum fixarum scriptum in Hispanico continentem radices stellarum fixarum eodem modo cum tabulis. Qui liber extractus fuit de armario Regis Alfontii, sicut dixit mihi ille qui extrahi eum procuravit. Vidi etiam stellas fixas situatas isto modo in spera solida facta pro ipsomet Alfontio'. A book on the fixed stars written in Spanish that contains the radices of the fixed stars in the same manner as the tables. This book was taken from King Alfonso's book cabinet as I was told by the person who administered its removal. I have also seen the fixed stars placed in this manner on a solid sphere made for Alfonso himself. Nothaft, p. 94. As Nothaft notes, this passage was previously cited by North, pp. 289–90, who misreads *sicut dixit* as *Servus* (?) *dixit*.

47 Chabás and Goldstein, *The Alfonsine Tables*, pp. 247–48.

48 'Since our author makes no allusion whatsoever to having visited the Iberian Peninsula, it would seem that a copy of the *Libro* — together with a celestial globe based on it — had been removed from King Alfonso's private library and transported to France at some point between the 1270s and 1347'. Nothaft, p. 82.

49 In the inventory of 1411 (MS. français 2700, f. 109v), it is specified that this text begins in the II folio.

50 Léopold Delisle, *Recherches sur la librairie de Charles V*, 3 vols (Paris: Champion, 1907), II, p. 100. 'The Alfonsine Tables, King of Castile, translated into French by order of Charles V, and they are in a parchment quire without binding, decorated with green and yellow bands, beautifully written and illuminated with gold. Beginning: *dessus dictes*. End: *table du moyen*. And signed on the back of the last page. Charles'.

inventory a book of astronomical tables is linked to a recognizable author, such as John of Lignères (item 599),[51] the copyist indicates it. Had King Charles V commissioned a French translation of the tables of Alfonso X, it is logical to think that the text used as model would be that made in Castile or at least a version that was considered relevant and hence supported by a qualified author, but as we can see, the inventory only specifies 'Les Tables Alphons, roy de Castelle'. This small detail leaves the door open to speculation that this French copy had been translated from the version that came from Castile rather than the Parisian Alfonsine Tables. Beyond these disquisitions on the possible content of this French copy, this record is also particularly interesting since it mentions the materiality of the manuscript and helps us to consider how the Alfonsine royal manuscript could have been made.

The Royal Library in the Louvre also housed several copies of the tables written in Latin, but the descriptions do not clarify if these items refer to the Castilian or the Parisian set. One of them, item 592, again had the King's signature at the end of the book, so it also had to be considered an important piece in the royal collection.[52] In addition to these items directly related to the Alfonsine Tables, it is important to note that in the inventories of the Royal Library, written in 1411, 1413, and 1424, there are references to two other Alfonsine manuscripts. The first is recorded as follows:

> 714. Un livre d'astronomie, qui semble estre de Arte notoria, escript en espagnol, de lettre en forme, a deux coulombes, très parfaitemente bien figuré, et de bonnes couleurs de'enluminure de Boulougne, et contient en tout cinq cayers, dont le premier commence, au II foillet en rouge lettre: *estas son las figuras*, et ou derrenier *ocio aneiello de mercurio*. Couvert d'une pele de parchemin.[53]

According to its material description, its illumination, and the *incipit* and *explicit*, the manuscript must be the *Libro de astromagia*, kept at the Vatican Library (BAV MS Reg. lat. 1283pt.A, ff. 1^{r}–36^{v}). This manuscript also left the Royal Library, as it was not recorded in the inventory dated in 1423 and it started its own periplus until reaching Rome.[54] The

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51 'Un livre appellee le Canon maistre Jehan de Linières sur les tables de Alphonse, roy de Castille, en latin et en parchemin, et n'y a autres choses que tables, et commence ou II fo.: *tabula notarum annis*'. Delisle, II, p. 101. (A book called the Canon of Master John of Lignères on the Tables of Alfonso, King of Castile, in Latin, and on parchment, and there is nothing more than tables and starts on the second folio: *tabula notarum annis*).

52 592. 'Les Tables Alphons, en un livre couvert de parchemin. Comm.: tabula veri motus. Fin: tabula proportionis. Et sont signées en la fin CHARLES. – 4s.- / 593. Les Tables Alphons et alia, couvertes de parchemin, escriptes de lettre de forme, en parchemin. Comm.: medius cursus solis. Fin: tabule differentie ascensionum. – Modici valoris. 2 s.' / '594. Tabule Alphonsi, en cayers, couvertes de parchemin et escriptes en parchemin. Comm.: tabula medii motus. Fin: prima secunda tercia. – Nihil'. Delisle, II, pp. 99–100.

53 Delisle, II, p. 117. (A book of astronomy, which seems to be of Arte notoria, written in Spanish, well written, two-column, very well figured, and with good colours, Boulougne illumination, and contains five quires, and the first begins in the second folio with red letters: 'estas son las figuras' and the last 'ocio aneiello de mercurio'. Covered by a parchment.) The previous item, 713, is also a manuscript of 'Ars notoria', written in Spanish, which was also registered in the first inventory redacted in 1373.

54 For further information on the *Libro de astromagia,* see A. Warburg, *La rinascità del paganesimo antico. Contributi alla storia della cultura* (Florence: La nuova Italia 1966); David Pingree, 'Between the "Ghāya" and the "Picatrix"', *Journal of the Warburg and Courtauld Institutes*, 44 (1981), 27–56; A. D'Agostino, *Astromagia: ms. Reg. lat. 1283* (Naples: Liguori 1992); Alejandro García Avilés, 'Two Astromagical Manuscripts of Alfonso X', *Journal of the Warburg and Courtauld Institutes,* 59 (1996), 14–23; Fernández Fernández, *Arte y ciencia*, pp. 289–319.

other was a French copy of the *Libro de las formas et las ymágenes*,[55] another partially preserved Alfonsine manuscript, with just the prologue and the index, currently at the Escorial (RBME MS h-I-16):

> 616. Trente neuf cayers en papier du livre des formes, figures et ymages qui sont ès cieux, translatez d'espagnol en françois par Pierre Leraut, jadiz maistre des pors et passaige en la senechaucie de Beaucaire, du commandement de Monseigneur le duc de Berry, dont le premier cayer commence *Au nom du père et du filz*. Et sont touz yceulz cayers liez en une couverture de parchemin. – Non prisié. Nihil.[56]

According to the inventory, the translation into French was commissioned by John, Duke of Berry (1340–1416), and was produced by Pierre Leraut, identified as Pierre Lesant, seneschal at the service of the King of France, *maître des ports de la sénéchaussée de Beaucaire-Nîmes*, who certainly knew the Spanish language well.[57] If the duke ordered this translation, it is logical to think that he had in his possession a manuscript with the Spanish version, perhaps the one produced in the Alfonsine *scriptorium*, or at least a close copy. Unfortunately, apart from the general prologue and the index kept at the Escorial, there is no trace of this book nor of the French copy in current collections; therefore there are multiple gaps in the information that we have.[58]

In addition to these recognizable titles, the inventories of the Louvre Royal Library also include two Latin copies of the *Liber Razielis*,[59] as well as three exemplars of Haly Abenragel's *Liber in judiciis astrorum*.[60] Both works were also translated in the Alfonsine *scriptorium*,[61] which shows that Alfonso X's books circulated beyond the borders of his

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55 Alfonso X, *Lapidario and Libro de las formas & las ymagenes*, ed. by Roderic C. Diman and Lynn W. Winget (Madison: Hispanic Seminary of Medieval Studies, 1980); García Avilés, 'Two Astromagical'; Fernández Fernández, *Arte y ciencia*, pp. 281–88.

56 Delisle, II, p. 103. (Thirty-nine quires on paper of the book of the forms, figures, and images that are in the heavens, translated from Spanish into French by Pierre Leraut, master of ports of the seneschal of Beaucaire, by order of the Duke of Berry, and the first quire begins *Au nom du père et du filz*. And all the quires are gathered in a parchment cover. It is not common.)

57 The word 'Leraut' seems to be a misunderstanding of Delisle. García Avilés, 'Two Astromagical', p. 18; cf. G. Dupont-Ferrier, *Gallia regia ou état des officiers roy aus des baillages et des senéchaussées de 1328 à 1515*, 6 vols (Paris: Imprimierie nationale, 1942–61), I, pp. 302–3; C. Lagomarsini, 'Le cas du compilateur compilé', *Journal of the International Arthurian Society*, 3 (2015), 55–71 (p. 64).

58 As García Avilés pointed out, the *Libro de las formas et las ymágenes* did not appear, or at least with this title, in the inventory of the library of the Duke of Berry made in 1416, but in the document it is said that there were two Spanish manuscripts of magic in the hands of M. Arnoul Belin, treasurer of Sainte Chapelle de Bourges, 'Deux gros livres de magique escripts en espagnol, l'un couvert de pel rouge et l'autre d'une blanche pel sans ais, lesquels M. Arnoul Belin a eu comme l'an dit'. Alfred Hiver de Beauvoir, *La Librairie de Jean duc de Berry au Château de Mehun-sur-Yevre* (Paris: Auguste Aubry, 1860), item 81, p. 43; García Avilés, 'Two Astromagical', p. 18.

59 699 and 700. Delisle, II, p. 115.

60 671, 675 and 721. Delisle, II, pp. 111, 119.

61 The Castilian translation of the *Liber Razielis* is lost, but thanks to the Latin copy (BAV MS Reg. lat. 1300), we know it was produced under the commission of King Alfonso X by 'magister Johannes clericus', probably Johan Daspa. The *Libro conplido de los iudizios en las estrellas* was translated into Latin twice, and both translations were commissioned by the King during different periods. The first one was produced by *Alvarus*, identified as Álvaro de Oviedo, and is preserved just in two manuscripts (BAV MS Palat. lat. 1370, ff. 65^{r}–77^{r}, and RBME MS J-II-17). The second was produced by Aegidio de Tebaldi and Pietro de Reggio, and in this case, there are multiple copies preserved. This version rapidly spread and was used for new translations into French, English, German, Dutch, and Hebrew. For further information and a bibliography, see Alfonso X, *El libro conplido en los iudizios de las estrellas*, ed. by Gerold

kingdom and highlights the great interest that French monarchs, especially Charles V, had in the scientific production commissioned by their Castilian homonyms.[62]

3. The reception of the Alfonsine Tables and their Parisian version in the Hispanic kingdoms during the fourteenth and fifteenth centuries

3.1. The Crown of Castile

Curiously, in Castile after the death of King Alfonso X and for almost two centuries after, the influence of his astronomical tables, both the original and the later Parisian version, was practically non-existent. Between 1284 and the second half of the fifteenth century, there are hardly any documentary traces or evidence of their use.[63]

There is a mention of the Alfonsine Tables in a treatise on astrology, dated 1438 (BNE MS RES/2) and attributed to Enrique de Villena (*c.* 1384–1428).[64] The author explains how the movements of the Sun and the Moon are 'concordados et examinados en las tablas alfonsias del anden del çielo estrellado'.[65] Villena, a nobleman related to the royal houses of Castile and Aragon, devoted his life to study.[66] Although he died in Castile in the service of King Juan II (1405–54), his nephew, Villena spent a long period at the court of King Martì I (1356–1410) in Barcelona, and had a close relationship with some members of the Hebraic community in Barcelona and Zaragoza. When Villena died, King Juan II

Hilty (Madrid: Real Academia Espanola, 1954); Gerold Hilty, 'El libro conplido en los iudizios de las estrellas', *Al-Andalus*, 20 (1955), 1–74; Fernández Fernández, *Arte y ciencia*, pp. 107–12, 320–22. In the Louvre Royal Inventory, there are also three examples of the French translation of this work: 669, 672, and 673, Delisle, II, p. 111 (maybe also 670, draft material).

62 Jean-Patrice Boudet studied the connection between the two monarchs and how they used Salomon as a model of a learned King. J.-P. Boudet, 'Le modèle du roi sage aux XIII^{e} et XIV^{e} siècles: Salomon, Alphonse X et Charles V', *Revue historique*, 647 (2008), 545–66.

63 With regard to the presence of the exemplars of the Parisian Alfonsine Tables in Spanish institutions, apart from the BNE MS 4238 linked to the Crown of Aragon we discuss later, Chabás and Goldstein, *The Alfonsine Tables*, pp. 292–93, discuss BNE MS 7856, a fourteenth-century manuscript containing the tables and canons of John of Saxony explicitly mentioning *Jacobus de P[e]rusia etc.* [the final sign is the abbreviation of *et caetera*, not *scripsit* as some authors read], and following Millás Vallicrosa (1942, 227–30), BNE MS 10002, an early fifteenth-century manuscript, probably of Italian origin. BNE MS 7856 comes from the Royal Library in Madrid, so it is not easy to specify a previous owner without an in-depth study of the different book collections gathered in the palace; BNE MS 10002 belonged to Cardinal Francisco Javier de Zelada who lived and created his library in Rome. After his death, his manuscripts were donated to the library of Toledo Cathedral; this is why the book is currently in the BNE, so it cannot be considered as a piece of information to document the knowledge of the Parisian Alfonsine Tables in the Iberian Peninsula during the late Middle Ages.

64 José M. Millás Vallicrosa, 'El "Libro de Astrología" de Don Enrique de Villena', *Revista de Filología Española*, 27 (1943), 512–42 (p. 23); Enrique de Villena, *Tratado de astrología atribuido a Enrique de Villena*, ed. by Pedro M. Cátedra and Julio Samsó (Madrid-Barcelona: Editorial Labor-Río Tinto Minera, 1981), p. 157.

65 BNE MS RES/2, f. 19^{vb}.

66 Emilio Cotarelo y Mori, *Don Enrique de Villena. Su vida y obras* (Madrid: Estudio Tipográfico Sucesores de Rivadeneyra, 1896). Elena Gascón Vera, 'Nuevo retrato histórico de Enrique de Villena', *Boletín de la Real Academia de la Historia,* 175 (1978), 107–43; Pedro M. Cátedra, 'Para la biografía de don Enrique de Villena' *Estudi General,* 1 (1981), 29–33 and 'Algunas obras perdidas de Enrique de Villena, con consideraciones sobre su obra y su Biblioteca', *El Crotalon: Anuario de Filologia Española*, 2 (1985), 53–75; Derek C. Carr and Pedro M. Cátedra, 'Datos para la biografía de Enrique de Villena', *La Coronica,* 11 (1983), 293–99.

ordered the expurgating of his library. This action was justified by religious intentions, but in reality it was an organized political strategy in the court to find a scapegoat in a period of great difficulty.[67] The act was carried out by Bishop Lope de Barrientos (1382–1469), who decided to burn fifty scientific books, which, according to his criteria, dealt with necromancy and occult sciences. Barrientos kept the rest of the book collection. Whether a copy of the Alfonsine Tables was among those books is something we cannot confirm, but it seems plausible since Villena explicitly mentions them in his work.

Apart from this short note, we do not have, or have not yet found, other references to the Alfonsine Tables in scientific works produced in Castile. In fact, information about astronomical and astrological practices in this territory during the fourteenth century is not abundant and the promotion of this kind of work by the court disappeared. This could be related to the position of Christian orthodoxy against Muslim and Judaic communities; the latter groups were closely related to the knowledge and practice of natural sciences, especially astrology. Nevertheless, there are enough references to conclude that astrological practices remained alive in Castile at that time,[68] but people involved in these practices probably used other tables or tools to make horoscopes.

An 'Alfonsine tradition' in Castile was not recovered until Nicolaus Polonius occupied the chair of astronomy, *cathedra astrologia*, at the University of Salamanca (*c.* 1460). This scholar, probably from Poland as his name suggests, brought with him a version of the Parisian Alfonsine Tables called the *Tabulae resolutae*, initially developed in Cracow for university students and later adapted to other Central European cities. In Salamanca, Polonius composed new tables for the meridian of this city.[69]

The Polonius tables and canons are kept in a fifteenth-century manuscript of Castilian origin, now in Oxford (Bodleian Library MS Canon Misc. 27, ff. 122^{v}–129^{r})[70] and in a

67 After his death, Villena was accused of practising necromancy and magic, and although he was defended by important authors, most of the nobility and common people judged his excessive liking for study and science as inappropriate and gladly accepted this accusation. For further information, see Elena Gascón Vera, 'La quema de los libros de don Enrique de Villena: una maniobra política y antisemítica', *Bulletin of Hispanic Studies*, Oct 1 (1979), 317–24; Derek C. Carr, 'Arabic and Hebrew Auctoritates in the Works of Enrique de Villena' in *From Arabye to Engelond. Medieval Studies in Honour of Mahmoud Manzalaoui*, ed. by A. E. Christa Canitz and G. R. Wieland (Ottawa: University of Ottawa Press, 1999), pp. 39–60.

68 In addition to the mention of astrological practices in medieval literature and Castilian chronicles, the copies of the *Libro conplido* confirm the interest on this matter during the fourteenth and fifteenth centuries. Luis M. Vicente García, *Estrellas y astrólogos en la literatura medieval española* (Madrid: Laberinto, 2006); Fernández Fernández, *Arte y ciencia*, pp. 129–34.

69 Guy Beaujouan, *Manuscrits scientifiques médiévaux de l'Université de Salamanque et de ses 'Colegios mayores'* (Bordeaux: Yéret, 1962), p. 16; José Chabás and Beatriz Porres de Mateo, 'Los cánones de las "Tabulae Resolutae" para Salamanca: origen y transmisión', *Cronos: cuadernos valencianos de historia de la medicina y de la ciencia*, 1 (1998), 51–83. José Chabás, 'The Diffusion of the Alfonsine Tables: The Case of the *Tabulae resolutae*', *Perspectives on Science*, 10 (2002), 168–78; José Chabás, 'The University of Salamanca and Renaissance of Astronomy during the Second Half of the 15th Century', in *Universities and Science in the Early Modern Period*, ed. by Morchedai Feingold and Víctor Navarro Brotóns (Dordrecht: Springer, 2006), pp. 29–36 (p. 31). Chabás, *Computational Astronomy*, pp. 311–20.

70 For reproductions of several folios, see: https://digital.bodleian.ox.ac.uk/inquire/p/f. 5659bcc-a7ab-4129-bd37–00c397d37f68. In addition to the tables and canons written by Polonius, this manuscript includes the canons and tables of Jacob ben David Bonjorn, some tables associated with Ibn al-Kammād, the canons of John of Lignères and his Tables of 1322. Chabás and Goldstein, *The Alfonsine Tables*, p. 293. The Bodleian Library digital catalogue repeats the incorrect date (fourteenth century, third quarter) published by Jonathan J. G. Alexander and Otto Pächt, *Illuminated Manuscripts in the Bodleian Library* (Oxford: Clarendon Press, 1966), p. 67, instead of the correct date, *c.* 1461.

fifteenth-century manuscript in Lisbon (Torre do Tombo, Manuscritos da Livraria, tt-msliv n.º 2115); its canons are also found in a sixteenth-century manuscript in Cambridge, (Trinity College, MS O.3.13, ff. 74^{v}–80^{v}). The manuscript in Oxford is especially interesting, because, in addition to Polonius's text, it has a set of beautiful drawings of the zodiacal constellations (with the stars in red and captions written in Castilian ff. 152^{r}–157^{v}). The captions provide material that links certain stars to the lunar mansions or clarifies aspects of the figure. The set of zodiacal constellations is located at the end of the book, after the Polonius tables. Besides their beauty, these illustrations are a very interesting part of the history of the Alfonsine Tables because the latter allow us to consider whether or not they had a star catalogue.

In 1986, Kunitzsch wrote an interesting paper on the star catalogue appended to the Alfonsine Tables, or rather the Parisian Alfonsine Tables.[71] The author asserted that 'like every complete *zij*, or work of astronomical tables, the Alfonsine Tables [he was talking about the Parisian version], also contain a star catalogue' that was included in many manuscript copies. He further explained that 'no collaborators of Alfonso's were involved in the establishment of this catalogue', which was the same as that in the translation of Gerard of Cremona's *Almagest*, but adopted to the value of precession used in the star catalogue found in Alfonso's *Libro del saber de astrología* (Ptolemy +17°8').[72]

Today, with a much greater number of examples analysed, we know that most manuscript copies of the Parisian Alfonsine Tables do not contain a star catalogue and where they do, they are not all the same.[73] Why do only certain manuscripts contain the star catalogue? Does this detail have anything to do with the content and dissemination of the Alfonsine Tables produced in Castile? Did the Castilian Tables have a star catalogue or was it included in the early Parisian version? As usual, there are no conclusive answers; but if the coordinates in some tables are the same as in other Alfonsine materials, it is logical to assume that the Alfonsine Tables had a star catalogue from the beginning. Indeed, if we analyse the content of the Castilian canons in MS 3306, a table with the fixed stars is expressly mentioned in Chapters 39 and 41.[74]

What might the table of fixed stars in the Alfonsine Tables have looked like? Did it include iconic apparatus? Ptolemy's star catalogue in the Latin translation of Gerard of Cremona was also disseminated in a group of manuscripts called *Sūfī Latinus*, but in this case the longitudes of the stars are the same as al-Sūfī's value (Ptolemy +12°42'). These star

71 Paul Kunitzsch, 'The Star Catalogue Commonly Appended to the Alfonsine Tables', *Journal for the History of Astronomy*, 17/2 (1986), 89–98 (p. 89).

72 Kunitzsch, 'The Star Catalogue', p. 90. The same argument appears in Paul Kunitzsch, 'Star Catalogues and Star Tables in Mediaeval Oriental and European Astronomy', *Indian Journal of History of Science*, 21/2 (1986), 113–22 (p. 117).

73 I owe thanks to Richard L. Kremer for this information. The star catalogues preserved in manuscripts and printed editions have variations in their data and even in the names of the stars. For example, the catalogue in the 1483 *editio princeps* derives from Prosdocimo's catalogue (José Chabás, 'From Toledo to Venice: the Alfonsine Tables of Prosdocimo de' Beldomandi of Padua (1424)', *Journal for the History of Astronomy*, 38 (2007), 269–81) and the star catalogue published in 1492 has twenty-nine stars with different names, which, according to Kunitzsch, were compiled from other sources and added to the star catalogue by the circle of John of Gmunden (*c.* 1380–1442) in Vienna (Kunitzsch, 'The Star Catalogue', pp. 92–93). Different kinds of star catalogues can be found in José Chabás and Bernard R. Goldstein, *A Survey of European Astronomical Tables in the Late Middle Ages* (Leiden: Brill, 2012), pp. 185–99.

74 Chabás and Goldstein, *The Alfonsine Tables*, pp. 78, 84.

catalogues are illustrated with images of the constellations derived from the visual tradition of al-Sūfī's *Book of the Fixed Stars*.[75] With regard to the constellations of Oxford Bodleian MS Canon Misc. 27, although the style of these drawings follows the fifteenth-century trend, it is worth noting that the iconography of the constellations is the same as in the Alfonsine manuscripts. Like the *Sūfī latinus* corpus, the Alfonsine iconography of constellations stems from the figurative tradition derived from al-Sūfī's *Book of the Fixed Stars* but from a different brand of dissemination with specific features.[76] Moreover, the information presented by the Castilian captions in MS Canon Misc. 27 fits with the data provided by the *Libro de las figuras de las estrellas fixas*, the first treatise of the aforementioned *Libro del saber de astrología*. These particularities seem to point to a Castilian source for this material. What was the formal model for this manuscript? Could the painter be using a lost copy of the Alfonsine Tables alongside a star catalogue with figures? Certainly, if we think of most scientific manuscripts made in the Alfonsine *scriptorium*, the idea of the Alfonsine Tables as an illuminated manuscript with an iconic repertoire makes perfect sense. These questions once again are difficult to resolve, but it is clear that there is a direct connection between the images in the Oxford manuscript and Alfonsine materials.[77]

In addition to the knowledge brought to, and developed by, Polonius in Salamanca, the Parisian Alfonsine Tables were also known in Castile in the final decades of the fifteenth century and throughout the sixteenth century. Proof of this is the anonymous Castilian translation of John of Saxony's canons preserved in a paper manuscript (dated *c.* 1490) in the Escorial (RBME MS T-III-29, ff. 120^{r}–150^{r})[78] and the sixteenth-century Castilian translation made by the 'bachiller Franciso de Morales, clérigo presbítero' preserved in BNE MS 3306, folios. 74^{r}–87^{v}. Both translations were made from the text recorded in the *editio princeps* of 1483.[79] Who commissioned the first translation into Spanish, where was it made, and by whom are questions yet to be resolved. Clarifying these points would contribute to a better overall view of this sequence of dissemination. The second translation is also linked to numerous interrogations. The type of writing is known as *italic*, whose

75 Kunitzsch, 'Star Catalogues', p. 117. For the 'Sufi Latinus' manuscripts, see Marie-Thérèse Gousset, 'Le Liber de locis stellarum fixarum d'Al-Sûfi, ms. 1036 de la Bibliothèque de l'Arsenal à Paris: une réattribution', *Arte medievale*, 2 (1984), 93–107; Paul Kunitzsch, 'Ṣūfī Latinus', *Zeitschrift der Deutschen Morgenländischen Gesellschaft*, 115 (1965), 65–74; Paul Kunitzsch, 'The Astronomer Abū 'l-Husayn al-Sūfī and his Book on the Constellations', *Zeitschrift für Geschichte der Arabisch-Islamischen Wissenschaften*, 3 (1986), 56–81.

76 Laura Fernández Fernández, 'Arab Stars in the Castilian Sky: Al-Sūfī's *Book of fixed stars* Amongst the Manuscripts of Alfonso X', in *The Stars in the Classical and Medieval Traditions*, ed. by Alena Hadravová, Petr Hadrava, and Kristen Lippincott (Prague: Scriptorium, 2019), pp. 93–114.

77 This relationship between the figures in MS Canon Misc. 27 and the Islamic imprint in the Alfonsine manuscripts was pointed out by Gousset, p. 94 and Kunitzsch, 'The Astronomer', p. 81. On the other hand, Alejandro García Avilés, 'Arte y astrología en Salamanca a finales del siglo XV', *Anuario del Departamento de Historia y Teoría del Arte*, 6 (1994), 39–60 (p. 45) suggested that the visual source of this manuscript might be an Islamic celestial globe rather than a manuscript.

78 This manuscript in its old signature, *olim*. iii.Q.26, was cited by Rodríguez de Castro, p. 645 and Rico y Sinobas, V, pp. 24–25. The codex is a composite miscellaneous book with a Latin text of Gasparo Contarini (1483–1542), dated in Venice in 1527 (ff. 1^{r}–119^{v}). The book, presently in El Escorial, belonged to the library of the Conde Duque de Olivares (1587–1645).

79 The first text was edited by José Martínez Gázquez, who also published a few fragments of the second one. John of Saxony, *Las Tablas de los movimientos de los cuerpos çelestiales del illuxtrisimo Rey Don Alonso de Castilla: seguidas de su Additio: traducción castellana anónima de los cánones de Juan de Sajonia*, ed. by José Martínez Gázquez (Murcia: Universidad de Murcia, 1989).

use, first extended in the Aragon area, spread through Castile at the end of the sixteenth century; therefore, we could consider that this copy was made during the latter decades of that century.[80] Neither Rico y Sinobas nor Martínez Gázquez, the scholars who studied this translation, provided any information about Francisco de Morales.[81] As mentioned previously, the text is part of BNE MS 3306, a composite manuscript that had belonged to Juan Fernández de Velasco, whose library was well stocked with scientific books;[82] therefore, it is logical to think that the translation was made within his circle of influence.

The question of the disappearance of the Alfonsine Tables for almost two centuries is always present in studies of history of science on the Iberian Peninsula and the answer probably has more to do with political than with scientific aspects. Science is not neutral, it is subordinated to the political and social framework in which it develops; in this case, astronomical tables were intimately linked to the monarch. In addition to their scientific purpose, the Alfonsine Tables were conceived as an important piece in the construction of the King's legacy. The epoch of their calculation was the year 1252, when Alfonso was proclaimed king, and in the prologue of the canons, the *era alfonsí* was established, equivalent to the eras of other historically renowned characters such as Alexander the Great or Caesar. One of the possible reasons for their 'disappearance' from the Castilian scientific milieu could be directly related to the desire to tarnish the memory of the King. This *damnatio memoriae* was used as part of a political strategy constructed within the framework of the court, firstly to justify the revolt of his son, Sancho, and later to vindicate the need to halt his lineage and support the arrival of the Trastámara House in the government.[83] In this political movement, the King, previously distinguished for his wisdom, was transformed into an astrologer or even a sorcerer interested in occult sciences. Furthermore, the main aspect of this legend, constructed to slander Alfonso X, was his excessive promotion and practice of science and consequently his arrogance was so intense, according to his enemies, that he had even questioned the work of God.[84]

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80 The type of writing is known as *italic*, whose use first extended in the Aragon area and spread through Castile at the end of the sixteenth century; therefore, we could consider that this copy was made during the latter decades of that century. Rico y Sinobas dated it ambiguously: V, pp. 42–43 (sixteenth century), I, p. LVI (seventeenth century); Martínez Gázquez, p. 16, also dated it to the sixteenth century.

81 A *bachiller*, scholar, and priest, called Francisco de Morales Cabrera (1564–1614) oversaw the Latin Chair, and from 1591 also the Greek Chair, at the University of Salamanca. Enrique Esperabe de Arteaga, *Historia pragmática e interna de la Universidad de Salamanca y los Reyes* (Salamanca: Imprenta de Francisco Núñez, 1914), p. 600. Perhaps this scholar was the one who was entrusted with the translation.

82 It is not strange that Juan Fernández de Velasco's son, Bernardino Fernández de Velasco y Tovar (1609–52), commissioned Francisco García Ventanas, a mathematician at his service, with the last edition of the Parisian Alfonsine Tables, the only one made in Spain. This new edition was printed in Madrid in 1641. *Tabulae Alphonsinae Perpetuae Motuum Coelestium denuo restitutae et illustratae à Francisco García Ventanas Mathematico* (Madrid: Officina Regia, 1641).

83 The Trastámara lineage began its rule in Castile in 1369 with Enrique II (1334–79) after the murder of his half-brother King Pedro I (1334–69).

84 This episode is known in Alfonsine historiography as the 'blasphemy of King Alfonso'. For further information, see Jerry R. Craddock, 'Dynasty in Dispute: Alfonso X el Sabio and the Succession to the Throne of Castile and Leon in History and Legend', *Viator*, 17 (1986), 214–19; Bernard R. Goldstein, 'The Blasphemy of Alfonso X: History or Myth', in *Revolution and Continuity: Essays in the History and Philosophy of early Modern Science*, ed. by Peter Barker and Roger Ariew (Washington, DC: Catholic University of America Press, 1991), pp. 143–53; Leonardo Funes, 'La blasfemia del Rey Sabio: itinerario narrativo de una leyenda (primera parte)', *Incipit*, 13 (1993), 51–70, 'La blasfemia del Rey Sabio: itinerario narrativo de una leyenda (segunda parte)', *Incipit*, 14 (1994), 69–101, and 'La leyenda de

It is remarkable that when, in the rest of Europe, Alfonso X was respected and indissolubly linked to astronomical science thanks to his tables, in the Castilian historiographical sources, the monarch became a negative figure. However, despite the pernicious vision of Alfonso X orchestrated by a faction of the court, the ideal of the Learned King was defended by other authors such as don Juan Manuel (1282–1348). In the fifteenth century, a few Castilian chronicles tried to recover the intellectual reputation of the monarch, pointing to his *tablas de astrología* as one of his main achievements.[85] In the sixteenth century, important scholars claimed the cultural production promoted by the Learned King, and as we have seen, the fame of his tables continued to grow. The laudatory words about the Alfonsine Tables that Jerónimo Román de la Higuera incorporated in his aforementioned book, *Historia eclesiástica de la imperial ciudad de Toledo*, should be understood within this framework of recognition of Alfonso X. Nevertheless, the negative view of the King was kept alive as a result of the new versions of the legend disseminated by Juan de Mariana (1536–1624) and Jerónimo Zurita (1512–80), and it remained active until the nineteenth century.[86]

3.2 The Crown of Aragon

On the other hand, in the Crown of Aragon scientific activity promoted by the court continued during the late Middle Ages; in fact, King Pere 'el Ceremoniós' (1319–87) commissioned his own tables.[87] The Royal Library had to offer a significant number of scientific books in order to support the work of the astronomers and physicians patronized first by King Pere, and later by his son Joan I 'el Caçador' (1350–96). Proof of this is in the letter that *el Ceremoniós* wrote to his archivist on 24 October 1359 to allow Dalmau Ses Planes, an astronomer from Perpignan in his service, to consult all the astrological books in

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la blasfemia del Rey Sabio: revisión de su itinerario narrativo', e-Spania [Online], online since 1 October 2016, accessed 22 March 2020. URL: http://journals.openedition.org/e-spania/25873; George Martin, 'Alphonse X maudit son fils', *Atalaya*, 5 (1994), 151–78; Amaia Arizaleta, 'De la soberbia del rey: dos formas breves en la construcción historiográfica', in *Tipología de las formas narrativas breves románicas medievales*, III, ed. by Juan M. Cacho Blecua and Mª Jesús Lacarra (Zaragoza/Granada: Universidad de Zaragoza/Universidad de Granada, 2004), pp. 79–110; Isabel de Barros Días, 'A blasfémia do Rei Sabio: os antecedentes da lenda', in *Estudios de literatura medieval. 25 años de la AHLM*, ed. by Antonia Martínez Pérez and Ana Luisa Baquero Escudero (Murcia: Universidad de Murcia, 2012), pp. 189–96; Isabel de Barros Días, 'La blasfemia del Rey Sabio: vicisitudes de una leyenda (nuevas hipótesis respecto a la datación y la posición relativa del texto portugués)', *Anuario de Estudios Medievales*, 45/2 (2015), 733–52.

85 Fernando Pérez de Guzmán (*c.* 1377–1460) evoked the influence that Alfonso X had over the kingdom even after his death in his work, *Loores a los claros varones de España*: 'Non le valiendo ciencia, / Franqueza, esfuerzo e potencia / De que tanto fué dotado. / Vive por caballería / Este rey, pero es muerto. / Aunque duerme está despierto / Por Tablas de Astrologia. / Ordena, rige e guia / Con Leyes nuestras memorias / Deléitanos con Estorias; / Orna con Filosofia'. (Not worth the science, openness, effort, and power, which were his gifts. He lives by chivalry, this king though he is dead, though he sleeps he is awake, by tables of astrology, he commands, rules, and guides, with laws, our memories. He delights us with stories, he decorates with philosophy). Marcelino Menéndez y Pelayo, *Antología de poetas líricos castellanos. La poesía en la Edad Media* (Madrid: CSIC, 1944), T. 4, p. 259. For an interesting analysis of Alfonso X in some fifteenth-century chronicles, see Jean-Pierre Jardin, 'La figure du roi Alphonse X chez quelques chroniqueurs du XV^e^ siècle', *Cahiers de linguistique hispanique médiévale*, 20 (1995), 75–96.

86 Antonio Rivera García, 'La leyenda sobre la blasfemia de Alfonso X: un episodio de la conflictiva relación entre especulación teórica y razón de estado', *eHumanista* 31 (2015), 426–51.

87 José M. Millás Vallicrosa, *Las Tablas astronómicas del Rey Pedro el Ceremonioso* (Madrid/Barcelona: CSIC, 1962).

the royal archive with the aim of creating his own work.[88] Thanks to such documentation, we know that in 1361 the monarch also commanded Dalmau Ses Planes and Pere Gilbert to construct a celestial sphere for the Royal Library, 'cambra on estan los libres' (room where the books are), with the figures of the constellations and planets, 'signes, steles, planets e alters figures diverses' (signs, stars, planets, and other figures). Depicted by Ramón Torrent, a painter from Barcelona, this curious and very luxurious artefact was made of gold, silver, and tin, was depicted in blue 'atzur d Acra' (ultramarine blue) and exhibited in the Royal Palace.[89]

In this scientific atmosphere, the tradition of the Alfonsine Tables was kept alive, at least in a documentary sense. In 1373, Ses Planes specifically mentions them in the prologue of the work *Taules i almanac*.[90] Additionally, in the inventory of goods preserved in the Royal Palace in Barcelona [Palau Reial Major] recorded after the death of King Martí 'l'Humà' (1356–1410), there are two important items related to them.[91] The first mentions a book of the tables, probably without the canons, apparently produced in Mallorca[92] and written in Catalan:

> 24. Yĕhudà ben Mošé ha-Kohen, Iṣḥāq ben Sid, Taules alfonsines, Traductor: Anònim. Text: Item, un altre libre appellat Taules alfonsines, en català, scrit en pergamins ab posts de fust cubert de cuyro vermell empremptades ab senyal reyal a cada part, ab dos tancadors de fil groch e vermell. Lo qual comença: 'Taules de les diffarències', e faneix en vermelló: 'in Maiorica'.[93]

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88 Antonio Rubió y Lluch, *Documents per l'historia de la cultura catalana mig-eval* (Barcelona: Institut d'Estudis Catalans, 1908–21), I, 190: CXCI. The place, as Rubió clarifies, was Cervera, not Girona. The same day, the King wrote to Ses Planes to command him to work with Pere Gilbert, 'magistrum in artibus et in astrorum scienciam peritissimum'. José Chabás, *L'Astronomia de Jacob Ben David Bonjorn* (Barcelona: Institut d'Estudis Catalans, 1992), p. 16. The document specifies the prohibition of consulting two books of Ali ben Ragel, one of which was probably the *Judiciis Astrologie*, the Latin translation of the *Libro conplido en los iudizios de las estrellas* commissioned by Alfonso X. According to Vernet and Romano, the book was translated into Catalan during the reign of King Pere 'el Ceremoniós', and King Joan, on 11 October 1386 (one year before his coronation), commissioned a new copy. Unfortunately, the Catalan copy is also lost. Joan Vernet and David Romano, *Bartomeu de Tresbéns. Tractat d'Astrologia* (Barcelona: Biblioteca Catalana d'Obres Antigues, 1957–58), p. 202; Fernández Fernández, *Arte y ciencia*, pp. 132–33.

89 Rubió y Lluch, *Documents*, I, pp. 199–200: CCI, CCII, and 1921, II, pp. 139–42: CXLI. Curtains for protecting the globe are also mentioned in the document.

90 This work must be the result of the observations made by Ses Planes and Gilbert between 1360 and 1366, but it was written by Ses Planes in 1373. Lynn Thorndike, 'Introduction and Canon by Dalmatius to Tables of Barcelona for the Years 1361–1433', *Isis* 26 (1937), 310–20; Chabás, *L'Astronomia*, pp. 16–17.

91 'Inventari parcial de la biblioteca reial elaborat, a la mort de Martí I 'l'Humà' (1396–1410), per Pau Nicolau, secretari del rei, per autoritat de Francesc Fonolleda, en benefici de la reina vídua, Margarida de Prades.' Barcelona - Arxiu de la Corona d'Aragó - Cancelleria reial, Registres – reg. 2326. This is a partial inventory published for the first time by Jaume Massó i Torrents, 'Inventari dels béns mobles del rey Martí d'Aragó', *Revue Hispanique*, 12/42 (1905), 413–590. A selection with the scientific items can be consulted in Chabás, *L'Astronomia*, pp. 28–37, and online via Sciencia.cat: *La ciència en la cultura catalana a l'Edat Mitjana i el Renaixement* (https://www.sciencia.cat/db/cercador.htm?doc=19).

92 In 1381, King Joan wrote to the governor of Mallorca to request astrological treatises and the Jewish astronomer Vidal Afrahim was working there, so the city must have been an established location for copying scientific manuscripts. Michael A. Ryan, *A Kingdom of Stargazers: Astrology and Authority in the Late Medieval Crown of Aragon* (Ithaca: Cornell University Press, 2011), p. 114.

93 (Another book called Taules alfonsines, in Catalan, written on parchment, with board binding covered with red leather, engraved with the royal arms, with two yellow and red thread fastenings. Which begins 'Taules de les diffarències', and ends, in red, 'in Maiorica'.)

This parchment codex had to be a relevant copy, or at least, it had a special significance in the Royal Library since its binding included the royal heraldry, a peculiarity that not all the books showed. In addition to this manuscript, another Catalan copy is mentioned, on paper:

> 238. Yĕhudà ben Mošé ha-Kohen, Iṣḥāq ben Sid, Taules alfonsines, Traductor: Anònim. Text: 'Ítem, un altre libre appellat Taules alfonsines, en romanç, scrit en paper ab posts de paper engrutades e cubert de cuyro vermell, ab dos tancadors de bagua. Lo qual comença: 'Per ço és atrobat', e faneix: 'havets aüdes altres'.[94]

Therefore, the Alfonsine Tables were also translated into Catalan and they were copied on several occasions. Although this inventory was made after King Martí's death, the astronomical books had been commissioned or acquired by King Pere, and particularly by Joan I. The latter became Jean de Berry's brother-in-law following Joan's marriage to Yolande de Bar, so he could have been a point of connection between both territories and cultural milieus.[95]

Unfortunately, none of the books of the tables mentioned in this inventory have been preserved. We must not forget that this list of books corresponds to part of the goods given to the widowed Queen Margarita de Prades (*c.* 1387–1429) and that they were probably sold, meaning they left the royal archive, and were sadly either lost or simply have not yet been identified.[96]

The Parisian Alfonsine Tables were also known in the Crown of Aragon and they were even adapted to the meridian of Morella (BNE MS 4238), although the number of copies of the Parisian Alfonsine Tables on the Peninsula is minimal compared to those preserved in other parts of Europe.[97]

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94 (Another book called Taules alfonsines, in romance, written on paper, with paper covers and covered with red leather, with two clasps. Which begins 'Per ço és atrobat' and ends 'havets aüdes altres'.)

95 If we examine the documentation, this connection is evident. For example, on 11 October 1388, in Zaragoza, King Joan (1350–96) requested that Jean de Berry give the Parisian astrologer Guillem Lunell permission to travel from France to Aragon. Rubió y Lluch, *Documents*, I, 354: CCCXCVI; Ryan, pp. 118–19. García Avilés, 'Two Astromagical', pp. 20–21, suggests that the *Libro de las formas et las ymágenes* and the *Libro de astromagia* could have arrived in France thanks to the close ties between Joan I and the Duke of Berry, and even Charles VI of France. If so, we should first pinpoint the transmission of the book from Castile to Aragon.

96 Jaume Riera i Sans, 'La bibliothèque du roi Martin', in *Association Internationale de Bibliophilie. XXII Congrès. Actes et Communications, Barcelona, 2001* (Barcelona: Associació de Bibliòfils de Barcelona, 2005), pp. 105–17 (p. 117). There is also a seventeenth-century copy made by Fray Manuel Ribera (1652–1736) among the books from the Convento de la Merced, in Barcelona, which was used by Félix Torres Amat, *Memorias para ayudar a formar un diccionario crítico de los escritores catalanes y dar alguna idea de la antigua y moderna literatura en Cataluña* (Barcelona: Imprenta de J. Verdaguer, 1836), p. 715. In this list, it is said that both books were in the library of this convent: 'TAULES Alfonsines: en catalá, scrit en pergamins. Comensa: Taula de las diffarencias, é faneix: in Maioricae. Bib. De D. Martin, Merced. Taules alfonsines: en romans, en paper. Comensa: Perço es trobat, é faneix: havets agudes altres. Idem. n. 237'.

97 BNE MS 4238 is a composite, multiple-text manuscript dated to the end of the fourteenth and the early-fifteenth centuries. The manuscript contains the canons by John of Saxony and the Parisian Alfonsine Tables adapted to Morella. See José Chabás, 'Astronomía alfonsí en Morella a finales del siglo XIV', *Cronos*, 3 (2000), 381–91; Chabás and Goldstein, *The Alfonsine Tables*, p. 292.

3.3 The Kingdom of Navarre

To complete the picture of the Hispanic Christian kingdoms, we turn to Navarre. In the courtly documentation of the fourteenth century some astrologers appeared, denoted as 'sol', 'estorlogo', or 'astrologuo'. All came from other territories, Foix, Avignon, Burgundy, Germany (*maestre Reymar*), and apparently they went to the court to cover specific demands. There are also references to two Jews as 'maestre de astrolabio' (master of astrolabe). In 1416, Johan de Sancto Archangelo received fifty-eight sueldos for the creation of an 'estrument de astrologia' (astrology instrument),[98] a sophisticated and precious artefact made of silver with 'figuras de estreillas' (figures of the stars) commissioned by King Carlos III (1361–1425). In 1430 García Arnaldo de Suescun, *estorlogo*, is related to another artefact called an *estrelario*.[99] As we can see, astronomical and astrological practices were present in Navarre and scholars and texts circulated in this territory; but there is no trace of the Alfonsine Tables or the Parisian version in this documentation. It is worth mentioning that the only medieval fragment of astronomical tables preserved in the Castilian language, in this case a translation of the Toledan Tables, is an unclassified bifolio in the Archivo General de Navarra. It apparently dates to the fourteenth century and, after falling into disuse, served as a binding for the cover of a book by 'los calcateros y sastres' (the guild of shoemakers and tailors) of Pamplona. Apparently the Toledan Tables were used throughout the fourteenth century. The fact that the fragment has been found in a book on guilds outside the scientific context of court or university suggests that those tables were widely disseminated, even though no further copies have been found.[100]

4. The documental recovery of the Alfonsine Tables in Spain during the sixteenth century

Despite the silence of the Castilian sources until the fifteenth century, the inventories of sixteenth-century libraries provide us with valuable information to document new stages in the history of the Alfonsine Tables and their impact. The tables did not disappear from Castile; rather they had been 'disconnected' but re-emerged in the sixteenth century, at least from a documental point of view. This is evidenced not only by their presence in several inventories but also by the copy of the Castilian canons preserved in BNE MS 3306, with which I started this chapter.

One of the earliest pieces of information we have, here quoted for the first time in relation to the history of the Alfonsine Tables, is the inventory of Juan de Guzmán, III

98 AGN, Comptos. Registros, 1ª Serie, nº 344, f. 103; Fernando Serrano Larráyoz, 'Astrólogos y astrología al servicio de la monarquía navarra durante la Baja Edad Media (1350–1446)', *Anuario de Estudios Medievales*, 39 (2009), 539–53, p. 548. Iohannes de Sancto Archangelo was the author of one set of astronomical tables 'Tabule Johannis Archangeli ad inveniendum facillime vera loca omnium planetarum', Bodleian Library MS lat. Misc. d. 88, ff. 60–84, and he is also mentioned by Simon de Phares as the author of the treatise 'Equatorium planetarum facilis compositionis', BnF MS lat. 7443, ff. 243^{v}–246, and named in f. 229^{r}. Jean-Patrice Boudet, *Lire dans le ciel. La bibliothèque de Simon de Phares, astrologue du xve siècle* (Brussels: Centre d'études des manuscrits, 1994), pp. 146, 151.

99 Serrano Larráyoz, 'Astrólogos y astrología', p. 548.

100 Serrano Larráyoz, 'Astrólogos y astrología', p. 549; José Chabás, 'The Toledan Tables in Castilian: Excerpts of the Planetary Equations', *Suhayl*, 11 (2012), 179–88.

duke of Medina Sidonia (1466–1507).[101] This nobleman died in 1507 in Seville, probably of the plague. The inventory of his belongings provides important data about his library of circa 230 books, a significant part of which were devoted to scientific topics, especially medicine and astronomy. It is likely that the scientific collection came from the library of his father, don Enrique Pérez de Guzmán y Meneses (*c.* 1434–92), who lived in his residence in Sanlúcar de Barrameda (Cádiz) between 1478 and 1492.[102]

In addition to the scientific books, the duke owned a few instruments, 'un estrolatio que tiene quatro ruedas de laton y otro triabulo de laton e otros antojos de laton metidos en su caxa' (one astrolabe with four brass circles, and one brass triangle [a quadrant?], and a brass eyeglass in its box), so he clearly was interested in scientific matters.[103]

Among these books, there are four related to astronomical tables,[104] two of which concerned the Alfonsine Tables: item 75 is a paper book, 'otro libro, de las tablas alfonsyes', and item 140, on parchment, 'otro libro en pergamino, que son las Tablas Alfonsyes'. We know that both were manuscripts, as the few printed books in the inventory are identified by expressions like *libro de molde* or *libro de forma*.[105] Furthermore, both books were written in Castilian, as evidenced by their titles; had they been Latin texts, the copyist would have specified it in the inventory as is done with all the Latin books registered. The fact that there is no Latin copy of the tables in this library or in any contemporary library we know, either handwritten or printed, I think is evidence enough to consider that these entries refer to the Castilian version of the tables and not to the Parisian version. Furthermore, the presence of these copies of the Alfonsine Tables in this library is proof of the knowledge of the work and its circulation, at least among a select group of people.[106]

The Guzmán lineage was very close to the royal house; in fact, one of its members, Alonso Pérez de Guzmán (1256–1309), known as *el Bueno*, was a direct collaborator, first

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101 Granada, Archivo de la Real Chancillería de Granada, ARCHGR/01RACH//CAJA 764, pieza 13. The inventory was published in Miguel A. Ladero Quesada and Mª Concepción Quintanilla Raso, 'Bibliotecas de la alta nobleza castellana en el siglo XV', in *Colloque International de la Casa de Velázquez. Livre et lecture en Espagne et en France sous l´Ancien Regime* (Paris: Casa de Velázquez, 1981), pp. 47–62 (pp. 57–59); Miguel A. Ladero Quesada, *Guzmán. La casa ducal de Medina Sidonia en Sevilla y su reino. 1282–1521* (Madrid: Editorial Dykinson, 2015).

102 For Guzmán lineage, see Ladero Quesada, *Guzmán*.

103 Among the astronomical and astrological manuscripts, we find the 'espera mundi con sus glosas', two 'Tolomeo', 'Abumasar de magis comuncionibus', several treatises of astrology and alchemy, one book described as 'se dize conpendio de las estrellas', and another 'que dize encima de Aben Ragel'; the latter could be the *Libro conplido en los iudizios de las estrellas*, also commissioned by Alfonso X. Another interesting book is the *arte notoria,* with the royal heraldry, lions, and castles in its tables (it is not clear if the heraldry was in the binding or if the book had tables with these elements), 'Otro libro de arte notoria, que tiene castillos e leones en las tablas'. We also find the *Estoria de España*, the *General Estoria*, and the III *Partida*, all of them from Alfonso X's intellectual productions.

104 Item 150, 'que es glosa de las tablas toledanas' and item 158, 'otro libro enquadernado en pergamino, que dize encima Tablas del Blanco'. These 'Tablas del Blanco' could very well be the tables of Giovanni Bianchini, first printed in 1495. Bianchini was called *Blanchinus* in Latin, which was probably translated into Castilian as *Blanco*. I thank José Chabás for this information.

105 There are just five printed books in the whole inventory: 'Otras oras yluminadas de mano, y la escritura de **molde**, de pargamino, con una cerradura de plata', 'un libro de poesía de **molde**, guarnecido de terciopelo negro', 'unas oras de **molde** viejas', 'otro libro de **molde** de rezar, con un cuero colorado' f. 10^{v}, 'otro libro de Ovidio, de **molde**', and 'otro libro de **forma**, de noviceas', f. 26^{r}.

106 I wonder if the existent copy of the Castilian canons, in the hands of Juan Fernández de Velasco (BNE MS 3306), was made from one of the books mentioned in the library of the third duke of Medina Sidonia, since these lineages were linked through Juan Fernández de Velasco's mother, Ana Pérez de Guzmán y Aragón, daughter of the sixth duke of Medina Sidonia.

of Alfonso X, and later of his son, Sancho IV, and his lineage remained linked to the royal house throughout the fourteenth and fifteenth centuries. As we can see, there was a direct connection between this family and the court and therefore a member of the Guzmán family may have known and acquired a copy of the Alfonsine Tables. What happened to these books is not known; unfortunately, none of our exemplars of interest are recorded in the catalogues of current public institutions.

To this new reference we must add the valuable information provided by Gonzalo Argote de Molina (1548–96), an influential character on the Spanish intellectual scene during the second half of the sixteenth century. Gonzalo Argote de Molina had a remarkable library in Seville containing important manuscripts, including several directly related to Alfonso X. We know the list of books that Argote had in his studio in Seville thanks to one document kept in the BNE MS 18554/23, folios 1–2^{v}: 'Libros de mano nunca impressos tocantes a Historia de Espana que se veen en Sevilla en el estudio de Goncalo Argote de Molina.'[107] Among them is an item directly related to our topic: 'Las Tablas Alfonsies originales que mando escreuir el Rey don Alonso el sabio escriptas en pergamino yluminadas', in fact, according to the description, the book could be the royal manuscript of the tables that Alfonso X commissioned.[108]

Another inventory from Argote's studio in the Colombina Library (Biblioteca Capitular Colombina MS 57–3-16, ff. 144–7) specifies even more information: 'Las tablas alfonsinas originales que mandó escribir el rey don Alonso el Sabio, escritas en pergamino, iluminados con adornos de oro'.[109] Both documents indicate that the manuscript was the original commissioned by Alfonso X, written on parchment and illuminated with golden ornaments, the same features found on the French copy in the Louvre Library.

How the Alfonsine Tables arrived in Gonzalo Argote de Molina's studio is an enigma. He was one of the most remarkable scholars at that time and had received permission from King Felipe II to consult any archive or library he needed for his work; therefore, he had access to nobiliary collections, as well as municipal and religious archives.[110] The book of the Alfonsine Tables in his studio could be the one previously owned by don Juan Pérez de Guzmán. As a matter of fact, Argote de Molina had a close relationship with this family, documented the Guzmán lineage, and wrote the book *Linage y sucesión de la*

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107 A digital copy is available at: http://bdh-rd.bne.es/viewer.vm?id = 0000250259&page = 1. In addition to the *Tablas Alfonsíes*, Gonzalo Argote de Molina had in his studio these Alfonsine manuscripts: 'El uso del Astrolabio escripto en pergamino por mandado del Rey don Alonso el Sabio. Libro de philosophia escripto por el moro Azbrani hecha por mandado del Rey don Alonso el Sabio. Repartimiento original antiguo de la ciudad de Seuilla y su tierra hecho por el Rey don Alonso el Sabio'. See Laura Fernández Fernández, 'El MS. 8322 de la Bibliothèque de l'Arsenal y su relación con las tablas alfonsíes. Hipótesis de trabajo', *Alcanate*, 7 (2010/11), 235–68, (pp. 248–49) and *Arte y ciencia*, pp. 334, 341.

108 (The original Alfonsine Tables that King Alfonso the Learned ordered to be written, on parchment and illuminated.)

109 (The original Alfonsine Tables that King Alfonso the Learned ordered to be written, on parchment and illuminated with gold ornament.)

110 On 3 July 1576, the monarch signed a royal charter, *real cédula*, granting him permission to consult any document of interest to his work, which allowed Argote access to all kinds of books and documents. Celestino López Martínez, *Algunos documentos para la biografía de Argote de Molina* (Seville: Imprenta y Librería de Eulogio de las Heras, 1921), p. 96.

casa de Guzmán y de la de Ponce de León. Following Argote's death in 1596, the fate of his manuscripts and the exemplars he had borrowed is unclear.[111]

A last reference to this record is a sale catalogue published in 1804 by a bookstore in Madrid, the *Librería de Claros*, located in Arenal street. The catalogue states: 'Catálogo de manuscritos especiales de España anteriores al año 1600 que logró juntar en la mayor parte un curioso andaluz',[112] and the Alfonsine Tables, handwritten and illuminated, are mentioned in it: 'Tablas astronómicas, alfonsinas, iluminadas'.[113]

This list has been studied by several scholars and raises important questions concerning the whereabouts of these manuscripts, since we have no information about their sale or acquisition by institutions such as the National Library or the Royal History Academy.[114] Not to mention that the sale of such important manuscripts would not have gone unnoticed in Madrid at that time. I wonder whether the bookstore only possessed (and was offering for sale) the inventory itself, not the books. Aside from this 1804 reference, we have no further information on the subject, leaving the manuscript of the Alfonsine Tables lost to the subsequent historiography.

To finish our documentary and material history of the *Libro de las tablas alfonsíes*, I would like to consider the library of Juan de Herrera, the aforementioned architect of King Felipe II, as it provides new and important data on the dissemination of the astronomical tables related to Alfonso X.

In addition to his role as main architect of the court, Herrera distinguished himself for his intellectual work and collected a considerable number of books. We are aware of his library thanks to the four inventories of his belongings he made during his life.[115] To create this library, he acquired books from different places, even asking for specific titles outside of the kingdom. This is the case of his request to Cristobal de Salazar, secretary of the Spanish Embassy in Venice. In 1584, Herrera asked him for several scientific books, including 'Las Tablas del rey D. Alonso en vulgar italiano'.[116] The solicited copy was certainly

111 The library and activity of this character have been studied by Inora Pepe Sarno, 'La biblioteca di Argote de Molina. Tentativo de catalogo della sezione manoscritti', in *Studi di letteratura spagnola* (Rome: Società Filologica Romana, 1967), pp. 165–262; Gregorio de Andrés, 'Códices del Escorial procedentes de Gonzalo Argote de Molina, con la edición de dos inventarios de sus manuscritos', *Cuadernos para investigación de la filología hispánica*, 10 (1988), 7–38.

112 'Catalogue of special manuscripts of Spain prior to 1600, united in their majority by a curious Andalusian man'. Although Inoria Pepe Sarno questioned the identity of this *curioso andaluz*, Gregorio de Andrés asserted without doubt that the character was Argote de Molina himself. Pepe Sarno, p. 182; Andrés, 'Códices', p. 10.

113 (Astronomical tables, Alfonsine, illuminated.)

114 Andrés, 'Códices', pp. 10–11, pp. 17–31; Pepe Sarno, pp. 177–83.

115 The inventories were published by Agustín Ruiz de Arcaute, *Juan de Herrera. Arquitecto de Felipe II* (Madrid: Instituto Juan de Herrera, 1997 [Madrid: Espasa Calpe, 1936.]), pp. 150–71; Luis Cervera Vera, *Los cuatro testamentos otorgados por Juan de Hererra* (Santander: Fundación Juan de Herrera, 1997); Francisco J. Sánchez Cantón, *La librería de Juan de Herrera* (Madrid: CSIC, 1941).

116 The books Herrera asked for were mainly for the library of the Royal Mathematical Academy founded by Felipe II in 1582, a project in which Herrera was involved from the beginning. In fact, Herrera was the first director of the institution until his death in 1597. For the complete list of books that Herrera asked of Salazar see Eugenio Llaguno y Amirola, *Noticias de los arquitectos y arquitectura de España desde su restauración* (Madrid: Imprenta Real, 1829), Tomo II, pp. 360–62; Ruiz de Arcaute, pp. 99–100. Regarding the Royal Mathematical Academy, see Pedro García-Barreno, 'The Madrid Mathematical Academy of Phillip II', *Bollettino di Storia delle Scienze Matematiche*, XX (2000), 87–188.

sent to Herrera as it appears as 'Las tablas de el Rey don alonso en ytaliano manoescritas sin figuras'[117] in the inventory of his library made several years after the request.[118]

As Chabás and Goldstein explained,[119] the Parisian Alfonsine Tables arrived in Italy in the first half of the fourteenth century, but as we have seen so did the original Alfonsine Tables, even before their arrival in Paris. According to the astronomer and mathematician Prosdocimo de' Beldomandi (*c.* 1370–1428), Jacopo Dondi of Padua (1290–1359) had composed new tables for this city based on the Parisian Alfonsine Tables, an endeavour that would be completed by Prosdocimo himself.[120] The tables and canons of Prosdocimo are known in several Latin manuscripts; Chabás provides details of fifteen copies, one of which (Biblioteca Nazionale Centrale di Firenze MS Conv. Sopp. I.III.23), has the canons translated into Italian. Could this Italian copy of the Prodoscimo tables have anything to do with Juan de Herrera's request? Was there another version of the Alfonsine Tables or the Parisian Alfonsine Tables written in Italian? As far as I know, nobody has considered whether the Alfonsine Tables, or their Parisian version, could have been translated into Italian. Beyond the Italian copy of the Prosdocimo tables, it seems that no other exemplars are preserved. However, thanks to the inventory of Juan de Herrera's library, we can confirm that a version of the tables written in Italian was known in Venice and that a manuscript with that content was sent to Madrid.[121]

In addition to this Italian copy, two other items interest us in Herrera's library inventory: a folder (*cartapazio*) with material on the Alfonsine astronomical tables written on parchment, 'Un cartapazio de cosas tocantes a las tablas de el rrey don alonso escrito en pergamino',[122] and a Latin copy of the *Libro de las armellas* and the rest of the astronomical instruments (I suppose those explained in the *Libro del saber de astrología*), 'Libro manoescripto del rrey don alonso sobre las armyllas y todos los instrumentos astronómicos en latín'.[123]

The connection between Juan de Herrera and the Alfonsine scientific material is not strange. As noted above, he was entrusted with the mission of illustrating the copy of the *Libro del saber de astrología* produced in 1562[124] and, according to Jerónimo Román de la Higuera in his *Historia eclesiástica de la imperial ciudad de Toledo*, the original manuscript of the Alfonsine Tables was once in the possession of the architect. We cannot know

117 (The tables of King Alfonso, in Italian, handwritten without figures). It may be that the specification 'sin figuras' is proof of the existence of copies with figures, and therefore with illustrations.

118 Ruiz de Arcaute, p. 161.

119 Chabás and Goldstein, *The Alfonsine Tables*, p. 292.

120 Chabás, 'From Toledo to Venice', p. 270.

121 Just out of curiosity, because I have not been able to find more information, there is a mention of one manuscript of the *Tabule Alphonsine* in the library of San Antonio, in Venice, recorded by Giacomo Filipo Tomasini in his work *Bibliothecae Venetae manuscriptae publicae et privatae* (Udine: Typis Nicolai Schiratti, 1650), p. 1. The manuscript is linked to Iohaneis de Rubeis (https://data.cerl.org/thesaurus/cnp00297682).

122 Ruiz de Arcaute, p. 160. (A folder of things concerning the tables of King don Alonso written on parchment).

123 Ruiz de Arcaute, p. 157. (Manuscript book of King don Alonso about the *armyllas* and all their astronomical instruments in Latin).

124 In 1505, the *Libro del saber* was bought by the Cardenal Cisneros (1436–1517) from King Fernando 'el Católico' (1452–1516) for the library of the university college he founded in Alcalá de Henares, the Colegio de San Ildefonso, the origin of the Complutense University. There, this manuscript was copied on several occasions, one of them in 1562 for Carlos, Prince of Asturias (1545–68), son of Felipe II, and Juan de Herrera was responsible for making its figures (RBME MS h-I-1). Fernández Fernández, *Arte y ciencia*, p. 248.

whether Higuera was right; but it is clear that Herrera knew and owned material related to these tables.

5. Material traces of the royal manuscript: a proposal

A significant number of manuscripts commissioned by King Alfonso remained linked to the royal treasury; but many others, especially those related to scientific issues, left the court and were acquired by other prominent personalities in the political and cultural sphere of the time and were preserved in their circles.[125] The royal manuscript of the Alfonsine Tables could have been sold or gifted and thus have assumed a history outside the court. However, did it even disappear at all? Is there no material trace left of the royal manuscript? Regarding this question, I would like to draw attention to one of the preserved Alfonsine codices, the compendium now in Paris, at the Bibliòtheque de l'Arsenal MS 8322.[126] This illuminated manuscript commissioned by Alfonso X is a miscellaney whose content is entirely devoted to astronomical tables: the *Canones de Albateni*, *Canones de Azarquiel*, *Tablas de Azarquiel*, and *Libro del cuadrante señero*, a book related to tabular content written by Isaac ben Sid in 1277, who was, as we have seen, one of the authors of the Alfonsine Tables. There is no doubt that this book was produced in Alfonso's scriptorium. Its textual and material features date it to the end of 1270s or early 1280s. Despite containing different texts, the manuscript was conceived as a compilation with a unitary character, both in terms of its material dimensions and theoretical approach. However, the manuscript is not complete; it lacks a first section with the general prologue, the *intitulatio*, and the usual table of contents. In fact, the codex was manipulated during the fifteenth century, as we can see on its first folio, completed on paper, not parchment, and written in *gotica rotunda*, not *gotica textualis* like the rest of the manuscript, that replaced the missing original folio. Furthermore, a close codicological examination reveals that at the beginning of the codex, thirteen queries have disappeared, approximately one hundred folios, as well as other queries inside the manuscript. These circumstances made me ask whether this codex might be the surviving part of a compilation, and whether part of those lost queries contained a copy of the missing Alfonsine Tables. During the second half of the 1270s, the *scriptorium* was entrusted to produce these kinds of works, compendia of all the scientific material developed during previous decades; therefore, mine is a plausible hypothesis. Who manipulated the manuscript and removed the first part and when they did so is again an enigma, but the codex was in the hands of a Venetian nobleman called Jacobus Contarenus, apparently a member of the Contarini family, which was well-known for its political and diplomatic activity and also for its intellectual position. According to an inscription on folio 23^{r} of the manuscript, Contarenus gifted the book to King Manuel I of Portugal (1469–1521) in 1496. Sometime after that, the manuscript returned to Spain, to

125 This happened with the *Libro de las cruzes*, *Libro conplido en los iudizios de las estrellas*, *Lapidario*, *Libro del saber de astrología*, *Libro de las formas et las ymágenes* (except for the prologue and index), *Libro de astromagia*, and the *Compendio* in Arsenal library. Further information about this topic can be found in Fernández Fernández, *Arte y ciencia*.

126 A digital copy available at: https://gallica.bnf.fr/ark:/12148/btv1b71003376

Seville, and it was housed in the library of Diego Ortiz de Zúñiga (1636–80) who gifted it to Juan Lucas Cortés (1624–1701), thanks to whom it would finish its periplus, after many vicissitudes, in the Bibliothèque de l'Arsenal.[127]

As I suggested a decade ago, the royal manuscript was manipulated and transformed throughout the course of the fifteenth century. It travelled from Castile to Venice, into the hands of Contarini, wherever he may have been, then to Lisbon, returning years later to Seville, and concluding its journey in Paris after a period in Lyon.

Having assumed the possibility that the *Libro de las tablas alfonsies* was the missing part of MS 8322, I began to ask what this book would look like. According to the documentary references analysed so far and to the features of the other scientific manuscripts commissioned by Alfonso X, it must have been an illuminated manuscript. The canons and tables of al-Battānī in MS 8322 undoubtedly offer us a direct element of comparison; and the prologues in other scientific manuscripts, like the *Lapidario* or the *Libro de las formas et de las ymágenes*, as well as the rest of the Alfonsine production, suggest that our book had an opening image portraying the King and his collaborators. We could also speculate on the presence of a constellation set, a topic directly connected to the subject and often used in other scientific manuscripts promoted by Alfonso. This is a possibility that certainly seems plausible if we recall the set of constellations present in MS Canon Misc. 27 analyzed above.

Furthermore, we can know with certainty who wrote at least the numerical tables in the manuscript. This is because Diego Ortiz de Zúñiga provided news of a document in the archive of the Cathedral of Seville, unfortunately undated, in which the name of one of the King's scribes, Suer Meléndez, is specified, 'que le faze las tablas e numeranças de los sus libros' (who makes the tables and numbers of his books).[128]

6. Conclusion

The history of the astronomical tables commissioned by Alfonso X, their dissemination, and their reinterpretation, is an important episode in the history of science. It is a history marked by the constant movement of books, scholars, and ideas, tracing multiple routes of knowledge and intellectual development over the centuries.

As we have seen, the *Libro de las tablas alfonsíes* was more than a scientific success. These tables were part of the history of Alfonso X for a long time, and despite being relegated and apparently disappearing from the scientific scene, they remained in the collective memory of the Kingdom of Castile through chronicles and other documentation. It is not surprising that some scholars in Spain during the sixteenth and seventeenth centuries were interested in this work and what it meant. Furthermore, these scholars, as those in the rest of Europe, were fully aware of the relevance of medieval manuscripts with regard to access to knowledge of earlier times, as well as their historical significance, and their beauty; thus, they made a significant effort to locate, identify, copy, and collect these sources. Proof of this lies in the numerous medieval books preserved in Renaissance libraries.

127 For further information, see Fernández Fernández, 'El MS. 8322'.
128 Ortiz de Zúñiga, p. 90.

For the time being, the exemplars of the Alfonsine Tables mentioned in the inventories of Juan Pérez de Guzmán, Gonzalo Argote de Molina, and Juan de Herrera's libraries have not appeared; but there are many archives and libraries yet to be explored. I trust that we will be able to find new references in the future to guide our search.

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