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## How Galileo Dedicated the Moons of Jupiter to Cosimo II de Medici

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**Nick Kollerstrom**

**Abstract.** This article looks at the logic whereby in 1610 Galileo was able to change, from being the mathematics lecturer at Padua university to become the ‘court philosopher’ of Florence, following his discovery of the Jupiter-moons. Within the framework of Biagioli’s excellent account of these events,<sup>1</sup> I argue for a slightly different perspective as regards why Galileo decided, or felt obliged, to dedicate the new moons to Cosimo II de Medici, in terms of a perceived astrological context to the event. I further suggest that a fuller appreciation of Galileo’s character is obtained by looking at the extent to which he shared the belief, widely accepted at the Medici court, of astrologically-ordained destiny. By way of comparison, this article looks at nativities which Galileo cast for himself and for his Venetian friend, Sagredo, with his written commentary upon the latter. This work is developed in my *Galileo's Astrology*.<sup>2</sup>

### **Mathematicus**

Galileo was a *mathematicus*, which meant that he practiced astronomy, astrology and mathematics. During the tenure of his chair at Padua University in Venice, it seems that the majority of his students were medical,<sup>3</sup> which meant that he would have had to show them how to set

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<sup>1</sup> Mario Biagioli, *Galileo Courtier The Practice of Science in the Culture of Absolutism* (Chicago: University of Chicago Press, 1993).

<sup>2</sup> Nicholas Campion and Nick Kollerstrom, *Galileo's Astrology* (Bristol: Cinnabar Books, 2004; *Culture and Cosmos* 7, no. 1 (Spring/Summer 2003)).

<sup>3</sup> Antonio Favaro, *Galileo Galilei e lo Studio di Padova* (Firenze: 1883). For Galileo’s letters to the Riformati at Padua, re medical students attending his lectures, see Antonio Favaro, ed., *Le Opere di Galileo Galilei* (Florence: G. Barbera, 1929–39), 2, pp. 236–7 (9 March 1609) and 264–5 (4 November 1609).

up a horoscope for the onset of a disease.<sup>4</sup> In 1993, two books were published that have helped with the developing image of Galileo. That by Poppi, a Franciscan monk, concerned a summons by the Inquisition, the Holy Office of Venice, in the year 1604 on the charge of undue fatalism which had been alleged in the astrological forecasts Galileo was making for his clients.<sup>5</sup> The Church did not in general mind astrology being practiced, however it could not endure the notion of a necessary fate as decreed by the stars, and that was what was being reported against the forty year old *mathematicus*. This summons – which remained merely as a warning, and did not lead to prosecution – had been buried for four centuries and Poppi was startled to discover it in old archives.

Also in 1993, Biagioli's opus appeared, and this brought out for the first time the rich symbolism involved in the process whereby Galileo came to dedicate the moons of Jupiter to the young and newly-enthroned Cosimo II de Medici, by alluding (Biagioli claimed) to Jupiter-motifs which the latter's grandfather Cosimo I had employed in his court.<sup>6</sup> We may note in passing that Galileo always alluded to the *stella* or the *planetae* he had found and never called them moons: as a proper noun Luna could not be made plural any more than could, say, Mars. It would be interesting to ascertain who first used the plural 'lunae', but it wasn't Galileo.

### Cosimo II's nativity

*Galilée se présente ici comme l'interprète direct de la volonté du Créateur, comme une sorte de prophète auquel Dieu envoie des signes. Plusieurs allusions à la "grace divine" et au "destin" sont discrètement glissées dans le Sidereus'.*

Isabelle Pantin, concerning the dedication of *Sidereus Nuncius*, 1610<sup>7</sup>

<sup>4</sup> Robert Westman, 'The Astronomer's Role in the Sixteenth Century: a preliminary study', *History of Science* 18, no. 2 (1980): pp. 105–147, 118–19.

<sup>5</sup> Antonino Poppi, *Cremonini, Galilei e gli Inquisitore del Santo a Padova* (Padova: 1993), pp. 42–54, 51–54. Poppi presented his findings during the 1992 Padua quattrocentenary celebrations, of Galileo accepting the mathematics chair there in 1592.

<sup>6</sup> Mario Biagioli, *Galileo Courtier The Practice of Science in the Culture of Absolutism* (Chicago: University of Chicago Press, 1993).

<sup>7</sup> I. Pantin, *Galileo Galilei: Sidereus Nuncius le Messenger Celeste* (Paris: Les Belles Lettres, 1992), p. 53, n. 22.

There is a fine drawing made by Galileo of the waxing Moon seen through his new telescope, perhaps the first to show ‘earthshine’ as appearing in the Earth-shadowed part of the Moon. It has been shown to be an accurate drawing of the Moon, its craters and its terminator boundary – rather better, in fact, than the pictures he published a couple of months later<sup>8</sup> – together with an adjacent star that helped to clinch its dating, to January 19<sup>th</sup>, 1610<sup>9</sup>. On this same sheet is found Galileo’s first sketch of his Cosimo II de Medici horoscope (See Fig 1). A finished version of what is more or less the same horoscope was dated by Owen Gingerich in 1976,<sup>10</sup> to 12<sup>th</sup> May 1590 (Fig 2).

It then dawned upon Guglielmo Righini (at the Arcetri-Florence astrophysics observatory) that this had to be the nativity drawn up for Cosimo II de Medici.<sup>11</sup> Righini miscomputed the time of day of this chart, making it too early by two hours so that Jupiter was just rising,<sup>12</sup> and this error has rumbled on in subsequent debate. Quite where these charts originally came from is less than clear: neither of them were in the *Astrologia nonnulla* in which Galileo’s extant astrological horoscopes etc. were kept, and it seems likely they were in the folio manuscript of *Sidereus Nuncius*, which appears in volume 3 of Favaro’s *Opere*.<sup>13</sup>

<sup>8</sup> O. Gingerich and A. van Helden, ‘The Making of Sidereus Nuncius’, *Journal for the History of Astronomy* 34 (2003): pp. 251–68.

<sup>9</sup> Ewen Whitaker, ‘Selenography in the seventeenth century’, in René Taton and Curtis Wilson, eds, *Planetary Astronomy from the Renaissance to the Rise of Astrophysics 2A* (Cambridge: Cambridge University Press, 1989), Chap. 8, pp. 121–43 (p. 125); Ewen Whitaker, ‘Galileo’s Lunar Observations and the Dating of the Composition of Sidereus Nuncius’, *Journal for the History of Astronomy* 9 (1978): pp. 155–69.

<sup>10</sup> Owen Gingerich, in Maria Luisa Righini Bonelli and William R. Shea, eds, *Reason, Experiment and Mysticism in the Scientific Revolution* (New York: Science History Publications, 1975), p. 88: ‘Two horoscopes, whose presence is not depicted in the National Edition, share the same leaf with lunar drawings’.

<sup>11</sup> Guglielmo Righini, ‘L’Oroscopo Galileiano di Cosimo II de Medici’, *Annali dell’istituto e Museo di Storia della Scienza di Firenze* 1 (1976): pp. 28–36.

<sup>12</sup> Pantin, *Galileo Galilei*, p. 53, n. 17.

<sup>13</sup> Righini stated that both horoscopes were in ‘the original manuscript of the *Sidereus Nuncius*’, presumably that reproduced by Favaro (*Opere*, Nat. Ed. III, Part 1, Mss Gal T.III par III), ‘in the same folios where Galileo has placed various views of the moon’. The two charts he alluded to as 29 v. and r. implying they were on opposite sides of the same sheet. Gingerich found them with lunar drawings in MS 48, which seems to be the newer ms number for that cited by Righini.

These two charts by Galileo used the new ‘Regiomontanus’ system of house-divisions. This meant that, while the planetary positions were measured in celestial longitude, the house-boundaries are measured in right ascension along the equator. It was ascertained by Owen Gingerich that Galileo had used the tables of Magini to obtain these planetary longitudes.<sup>14</sup> The Mercury-error is by far the largest in this chart, being three degrees out. The horoscopes given in Galileo’s *Astrologia nonnulla* show Mercury errors far larger than for any other planet.

The second, complete nativity was computed for a slightly later time than was the first.<sup>15</sup> The time for Cosimo’s birth is given in the Court archival records as ‘the first hour of the night’,<sup>16</sup> and he seems to have added on an hour or so, presumably to get Jupiter near to the MC, the highest part of the chart, as more suitable for a ruler – and for the argument he was concerned to weave.

In the Dedication to his *Sidereus Nuncius*, Galileo gave two time-determining items of information concerning the Medici chart, on which his dedication was based: Jupiter was reaching the highest part of the sky in its daily round, and the sign Sagittarius ruled by it was rising. Anyone having the birthdate of Cosimo could thereby reconstruct the chart. Thus, in the foreword to Galileo’s runaway bestseller which changed the universe forever, the nativity of the young Cosimo was indicated:

Jupiter, Jupiter, I say, at the instant of your highnesses birth had already passed the slow, dull vapours of the horizon and was occupying the midheaven, from which point it was illuminating the eastern angle.

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<sup>14</sup> In a 1990 review of the situation, Gingerich said Favaro had ‘suppressed ... this part of the sheet’ alluding to these Medici horoscopes, i.e., that he had excluded them from his multi-volume *Opere*. He added that Galileo had used the Regiomontanus method for house divisions and had taken the planetary positions from tables of Giovanni Magini, see ‘Book Reviews’, *Journal for the History of Astronomy* 21 (1990): pp. 368–69.

<sup>15</sup> The first, unfinished chart was set for 8.36 p.m. with 8° Sagittarius rising, and the second for 8.56 p.m. with 12° 35’ rising (reconstructed local mean times).

<sup>16</sup> Righini (op. cit. 9, p. 32) obtained this from the Medici archives at the Bibl. Nat. Florence ‘Diario di corte del Tinghi’, i.e., court record archives. Sunset was at 7.13 pm in Florence for May 12th and their ‘sunset’ could have been half an hour or so after this computed instant.

The Latin is *Orientalēque angulum sua Regia illustrans* and it alludes to Jupiter as illuminating the Eastern angle (the ‘rising’ sign) which was ‘*sua regia*,’ under his rulership, that is, Sagittarius. Scholars who have written on this subject (Righini, Biagioli and Westman,) have tended to miss this point<sup>17</sup>. Jupiter also holds a strong angular relationship to the horizon as shown by a modern reconstruction (Fig. 3), as is somewhat implied by Galileo’s language of its ‘illuminating’ the horizon-point, and again its formation of such angles could have been a reason for Galileo using the slightly later hour of birth.

Biagioli never apprehended that a chart i.e. nativity had been prepared, and rebuked Tomasso Campanella for having mistakenly assumed in a letter to Galileo that a ‘real horoscope’ was here involved.<sup>18</sup> Biagioli misplaced Jupiter’s position as having been just above the horizon at the Cosimo birth-moment. Earlier, Righini had found ‘no doubt that a horoscope or ‘nativity’ of Cosimo II existed’.<sup>19</sup>

As a general comment, making known the chart of one’s patron could be rather hazardous, and perhaps politically incorrect. But, by way of analogy, the imperial mathematician Kepler in the foreword to his *Astronomia Nova*, published six months before the *Sidereus Nuncius*, alluded to Mars in the natal chart of Emperor Rudolf II.<sup>20</sup>

### An ‘astrologico-dynastic encounter’

<sup>17</sup> For a discussion of Sagittarius as Cosimo II’s rising sign, see Germana Ernst in ‘Aspetti dell’astrologia e della profezia in Galileo e Campanella’, in P. Galluzi, ed., *Novita Celesti e Crisi del Sapere* (Florence: Barbera, 1984), pp. 258–66 (p. 264).

<sup>18</sup> Biagioli, *Galileo Courtier*, p. 128, n. 93; Galileo, ‘Campanella to Galileo, 8 March 1614’, in Favaro, *Opere* 12, pp. 31–33.

<sup>19</sup> Righini, op cit. (9), p. 30, quoted a letter from Cilli (secretary to king of Poland) to Vinta (Secretary of State of Tuscany), of 13 August 1611, alluding to ‘the nativity of the most serene Grand Duke, made by Signor Galilei’, suggesting he had seen a chart.

<sup>20</sup> Johannes Kepler, *New Astronomy* 1609, trans. by William Donahue (Cambridge: Cambridge University Press, 1992), p. 31: ‘To Rudolph II...’ (dedication), alluded to Mars as ruler of the horoscope, in relation to the rising sign and moon sign: ‘It is undoubtedly the Emperor’s horoscope that Kepler means’ (commentary by Eric Aiton). See Darrel Rutkin, ‘Celestial Offerings: Astrological Motifs in the Dedicatory Letters of Kepler’s *Astronomia Nova* and Galileo’s *Sidereus Nuncius*’, in W. Newman and A. Grafton, eds, *Secrets of Nature, Astrology and alchemy in Early modern Europe* (Cambridge, MA: MIT Press, 2001), pp. 133–72.

*Cosimo I identified with the planet Jupiter, named after the king of the Roman pantheon, and he filled the Palazzo della Signora, where he lived and ruled, with frescoes stressing this Olympic theme.*<sup>21</sup>

Cosimo I, grandfather to Cosimo II, had employed astral symbolism to legitimise the rule of his international-banking family in Tuscany: ‘No ruling house made more consistent use of astrology in all its different forms than the Medici... Cosimo used astrology in public far more than any of his predecessors’.<sup>22</sup> The primary image here used had been the rising sign Capricorn in his nativity:

This personal symbol would become the core image of a rulership propaganda that would make continuous reference to a destiny that had been indicated in the positions of the stars at his birth. The theme... was absolutely central to his manipulation of that propaganda as it appeared in repeated literary and artistic expressions from the beginning of his career to its end.<sup>23</sup>

Cosimo I used astrological advice regarding when the start of the siege of Siena in 1554, and he was seen to possess ‘felicitas’ or good fortune.<sup>24</sup> Science historians have disagreed over whether Cosimo I mainly invoked Jupiter-Zeus as his ruling planet, or whether it was rather Saturn-Cronos (as ruler of his ascendant, Capricorn).<sup>25</sup> Suffice to say that, when Galileo

<sup>21</sup> Dava Sobel, *Galileo's Daughter a drama of Science, Faith and Love* (London: Fourth Estate, 1999), p. 33.

<sup>22</sup> Paulo Rossi, ‘Society, culture and the dissemination of learning’, in S. Pumphrey, ed., *Science, Culture and Popular Belief in Renaissance Europe* (Manchester: Manchester University Press, 1991), pp. 143–75, 158–59.

<sup>23</sup> Claudia Rousseau ‘an Astrological Prognostication to Duke Cosimo I de’ Medici of Florence’, *Culture and Cosmos* 3 (1999): pp. 31–42 (p. 31).

<sup>24</sup> Rousseau ‘an Astrological Prognostication’, p. 33.

<sup>25</sup> R. S. Westman objected to Biagioli’s view on the grounds that ‘The alleged connections between Jupiter and Cosimo I... are at best tenuous’, see ‘Two Cultures or One?’ *Isis* 85 (1994): pp. 85, 79–115, 103, n. 76. A scathing review of Biagioli’s book by Michael Shank appeared in the *Journal for the History of Astronomy* 25 (1994): pp. 236–43, to which Biagioli responded in *Early Science and Medicine* 2 (1996): pp. 70–105, with a final riposte by Shank, *ibid*, pp. 106–150. Pantin’s comment (Pantin, *Galileo Galilei*, p. 53 n.17) was: ‘Jupiter était l’un des dieux des Medicis... mais il n’était pas le plus important; la propaganda insistait d’avantage sur les liens de la famille avec Mars, le protecteur de

invoked Jupiter in his dedication to Cosimo II he was tapping into a profound family tradition that was taken very seriously.

Galileo discovered four stars next to Jupiter on the night of 7<sup>th</sup> January,<sup>26</sup> then ascertained in the week following that they were orbiting around it. His nativity for Cosimo was adjacent to a selenographic sketch, dated as we saw to a mere week or so after this epic discovery. According to Biagioli, ‘Astrological predetermination was a recurrent theme in Galileo’s presentation of his discoveries to the Medici. What he had observed, Galileo claimed, was not a discovery but a confirmation of the Medici’s destiny, almost a scientific proof of their dynastic horoscope’.<sup>27</sup> After seventeen years of employment at the mathematics chair in Padua, he became able to envisage a change in his fortunes – he would be court philosopher to the Medicis in Florence. No such position existed and he had to envisage it; and his logic was able to convince others only because he himself fully believed it. He was then tutor to the 19-year old Cosimo, and well honoured by the Doge of Venice for the telescope he had donated, enabling the Venetians to see ships far away at sea.

Of relevance here is a remark to the young Cosimo about the importance of self-esteem (something Galileo was never short of):

because it is most true that our reputation begins with our own self-confidence, and whoever wants to be esteemed ought to have self-esteem first, when His Most serene Highness will demonstrate recognition of the importance of this encounter, no doubt not only all his subjects but all nations will recognise its importance too, and there will remain no feather in the wings of fame that will not write in praise of the glory of this event.<sup>28</sup>

The young Grand Duke had to believe in the meaning of this encounter, as well as Galileo, for these things to work. As he told Cosimo in the dedication of the *Sidereus Nuncius*, it was not by chance that “the bright stars offered themselves in the heavens” right after his enthronement’ (the

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Florence... et surtout avec Saturne, dieu de l’Age d’or et protecteur d’Augustine...’.

<sup>26</sup> A. Van Helden, ‘Galileo, telescopic astronomy and the Copernican system’, in *Planetary Astronomy from the Renaissance to the Rise of Astrophysics 2A* (Cambridge: Cambridge University Press, 1989), pp. 81–105 (p. 85).

<sup>27</sup> Biagioli, *Galileo Courtier*, p. 128.

<sup>28</sup> Galileo Galilei, ‘Letter to Vinta March 1610’, in Favaro, *Opere*, Vol. X, no. 464, pp. 28–29.



latter was in February of 1609).<sup>29</sup> Only Galileo had discovered the Medician stars *because* he had been connected to Cosimo since he was a young prince:

Therefore, since I was evidently influenced by divine inspiration to serve your Highness and to receive from so close the rays of your incredible clemency and kindness, is it any wonder that my soul was so inflamed that by day and night it reflected on almost nothing else than how I, most desirous of your glory (since I am not only by desire but also by origin and nature under Your dominion), might show how very grateful I am towards You. And hence, since under Your auspices, Most serene Cosimo, I discovered these stars unknown to all previous astronomers, I decided by the highest right to adorn them with the very august name of Your family.<sup>30</sup>

The four Medici brothers would share out the glory of having the four new Jupiter moons, Galileo explained, in a letter to Vinta the Secretary of State for Tuscany.<sup>31</sup> In the dedication to *Sidereus Nuncius* Galileo enunciated seven virtues which, he considered, belonged to the planet Jupiter:<sup>32</sup>

for who does not know that clemency, kindness of heart, gentleness of manners, splendour of royal blood, nobleness of public functions, wide extent of influence and power over others, all of which have fixed their common abode and seat in your highness – who, I say, does not know that these qualities,

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<sup>29</sup> Biagioli, *Galileo Courtier*, p. 128; Galileo Galilei, *Sidereus Nuncius*, trans. Albert Van Helden (Chicago, IL: University of Chicago Press, 1989), p. 31.

<sup>30</sup> Galileo, *Sidereus Nuncius*, p. 32; Biagioli, *Galileo Courtier*, p. 132.

<sup>31</sup> Galileo, 'Galileo to Vinta, 13 Feb 1610', in Favaro, *Opere*, Vol. X, no. 265, p. 283.

<sup>32</sup> Pantin, *Galileo Galilei*, p. 53, n. 20) has these Jovian virtues derive from Ptolemy's *Tetrabiblos* III, 30. Galileo's copy of the *Tetrabiblos* was annotated over several pages: A. Favaro, *La Libreria di Galileo Galilei descritta ed illustrata* (Rome: Tipografia Delle Scienze Matematiche E. Fisiche, 1887), VI, p. 43.

according to the providence of God, from whom all good things do come, emanate from the most benign star of Jupiter?’<sup>33</sup>

Biagioli argued that ‘Galileo was suggesting that Cosimo passed on his (and Jupiter’s) virtues to his successor through the Medician stars’ at the latter’s birth: ‘Those virtues were emanating from the four stars which – like innate virtues – always revolved very closely around Jupiter,’ for which decisive action ‘Galileo was somehow midwife to this astrologico-dynastic encounter’.<sup>34</sup> I reject this view, and instead suggest that the seven princely virtues spelt out so well in the *Sidereus Nuncius* were attributed solely to Jupiter in the natal position at the top of Cosimo’s horoscope, as being ‘ruler’ of the chart – they had nothing to do with the moons of Jupiter.

A year later, Galileo did permit himself to comment on the question which people were asking concerning the four new stars, viz. the nature of their influence,<sup>35</sup> and he did so in an eleven-page letter to Piero Dini in Rome.<sup>36</sup> He began by emphasising that he had as yet said nothing on this matter, which tends to refute the Biagioli thesis. As plants had medical virtues, many of which were unknown, he explained, so the powers inherent in stars remained to be explored. He then conjectured as to how more mental and spiritual qualities such as ‘acuteness and perspicacity of wit’ could derive from the smallest of celestial bodies, eg the little new moons, whereas the more gross objects (eg Jupiter) could pertain more to such attributes as ‘courage and boldness of heart’. He went on to suggest how this could be in principle investigated by checking records from past clients and their nativities. This view hardly supports Biagioli’s case.

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<sup>33</sup> Van Helden’s translation of Galileo’s *Sidereus Nuncius* is used here used (Galilei, *Sidereus Nuncius*. p. 31), except that ‘most,’ as ‘most benign star...’ has been inserted (*ex benignissimo Iouis Astro... emanare*).

<sup>34</sup> Biagioli, *Galileo Courtier* (4), p. 110; see Mario Biagioli, ‘Galileo the Emblem Maker’, *Isis* 81 (1990): pp. 230–58 (p. 234).

<sup>35</sup> The British ambassador in Venice Sir Henry Wootton, writing to King James on the day of *Sidereus Nuncius*’ publication (12 March 1610), alluded to the Jupiter-moons’ astrological implication: ‘for the virtue of these new planets must needs vary the judicial part,’ Wootton to Earl of Salisbury, Cited in Sobel, *Galileo’s Daughter*, p. 35.

<sup>36</sup> Galileo, ‘Galileo to Dini, 21 May 1611’, in Favaro, *Opere*, Vol. XI, pp. 105–116 (p. 107). For discussion of this letter, see Germana Ernst, ‘Aspetti del’ Astrologia a della Profezia in Galileo e Campanella’, in P. Galluzi, *Novita Celesti*, pp. 255–66.

The Medicis were at first hesitant over accepting the offer, following the publication of *Sidereus Nuncius*, after all it might have grave theological implications, in relation to the new heliocentric theory, and could well incur Papal displeasure. Others, Galileo then warned, might want the offer if the Grand Duke hesitated, and he wrote to the courtier Giugni in May that ‘whenever possible, please make sure that your most serene highness would not delay the flight of fame by taking an ambiguous stand about what he has seen many times himself – something that fortune reserved to him and denied to everybody else’.<sup>37</sup> In July 1610 Galileo’s life-contract arrived, awarding him a staggeringly large salary, more even than the Secretary of State Belisario Vinta.<sup>38</sup> He had now become a philosopher, instead of a mere *mathematicus*, to the Grand Duke of Tuscany, and his new status enabled him to discuss the nature of reality as was never really permitted for the latter. The Medici court distributed his book plus telescope to its embassies, and the Medicean stars eventually became an integral part of the discourse of the court, being well-celebrated in poetry, theatre, opera and ceiling décor. One court poet Chiabrera praised Galileo for having put ‘the name of our great Medici among the eternal stars, a name so powerful that it even improves the value of stars’.<sup>39</sup>

### Galileian Horoscopes

It may be of interest to compare one or two other horoscopes which Galileo drew up, in this context. Two which he prepared for his own birth were regrettably excluded from Favaro’s *Opere*,<sup>40</sup> but are in his *Astrologia nonnulla*, and, as with the two Medici charts he prepared, they explored slightly different birthtimes. He gathered that Cosimo’s birth was on the 15<sup>th</sup> February at 22.30 hours Pisa time, i.e., measured from sunset, as was equal to four o’clock next day ‘post-meridian’. His second

<sup>37</sup> Galileo, ‘Letter to V. Giugni in Favaro’, in Favaro, *Opere*, Vol. 10, no. 339, pp. 368–69.

<sup>38</sup> Biagioli, ‘Galileo the Emblem Maker’, pp. 230.

<sup>39</sup> Biagioli, *Galileo Courtier*, p. 143; for a compilation of poems re Galileo and the stars, see N. Vaccalluzzo, *Galileo Galilei nella del suo tempo* (Milan: 1910).

<sup>40</sup> In Favaro, *Opere*, 19, p. 205, ‘Appendice, *Astrologia nonnulla*’. Favaro gave their dates: ‘1564, 15 Februarii, h.22.30, 16 Februarii, h 4 p.m., 3.30 (inscribed by Galileo at the top of these charts). For a 1980 exhibition at the Bibl. Nazionale at Florence of astrological material, just these two charts were exhibited as having been drawn up by Galileo for his own birth: BNF *Opuscoli Astrologici* ms Galil. 81, Sec. XVI Cart. Cc.48.

chart is set for half an hour earlier,<sup>41</sup> and he seems to like the way it put the Moon closer to the MC; what with all the discoveries he was making about it, that might well have seemed a suitable place for the Moon in his own nativity. Both charts show his ‘part of fortune’ given by the arithmetic difference between ascendant, Sun and Moon.<sup>42</sup> Celestial latitudes of the planets are written out, required for ascertaining ‘primary directions’ as enable predictions concerning the course of one’s life to be ascertained. Astronomically, his longitudes of Mercury erred by almost four degrees,<sup>43</sup> which is comparable to or slightly worse than we saw earlier for his Cosimo II chart; while his lunar longitude erred by only one degree.

Unusually for a *mathematicus*, Galileo experienced doubt over the day on which he was born. We infer this from another chart by Galileo drawn up (perhaps somewhat later) for the 15<sup>th</sup> February for himself, but for the same given date of 15<sup>th</sup> February at 22 hours. This indicates some uncertainty over interpreting the date-convention at Pisa where he was born. One might not wish to view this chart as so authoritative as the two here shown.<sup>44</sup> The only evidence for his birth date comes from his own nativities, which tend I suggest to point towards February 16<sup>th</sup>, 1564.<sup>45</sup>

Concerning Galileo’s Venetian friend Guiseppe Sagredo, we have Galileo’s horoscope plus chart analysis in his remaining notes, and in addition there are two pages in his *Astrologia nonnulla* of ‘primary

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<sup>41</sup> The first nativity has 21° of Leo rising while the second, for half an hour earlier, has 14° of Leo rising. Sunset was at 17.24 LAT in Padua, and adding 15 minutes for the Equation of Time gives 17.38 LMT. Adding 22 ½ hours will bring us to 4 p.m. LMT.

<sup>42</sup> This was computed by adding the difference in celestial longitude between Sun and Moon to that of the Ascendant, and is shown in the bottom left corner of these charts.

<sup>43</sup> Ottavio Brenzoni found a difference in the Mercury positions of ephemerides by Stadius and Carelli of ten degrees; Galileo, ‘Letter to Galileo, Verona 19 Dec 1605’, Favaro, *Opere*, 7, p. 152. For periodic errors in Stadius’ Mercury positions of up to ten degrees see Owen Gingerich, *The Eye of heaven, Ptolemy, Copernicus, Kepler* (New York: The American Institute of Physics, 1993), p. 233.

<sup>44</sup> It has the name ‘Georg. Giacomius’ written on it in his hand, as if it might not be his own chart: fol. 37 of *Astrol. nonnulla*: Favaro, *Opere* 19, *Appendice*, p. 206.

<sup>45</sup> Noel Swerdlow has ascertained that the planetary positions were here taken from Johann Stadius’s *Ephemerides*. Of the various nativities for Galileo included in Favaro’s *Opere*, only these three were, he found, in Galileo’s hand. A forthcoming work of his will discuss these horoscopes in some detail.

directions' for Sagredo, more than for any other figure,<sup>46</sup> as would have had the purpose of enabling advice and predictions to be given concerning the course of his life. Sagredo died fairly young and, by way of atoning for loss of his dearest friend, Galileo cast him into one of the figures in his immortal dialogues together with Salviati and Simplicius. It surely adds a greater depth to our perception of Galileo's character, to appreciate that as well as being his patron, intellectual sparring-partner and best friend, Sagredo was also in the habit of receiving astral guidance and advice from that illustrious *mathematicus*. In his notes about Sagredo written for his own perusal he found that (after making highly flattering comments based on a Jupiter-Mercury sextile) Venus rising inclined the native to an unbalanced and unduly sensual temper: 'a warm and moist temperament results, indeed a sanguine one with lack of balance because of Venus' being the ill-balanced lady of the geniture...'.<sup>47</sup> In 1602 Sagredo wrote to Galileo about obtaining a nativity for another, as if this were quite a normal thing to do.<sup>48</sup>

One could make a similar comment about the charts he drew up for his two daughters, with written interpretations:<sup>49</sup> it is of interest that he wrote out these character-judgements as well as preparing the nativities, although not one of his biographers has ever mentioned this. The horoscopes emphasise how deeply Galileo believed in astral destiny, as we saw in his confident interpretation of the position of Jupiter, at the top of Cosimo II de Medici's horoscope.

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<sup>46</sup> These were not reproduced in Favaro's *Opere*, but were merely alluded to, in: Favaro, *Opere* 19, *Appendice to Astrologia nonnulla*, pp. 11–13 and p. 15 for Sagredo – his nativity p. 13, the interpretation 15.

<sup>47</sup> N. Kollerstrom, 'Galileo's Astrology', in *Eurosymposium Galileo 2001* (Orotava: 2001), pp. 421–431 (p. 428). z

<sup>48</sup> Galileo, 'Sagredo to Galileo, 18 Ottobre 1602', in Favaro, *Opere*, 10, no. 87, pp. 96–7.

<sup>49</sup> Favaro, *Opere*, 19, pp. 218–220 for character-readings of the daughters Virginia and Livia.

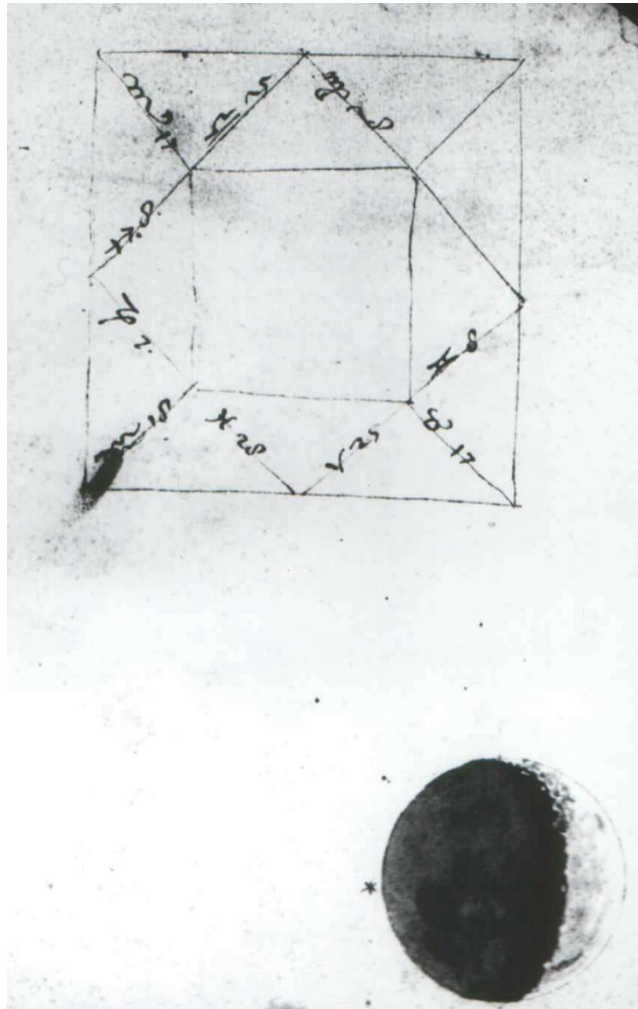


Figure 1. Galileo's sketch of the waxing Moon, as viewed on 19<sup>th</sup> January 1609 through his x20 telescope, on the same sheet as his first draft of the Cosimo II de Medici nativity.

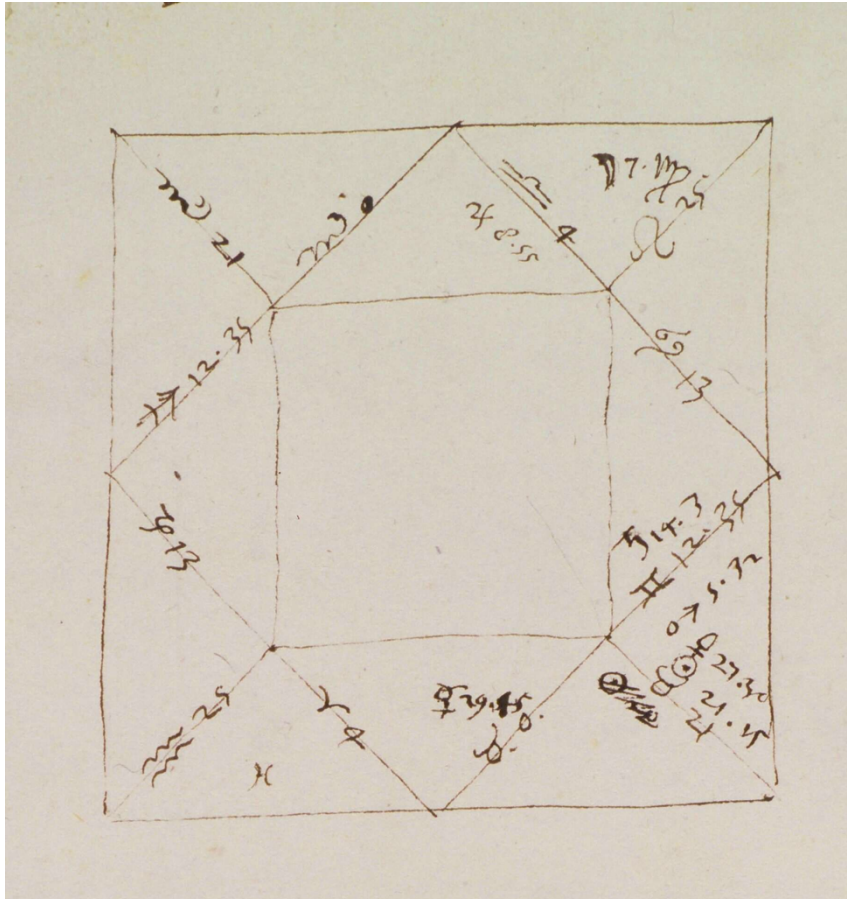


Figure 2/ Galileo's complete Cosimo II nativity, dated by Owen Gingerich to 12<sup>th</sup> May 1590. The 'ascendant' is here 12° 35' of Sagittarius and Jupiter appears as close to the midheaven at 4° Libra.

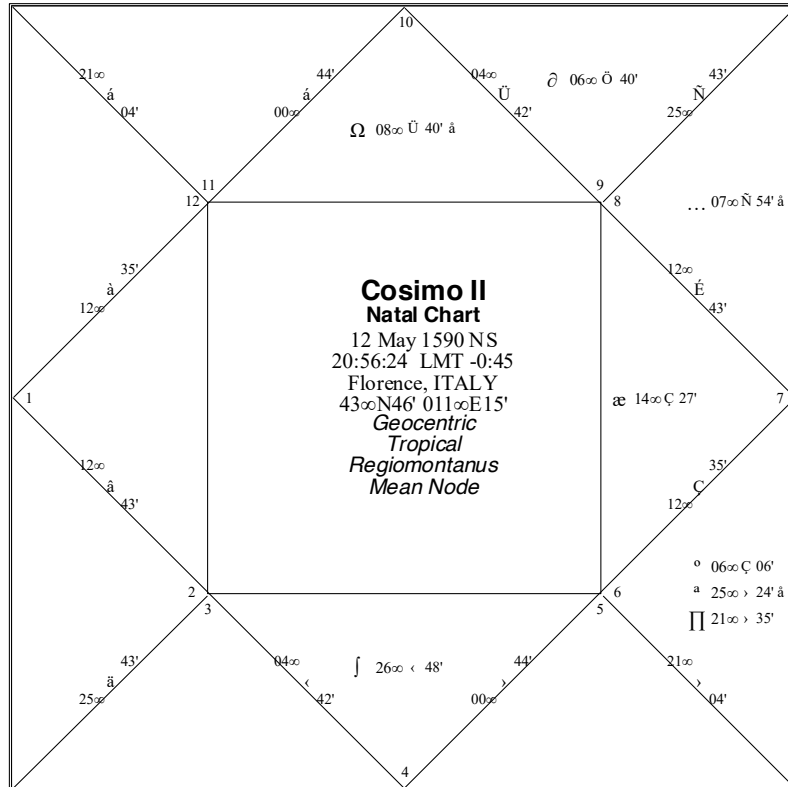


Figure 3. A modern reconstruction of Galileo's nativity for Cosimo II de Medici, using the Regiomontanus house divisions.







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