The Fabric of the Skies: Carlos de Sigüenza y Góngora and the *Academia Mexicana*

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Abstract
This case study discusses the role of the chair of mathematics and the status of celestial knowledge in the Real Universidad de México in late-seventeenth-century New Spain through the analysis of a chronicle of Marian festivities. *Triumpho Parthenico* (Mexico, 1683) was penned by Carlos de Sigüenza y Góngora (1645-1700), during his professorship in mathematics at the Mexican university. This Mexican-born author, known to Latin American scholars as a baroque polymath and prominent actor in the development of *criollo* identity, has been historically considered a defender of mathematical reasoning and a representative of a shift to modernity in New Spain. This essay argues that Sigüenza and his contemporaries' understanding of celestial knowledge and science is not merely instrumental to local political struggles, but that it should be contextualized within the political, epistemic, and confessional discussions about the origin, mediation and purpose of knowledge in early modern Mexico.

Keywords
Carlos de Sigüenza y Gongora, university, politics, devotion, knowledge, Republic of Letters, New Spain, colonial science

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At dawn of Sunday January 25th 1682, the Real Universidad de Mexico opened its doors to the most important church and civic dignitaries of Mexico City for a celebration dedicated to the Immaculate Conception.[1] The guests crossed the portico and discovered a spectacular exhibition of altars ornamented with sumptuous cloths, tapestries, precious stones, pearls and metals, mirrors, paintings and sculptures. Once inside, their enthralled gazes wandered: silk and velvet drapes reflected by mirrors and crystal recreate celestial light. Multitextured surfaces of silver and gold, inlaid diamonds, rubies, pearls and emeralds from Tyria, Milan, Venice, China, Muzos, Potosí and Zacatecas evoked the divine world's riches. By the entrance, on the wall next to the cloister, the visitors could contemplate a mountain range painted in perspective under a sky of brocaded silk. Walking through the atrium was compared to navigating around a "gulf of beauty".[2] This religious academic spectacle conveyed a cosmographic analogy. Every altar was a world which projected and reflected another. This image of the cosmos, was minutely conveyed by the tenure professor of mathematics (*cathedrático propietario de mathematicas*) of the *Real Universidad de Mexico*, Carlos de Sigüenza y Góngora (Mexico City, 1645-1700): "because of its magnitude, in describing it I had to apply what is observed in cosmography, whose masters give plenty news about the universe, even when they have to reduce it to a small map".[3]

The memory of these festivities was preserved in a volume that extolled the glory of the Virgin: *The Parthenic Triumph* (*Triumpho Parthenico que en glorias de Maria Santissima immaculadamente concebida, celebró la Pontificia, Imperial, y Regia Academia Mexicana*). This work, published in Mexico City by Juan de Ribera, one of the most notorious stationers in seventeenth-century New Spain, was commissioned and financed by the acting rector of the Real Universidad de México, Juan de Narvaez.[4] It included a history of Marian devotion in the university, an ekphrastic description of the baroque festivities mentioned above, and a collection of two poetry jousts hosted by the academic institution in 1682 and 1683. Overall, the work was a highly contrived defense of knowledge and Catholic faith in the *Academia Mexicana*, eponym of the Mexican university since its foundation in 1553. This 1683 statement, undertaken by the tenured professor of mathematics, gives rise to questions concerning the role of mathematics in relation to devotion in that epistemic community.

The status of mathematicians in the New World remains largely unexplored. This essay aims to shed light on this issue through a case study based on Carlos de Sigüenza y Gón-

1 Sigüenza y Gongora, *Triumpho Parthenico,* f. 20v.

2 *Ibid.,* f. 21r.

3 *Ibid.,* f. 23v.: "[...] por su magnitud era necesario practicar en su descripción lo que observa la cosmografía, cuyos profesores dan bastante noticia del universo, aún cuando lo estrechan a un corto mapa".

4 *Ibid.,* ff. Ir-VIIIv. The history of the book production is reconstructed from dedication letter to the reader and licenses of publication.

gora, who was Professor of Mathematics in the Real Universidad de México from 1672 to 1693. Any discussion concerning Sigüenza's significance in the history of early modern science has hitherto been based on his *Libra Astronómica*, a cometary disputation written against a Jesuit missionary on the occasion of the transit of the infamous 1680 comet. This work gave Sigüenza a particular reputation. In the early twentieth century Leonard Irving, historian of New Spain, based in Berkley, California, defined him as one of the most advanced thinkers of his time.[5] José Gaos, Spanish translator of Heidegger exiled in Mexico during the Spanish Civil War, considered Sigüenza as an exception to the leading scholasticism in New Spain.[6] This reputation persisted in those academic circles which worked on the history of science in the Iberian world: surveys and focus works from 1960 to 2000 distinguished Sigüenza's best-known work, *Libra Astronómica*, as the beginning of modern science in the Spanish Americas.[7]

Wider considerations of this author's poetic, historical and propagandistic work have nuanced this perspective. The Mexican polymath is currently associated with the elite of New World writers who enacted baroque aesthetics to express *criollo* subjectivities and displays of power.[8] Sigüenza's poetics, like that of his contemporaries, is broadly construed as an obscure, Latinate, rhetorically ornamented mode of thought that accommodated emblematic world views, neo-scholasticism, "neo-Platonism and hermetic currents", and other intellectual systems, in order to channel political anxieties.[9] Historian Anna More argued that Sigüenza's positioning in the renowned *Libra Astronómica* was not "a sign of scientific modernity for its own sake" but a tool in the formation of an idealized community of intellectual peers with cosmopolitan aspirations.[10] This essay proposes that Sigüenza's programmatic motivations also imply confessional and epistemological convictions which express more widely what astral observation, science and knowledge meant to his local community.

Libra Astronómica, a title which echoes Orazio Grassi's polemic with Galileo Galilei over the 1618 comet, is a fascinating defense of reason against received authority and gives an insight into the status of mathematical sciences in New Spain, including astrology, chronology and astronomy. It is also a work that attests to the reception and appropriation

5 Irving, *Don Carlos de Sigüenza y Góngora*, 23-28.

6 Sigüenza y Góngora, *Libra Astronómica y Philosophica*. See: Gortari, *Historia de la Ciencia en México*, 12, 229.

7 Trabulse, *Historia de la Ciencia en México*, 74-80, 125; Navarro Brotons, "La *Libra Astronómica y Philosophica* de Sigüenza y Góngora"; Navarro Brotons, *La Libra Astronómica y Philosophica de Sigüenza y Góngora Carlos de Sigüenza y Góngora*.

8 More, *Baroque Sovereignty*, 7-10.

9 Buxó, "Triunfo Parténico: Jeroglífico Barroco"; Cañizares-Esguerra, *Nature, Empire and Nation*, 48-56;

10 More, *Cosmopolitanism and Scientific Reason in New Spain*, 118.

of the works of natural philosophers such as Pico della Mirandola, Galileo Galilei, Athanasius Kircher, Pierre Gassendi and Giambattista Riccioli. This work needs to be analyzed on the basis of late-seventeenth-century discussions in New Spain about the limits of astrology in relation to chronology, astronomy and natural philosophy, beyond the mere European context. However, this is not the goal of this essay. Instead, I wish to go back to the institutional context in which such work was written and where science was ultimately conceived as divine knowledge. I will investigate the relationship between celestial knowledge and devotion in the *Academia Mexicana* where Sigüenza participated by exploring the engagement of the chair of mathematics with Marian devotion.

The *Academia Mexicana*: a space of politics, knowledge and devotion

The *Academia Mexicana*, celebrated in Sigüenza's *Parthenic Triumph*, was at once a place of political struggle and an idealized space of learning and devotion related to local pride. The work's title page highlighted its three key attributes: it was Pontifical, Imperial and Royal (*Pontificia, Imperial, Regia*), and therefore in strict allegiance to the Roman Catholic Church and the Spanish Monarchy. Literally, the *Academia Mexicana* referred to the Real Universidad de Mexico founded in 1532 as a central place of prestige where colonial authority and the casta system were negotiated.[11] This institution, dedicated to the formation of civil servants and church officials, was a crucial social crossroad where the most important jurists and theologians of the viceroyalty extended their influence from one socio-political sphere to another. The elected rector, for instance, was frequently also a member of the council (*cabildo*) of the Metropolitan Cathedral and judge (*oidor*) of the High Court (*Real Audiencia*). In university politics there was both an overlap and constant friction between the different governmental spheres as well as with the Franciscan, Augustinian, Dominican and Jesuit orders, who also participated in university governance and teaching. Moreover, this academic and political space was the medium in which locally-born elites, such as Carlos de Sigüenza y Góngora and Juan de Narvaez, the author and commissioner of the Marian festivities, sought for recognition and authority.

The *Academia Mexicana* was also an idealized community connected to history and futurity. The eponym, most likely coined in a neo-Latin dialogue published in Mexico in 1554 by the first Professor of Rhetoric, Francisco Cervantes de Salazar (1514-1575), conveyed a reimagined vision of the university's regimented body through humanist ideals of

[11] Martínez López-Cano, *La universidad novohispana en el siglo de Oro*, 37-38; Gonzalbo Aizpuru, *Historia de la educación en la época* colonial, 72-78; Mengegus and Aguirre, *Los Indios, el sacerdocio y la Universidad en Nueva España*, 56-76; Aguirre Salvador, "Mismas aulas, diferentes destinos". For a helpful overview of the history of universities in the New World: Gonzalez Gonzalez, *Una tipología de las Universidades Hispánicas en el Nuevo Mundo*.

classical education and Christian universality.[12] This intellectual space was bound by oath to the devotion of the Immaculate Conception, like all Catholic universities in the Spanish Monarchy.[13] Therefore, the promotion of the Marian cult was tied into the defense of education and it was a gesture of political allegiance with local implications. Sigüenza compared the *Academia* to a Mexican Athens and to a Marian Attic Garden, where each faculty represented a different colored flower or plant: white lilies for theology, olives for jurisprudence, dark red carnations for cannons, yellow retama for medicine, blue violet for philosophy and, shining among all the other flowers, the rose, which symbolized the Virgin.[14] In this sensual evocation, the Mexican university was praised as a legitimate space of knowledge and devotion.

Sigüenza argued that the Mexican scholarly grounds were worth being integrated into a universal history of education. Knowledge in New Spain, he claimed, had legitimate ancestry in Ancient Mexican schools, whose knowledge had been degraded and buried in the barbarous American soil until it was unearthed with the abundant silver of New Spain.[15] The idea of a forgotten ancient knowledge had been disseminated by Francisco de Gomara in his *General History of the Indies* and echoed by the neo-stoic humanist Justus Lipsius, who included a brief description of Mexican schools in his history of education, which was also a promotion of the Academy of Louvain.[16] Having defended the foundation of the university as a rebirth of reason, Sigüenza then represented the *Academia* as a storehouse, treasury and emporium of erudition and wisdom. He asserted that, albeit younger than European universities, his institution was nonetheless connected with them through love and Marian devotion.[17]

> Most florid Academia Mexicana, storehouse of erudition, treasury of letters, emporium of wisdom and inexhaustible source where erudites drink the sweet nectar of knowledge. Though not as ancient as others in Europe at the time of its foundation, it is coeval to most of them in the affectionate love of the holiest Virgen […][18]

12 Cervantes de Salazar, *Francisci Cervantis Salazari*; Id., *Mexico en 1554*.

13 Palafox y Mendoza et. al., *Estatutos, y constituciones*, 43v.

14 Sigüenza y Gongora, *Triumpho Partenico*, f. 18r; Id., *El Triunfo parténico*, 66.

15 *Ibid.*, f. 4v.: "Nostra Academia in barbara et ante hac inculta regione posita, modo etiam nascens eiusmodi est inchoata principiis, ut brevi credam futurum Novam Hispaniam, ut hactenus argenti copia, ita in posterum sapientium multitudine apud caeteras nationes optime auditurum".

16 *Ibid.*, f. 4; Justus Lipsius, *Lovanium*, 104.

17 For the metaphor of the early modern storehouse of knowledge: Pantin and Peóux, *Magasins de savoirs.*

18 Sigüenza y Gongora, *Triumpho Parthenico*, f. 5r: "Florentissima Academia Mexicana, deposito de la erudicion, erario de las letras, emporio de la sabiduria, y fuente inagotable donde beben los eruditos el nectar suavissimo de las ciencias, aunque menos antigua que aquellas otras de la Europa en el tiempo de su erección, coetania casi a todas en el cordial afecto a la Santissima Virgen [...]".

Sigüenza complained that Mexican Marian love, which should have naturally united his *Academia* with Catholic scholars throughout the world, was not reciprocated by other academies, who also defended the Immaculate Conception. Basically, he was outraged that his scholarly community was not included in the catalogue of the academies defending the cult that had been printed in the "Armamentario serafico", a Franciscan response to the Papal prohibition to use the word "Immaculate" as an attribute of the Conception.[19] He argued that the incomplete catalogue of Marian devotees, printed in Madrid in 1649, was a sign of Mexican scholars' self-inflicted silence.[20] Why should it have been his task as a mathematician to correct this omission?

The chair of mathematics in the Real Universidad de México

On a pragmatic level, Sigüenza's defense of the *Academia Mexicana* was integral to his socio-professional struggles. Appointed chair of mathematics from 1672, throughout his tenure he had progressively constructed a multifaceted identity, seeking legitimacy and authority. He was busy with many audiences and clients. At least from 1673 he was invested in annual lunar prognostics, which provided him with financial income and a heteronym (Juan de Torquemada) in the public sphere.[21] In the early 1680s, he sought patronage by designing and writing a commentary of the triumphal arches for the reception of the new viceroy Thomas de la Cerda, Conde de Paredes.[22] On the occasion of the 1680 comet, shortly after the new governor's arrival, he dedicated a short astronomical pamphlet to the vicereine Maria Luisa Manrique de Lara y Gonzaga.[23] The same year, he also wrote a chronicle of the foundation of the Congregation of Santa Maria de Guadalupe in Queretaro, commissioned by Juan Caballero y Ocio, commissary of the Inquisition, and favorably seen by the University rector in turn, Diego Garcia de Leon Castillo, who was also a Cathedral ecclesiastic, judge in the Inquisition and lawyer in the High Court.[24]

The publication of the *Parthenic Triumph* was directly related to Sigüenza's clientelist

[19] Sigüenza y Gongora, *Triunfo Parténico*, 31; Alba and Gutierrez, *Armamentarium seraphicum*; Reeves, *Painting the Heavens*, 142.

[20] Sigüenza y Gongora, *Triumpho Parthenico*, f. 5v.

[21] Manuscript evidence of Sigüenza's work as an almanac-maker is found in the Inquisition records of the National Archives of Mexico: AGNM, Ramo Inquisición, 670, ff.1, 11r-17v, f. 98r, 165r, 192r-193v, 203r-210r, 211r, 212r-215r, 212r-215r, 216r-v 243r-244v; 271r-272v; 283r-293v; f. 336r-336v, 342r-352v, 349-350r, 356r-358v.

[22] Sigüenza y Gongora, *Teatro de Virtudes Políticas*.

[23] There is no extant copy of the cometary pamphlet *Manifesto Philosophico contra los cometas*, published in 1680 (dedicated to the Vicereine) but the text is included in Sigüenza, *Libra Astronomica y philosophica*, 8-20.

[24] Sigüenza y Gongora, *Glorias de Querétaro*.

relationship with the acting rector of the University, Juan de Narvaez.[25] Born in Mexico City from a wealthy family, Narvaez aspired to enter the cathedral council (*cabildo*).[26] He was doctor in theology, treasurer of the Inquisition court and in 1681 managed to be appointed rector, although he was too young with respect to University statutes.[27] To gain the favor of the viceroy and other dignitaries, he played a fundamental role in the funding and reestablishment of Marian festivities in the university. Some of the previous rectors had also supported the cult: Doctor Antonio Rodriguez de Villegas, rector of the University in 1618, held the festivities for the Immaculate Conception in Mexico before moving to Manila; in 1652, the Mercedarian Juan de Ayrolo y Flores created a donation plan to relaunch the celebrations.[28] The promotion of the rector's program was the tangible condition for Sigüenza's participation in university politics. The result was an extremely articulated construction including not only social but also epistemic commitments.

Understanding the role of the chair of mathematics is a key to unraveling Sigüenza's implication in the Marian festivities. The professorship was established in 1637 by request of the students of the Faculty of Medicine. The university chronicles published in 1645 reported that this appointment was conceived to complement the curriculum of Medicine.[29] The content of the syllabus remains largely unknown. Mathematics was most likely understood as a fluid sphere that comprised the so-called "pure" mathematics, including disciplines such as geometry and arithmetic, and the "mixed" mathematics which comprised astronomy, optics, cosmography, music, architecture, surveying, etc.[30] The works of the first appointed professor, Mercedarian Friar Diego Rodríguez (Atitalac, Mexico, ordained 1613-d.1668), attest to the ongoing work in arithmetic, algebra, geometry, logarithms, horology, hydrology, surveying and eclipse observation for the establishment of longitude in the mid-seventeenth century university. Rodríguez was an open proponent of the Tychonian geo-heliocentric world system and, moreover, his writing contains a great number of references to Nicolas Tartaglia, Peter Apian, Oronce Finé, Andreas Schone, Johannes Toefler, Antonio Magini, Galileo Galilei, Johannes Kepler, Marin Mersenne, Li-

25 Sigüenza y Gongora, *Triumpho Parthenico,* f. 16r-v; Id., *El Triunfo parténico*, 164. For discussions on patronage in the context of early modern Europe: Trevor-Roper, *Princes and Artists*; Westman, "The Astronomer's Role in the Sixteenth Century: A Preliminary Study"; Kettering, *Patrons, Brokers, and Clients*; Lux, *Patronage and Royal Science in Seventeenth-Century France*; Moran, *Patronage and Institutions*; Biagioli, *Galileo, Courtier*; Findlen, *Scientific Spectacle in Baroque Rome*; Baldwin, *Pious Ambition*; Krausman Ben-Amos, *The Culture of Giving*; Biagioli, *Galileo's Instruments of Credit*; Carolino, "Science, patronage, and academies in early seventeenth-century Portugal".

26 González González, *Mecenazgo y literatura*, 22.

27 Sigüenza y Gongora, *Triunfo Parténico*, lx-lxii; Id., *Triumpho Parthenico*, f. 16v.

28 *Ibid.*, f. 13r.

29 Rodríguez Salas, Fray Diego Rodríguez, 88.

30 For a discussion on this distinction, see Remmert, *Our mathematicians have learned*, 666.

bert Froidmond.[31] The works of these authors were accessible through the trans-Atlantic book trade between New Spain and European cities such as Seville, Antwerp and Genoa, as well as through the circulation of libraries across military and missionary networks.

The printed 1668 university statutes imply that the professorship in mathematics was renamed Chair of Astrology (*cátedra de astrología*). This document also indicates that the candidates for this position had to compete by reading parts of Sacrobosco's *Sphere* in Latin, although the actual lessons would have been held in Spanish.[32] The strong presence of Jesuit missionaries in New Spain suggests that Sacrobosco's work was taught through Christoph Clavius's commentaries, as occurred in Catholic colleges as well as in Protestant universities throughout Europe in the seventeenth century. In New Spain, Clavius's pedagogy was most likely inaugurated no later than the tenure of Rodríguez, the first mathematical chair, who cited the Jesuit mathematician in his cometary treatise of 1652.[33] The circulation of Clavius's last edition of *Sphere*, better known as his *Operum mathematicorum*, in this immediate context is also attested by an annotated copy that once pertained to the Convento Grande de San Francisco, the Franciscan convent which was associated with the Real Universidad de México.[34]

The status of mathematics in relation to astrology in the Mexican university has hitherto been little explored. As mentioned above, the 1668 statutes indicate that the Chair of Mathematics came to be renamed Chair of Astrology (*cátedra de astrología*). Yet in the 1680s, when Carlos de Sigüenza y Góngora published several propagandistic works, including the *Parthenic Triumph*, he appended to his name the title "tenured Chair of Mathematics" (*cathedrático propietario de mathematicas*). Understanding the reasons behind these nominal changes would require further research. The first modification in the chair's official title coincides with the end of Friar Diego Rodríguez's tenure and may indicate university efforts to regulate more closely the activities of the appointed instructor and his course syllabus. Disciplinary struggles should also be taken into consideration, as shown by some case studies in European contexts. In circles linked to Jesuit education, such as those in which Clavius's works were read, "mathematics" (including its associated disciplines) implied an epistemological distinction. Mathematics was concerned with physical phenomena and quantity, not causes; whereas "physics" or natural philosophy sought to

[31] Trabulse, *Fray Diego Rodríguez*. Rodríguez-Sala, Fray Diego Rodrigeuz: astrónomo-astrólogo-matemático. As of 2007, Rodriguez has been the focus of university theses that expand of the previous. See, for instance, Martinez Albarran, *Fray Diego Rodriguez*; Rodríguez Camarena, *Un análisis situacional de la obra de Fray Diego Rodriguez*; Paredes Hernández, *El contexto conceptual de la primera cátedra de matemáticas en México*; Serrano Bravo, *El tractatus matematices de fray Diego Rodríguez*.

[32] Palafox y Mendoza et. al., *Estatutos, y constituciones,* 21, 32r-32v, 47r.

[33] Rodríguez, *Discurso Etheorologico*, 13.

[34] BNM, *Operum mathematicorum* RFO 510 CLA.o. 1611.

reveal causes and essential natures. The hesitancy to teach "physics" and "mathematics" together led to a distinct classification of subject matters in the *Ratio Studiorum*, the educational statutes of the Jesuit colleges.[35] These arguments reached New Spain, where Jesuit colleges were closely tied to the teaching and politics of the Real Universidad de México. However, the extent to which Clavius' attitude against astrology affected changes in the official naming of the professorship, as well as the conception of mathematical sciences more generally, remains unclear.

The chair of mathematics was paid 100 pesos a year, which made it the lowest paid position alongside Anatomy and Method. However, it is likely that, since its inception, the position was associated with implicit non-teaching activities related to other economic, political and intellectual spheres within or outside the university, such as prognostication, important secretarial work and propagandistic theological disputation. The chair of mathematics could aspire to influential positions within university politics, such as the committee of treasury.[36] Friar Diego Rodríguez, for instance, was in charge of keeping the university's financial records and this occupation may have taken up the majority of this schedule. Carlos de Sigüenza y Góngora also engaged with university administration aside his teaching duties.[37]

Contextual evidence suggests that the chair of mathematics was created with an implicit agenda that represented both political and epistemic aspirations of New Spain elites: to provide rational proof of the apparition of the Virgin of Guadalupe. Indeed, the chairs of mathematics before Sigüenza had been concerned with this conundrum. Friar Diego Rodríguez wanted to decipher the relationship between celestial phenomena and their divine presages. With the passage of the comet of 1652, the Mercedarian friar penned a treatise entitled *Ethereological Discourse on the New Comet* in which he established an equivalence between the presence of the Virgin in Mexico, a lunar eclipse and the sign of grace.[38] He drew from the iconographic and exegetical tradition of the Book of Revelations (12: 1-6), which described a woman clothed with the Sun, standing on the Moon and crowned with twelve stars (*mulier amicta sole ut luna sub pedibus eius, et in capite eius corona stellarum duodecim*). Commentaries of this passage interpreted the woman clothed with the Sun (*amicta sole*) as the Virgin Mary, treading on the mundane and corruptible Moon that contrasted with her purity. In turn, the Sun was read as an allegory of Christ's justice. The mathematician understood the image of the woman's body eclipsing the divine light both as an astronomical phenomenon and a timely act of mercy, intercession and protection.[39]

35 Dear, *Discipline and Experience*, 34, 162-168.

36 Palafox y Mendoza et. al., *Estatutos, y constituciones*, 13r, 19v.

37 For a helpful overview of Sigüenza's educational activities as Chair of Mathematics, see: Gonzalez y Gonzalez, *Sigüenza y Góngora y la Universidad*, 204-232.

38 Rodríguez, *Discurso Etheorologico*, 4.

39 *Ibid*., f. Vv. On scriptural commentaries of Revelations 12:1-6 and their accommodation into painting and natural philosophy, see Reeves, *Painting the Heavens*, 139-225

This exegetical tradition uniting astral knowledge and Mariology held sway over the first wave of concerted efforts aimed to prove the actual apparition of the Virgin of Guadalupe, the Mexican incarnation of the Immaculate, in the outskirts of Mexico City. In 1648, four years prior to the Mercedarian's emblematic accommodation of astronomy and theology, Miguel Sánchez had also associated the Virgin of Guadalupe to the *mulier amicta sole*, in his *Imagen de la Virgen Maria Madre de Dios Guadalupe*.[40] In 1649, the priest and university scholar Luis Lazo de la Vega proceeded in a similar manner in a short book entitled *Huei Tlamahuiçoltica* (The Great Event), which mentioned a sixteenth-century Nahuatl apparition story attributed to the Nahua scholar Juan Valeriano.[41] In this poetic Nahua text beginning *Nican Mopohua* (here is narrated), allusions to the seasons, nightly sky and the location of sunrise and sunset, provided arguments to astrological and mathematical speculations.[42] The chair of mathematics was in open dialogue with these theological and astrological-astronomical arguments.

A successor of Friar Diego Rodriguez, the Jesuit Luis Becerra Tanco, was also chair of Mexican languages. Working on the chronological concordances between the Mexican and Gregorian calendars, he too was an active participant in the juridical inquiries concerning the miraculous apparition of the Virgin of Guadalupe in Mexico. Two years before his brief appointment, in 1672, he had published *Orden milagroso del Santuario de nuestra señora de Guadalupe*, reprinted as *Felicidad de Mexico* in 1675. In this case, calendrical practices, conceived as a key application of early modern mathematics, were used to establish temporal equivalences aimed to date more precisely the Virgin's apparition.[43]

These related productions and activities suggest that the person who was appointed to the chair of mathematics was expected to participate in some capacity in the Mexican defense of the Virgin of Guadalupe and the Immaculate Conception. Before occupying his professorship, Sigüenza himself had indeed delved into this polemics. In his earliest known work *Primavera Indiana*, he evoked the time and space of the Virgin's apparition in astrological terms.[44] This work was reprinted in 1680, the same year of the publication of his renowned yet non-extant *Philosophical Manifest* against the astrological interpretation of comets.[45] Although not in the same textual space, theology and mathematics were expressed in those two works created within the auspices of the university. In 1683 with

40 Sánchez, *Imagen de la Virgen Maria*.

41 Lasso de la Vega, *The Story of Guadalupe*.

42 Valeriano, *Nican Mopohau*, 11-13, 23, 26.

43 Becerra Tanco, *La felicidad de México*, f. 12r-v.

44 This work was first published in 1664 but is known only through a re-edition appended to his 1680 Glorias de Querétaro. Sigüenza y Gongora, *Glorias de Querétaro* [signature L^1-M^1].

45 There is no extant copy of the cometary pamphlet *Manifesto Philosophico contra los cometas*, published in 1680 (dedicated to the vicereine) but the text is included in Sigüenza y Gongora, *Libra Astronómica*, 8-20.

the publication of the *Parthenic Triumph*, the tenured Chair of Mathematics demonstrated once again his commitment to the Marian defense, this time overlapping more explicitly those two modes of thought, which in the *Academia Mexicana* were seen as interdependent.

Mathematics as a tool for theology

Juxtapositions of cosmographical and devotional language and beliefs were not unknown to the global Catholic world. A metaphorical map of Marian devotion comparable to the cosmographic-university atrium conveyed Sigüenza's *Parthenic Triumph* could be found in works such as the *Atlas Marianus*, by the Jesuit Wilhelm Gumpemberg, published between 1657-1672.[46] This illustrated inventory of sanctuaries, routes of pilgrimage and Marian shrines from around the world contained, as in Sigüenza's work, associations between the natural world and faith. As Olivier has shown, early modern Marian atlases contained, for instance, comparisons between the Virgin and contemporary cosmographic ideas related to magnetism: just as magnets attract iron rings by chain reaction, the ubiquitous and miraculous power of Mary irradiates from herself and from depictions of her. The devotees in contact with those emanations are thus affected and united in her realm.[47] Both Gumpemberg (who wrote in the Germanic Jesuit provinces) and Sigüenza (in New Spain) worked within and across cultures where exegesis contributed to mathematical arguments and vice-versa.

The licenses at the beginning of the *Parthenic Triumph* shed further light on the perception of the role of the mathematician within the *Academia Mexicana*. Notably, the book's censors, reputed theologians related to the Inquisition, stated that no other than the chair of mathematics was indicated to witness and record the celebration of Mary, since in their view celestial observation could not be separated from Marian devotion. The second approval by censor Francisco de Aguilar, doctor in law and canon law, lawyer of the High Court, vespers (*visperas*) chair of canon law and tenured chair of law, explicitly stated that mathematician was the ideal person for understanding the relation between the Virgin and the stars. First, he commended Sigüenza's work for his mastery of celestial matters. As a response to his dedicated skill and knowledge, he wrote, the heavens had revealed themselves, opening up their secrets to him:

[46] Gumppenberg, *Atlas Marianus*.

[47] "el imán transmite su poder al anillo de hierro de suerte que el anillo pueda transmitir a otro anillo y así sucesivamente, como una cadena. Es cierto de la fuerza milagroso que reside en la imagen de María viene de María misma y los verdaderos creyentes saben por una larga experiencia que este poder [XXII] se extiende también a las imágenes que han estado en contacto con la imagen original". Quoted in Christin, "La mundialización de María", 316.

> Owing to the excellency of his [Sigüenza's] speculation, the celestial bodies, in strong proportional friendship, allow the purity of their radiance to be recorded, along with the mystery and secrets of their lights. The sky itself explicates these secrets to him in its own tongue [...].[48]

Aguilar developed the image of the mathematician in contact with the sky by connecting this encomium to Saint Augustine's sermon *The Epiphany*, in which the Maggi, led be a star, arrive from the Orient to adore the newly born child. The star, preached Augustin, communicated with those biblical characters as if it were a voice reaching out from the skies: *stella tamquam lingua caelorum*. In the same way, the heavens, implied the censor, talked to the devout mathematician in their own language – one which he would be skilled to translate. Moreover, the commentator insisted that Sigüenza's crucial participation in the recording of the Marian festivities was even more pertinent given the Immaculata's scriptural associations with the Sun, Moon and stars, conveyed in the aforementioned passage in the Book of Revelation 12: 1-6. By way of the celestial emblems found in the Bible, Mary possessed every bright body in the sky. Therefore, the mathematician skilled in celestial observation was indicated to reason, summarize and conclude astrological matter in her name:

> And increasingly so when the most Holy Mary surrounds herself in astrological matter [...] for frequently she designates herself with the names of the Sun, Moon and stars, arrogating to herself all the luminous bodies, which are the instruments of time. The astrologer contemplates their dimension and influences.[49]

In Aguilar's appraisal, the Virgin, surrounded by celestial matter, was at the heart of divine and astronomical time and space. The deity thus both contained and generated the possibility of knowing these realms. The devout mathematician, who contemplated and used celestial bodies as his tools, was granted grace and knowledge. In the censor's view, science came through observation and experience but, more importantly, through revelation. This conception of science adhered closely to the Thomistic orientations of the post-Tridentine Catholic Church.[50] Sigüenza openly embraced this understanding of science in his

[48] "Pues por su aventajada especulación, los astros, con más proporcionada amistad, se dejan registrar lo puro de sus resplandores, lo misterioso y secreto de sus luces, y el mismo cielo con su lengua se los explica, en ponderación de san Agustin hablando de los reyes caldeos: *Nuntiavit stella illis quam lingua caelorum"*. Sigüenza y Gongora, *Triumpho Parthenico*, f. VIr.

[49] "Y más cuando en Maria santisima se epiloga la materia de astrologia […] pues tan frecuentemente se apellida con los nombre de Sol, luna y estrellas, arrogandose esta señora todo cuerpo Luminoso que son los instrumentos del tiempo, cuyas dimensiones e influjos son contemplacion del astrologo", *ibidem* .

[50] For confessional politics in early modern science, especially related to the Catholic world: Feldhay, *Galileo and the Church,* 73-198; Van der Browke, *How to be a Catholic Copernican in the Span-*

astronomical work *Libra Astronómica*, printed seven years after his *Parthenic Triumph*:

> We Catholics, who possess knowledge of the eternal truths and are much more privileged by God than the pagan poets, read the divine Scriptures yet not for that reason do we understand their most concealed mysteries, nor those things that depart from us all the more in the most distant skies, whose perfect knowledge [...] will only be given to those who are granted a revelation by the uncreated wisdom.[51]

Such conviction was the metaphysical standpoint for Sigüenza's work, whether astronomical or devotional. It was also the basis for the Catholic legitimation of the mathematician's role in knowledge making, which spoke more generally to the role of the chair of mathematics and to an idea of science that lived in *Academia Mexicana*. Any endeavor in natural knowledge in this community, I argue, was conceived within this understanding. Marian devotion was therefore an integral part of any epistemological exercise. In defense of the Immaculate Conception, Sigüenza reminded his readers that, at the moment of the Virgin's conception, she had been given every faculty and knowledge. Thus, she possessed the sciences and was the mediator between God and Man. It was through her presence that knowledge could legitimately, with grace, be granted.[52] In her divine generosity, Mary shared that wisdom with all those, especially the celestial observers, who were devoted to her.[53] The mathematician's defense of the Marian cult the *Academia Mexicana* was precisely what gave authority to his institution's profession of the sciences.[54]

ish Netherlands, 85-110; Remmert, *Our mathematicians have learned and verified this*, 665-690.

51 "[...] porque nosotros los catholicos poseedores del conocimiento de las verdades eternas, y privilegiados de Dios muchissimo mas sin comparacion, que los Poetas gentiles leemos las escrituras divinas, y no por esso comprehendemos los misterios reconditos, que ay en ellas, ni las cosas que se retiran de nosotros otro tanto quanto se alejan los cielos cuyo perfecto conocimiento [...] solo lo tendra aquel que fuere servido de revelarselo la Sabiduria increada". Sigüenza y Gongora, *Libra Astronomica*, 25.

52 Sigüenza y Gongora, *Triumpho Parthenico*, f. 8v, f. 27.

53 *Ibid.*, f. 31v.

54 *Ibid.*, f. 8v.

Abbreviations

AGNM Archivo General de la Nación de México
BNM Biblioteca Nacional de México

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da Escritura. Describelo D. Carlos de Sigüenza, y Gongora, Mexicano, y en ella Cathedratico propietario de Mathematicas, Mexico, Juan de Ribera, 1683.

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