# The First Astronomical Text Published in the American Continent

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Abstract. In 1539 the Italian Giovanni Paoli, better known as Juan Pablos, began operating in Mexico City the first printing press that existed in the New World. The first books he printed were religious texts, vocabularies of some indigenous languages of Mexico, and compilations of ordinances and laws. In 1556 followed the *Sumario compendioso de las cuentas*, a text of arithmetic and algebra that was the first American mathematics book. A year later, he printed the *Physica Speculatio* by friar Alonso de la Veracruz, a text of Natural Philosophy that dealt with Aristotelian works such as Physics, On the Heavens, and Meteorology. As part of this book, was included the text of geocentric astronomy written during the thirteenth century by the Italian mathematician Giovanni Campano de Novara, entitled *Tractatus de Sphaera*, where the author discussed, from a geometric perspective, the cosmic structure and the stellar distribution. No doubt this is the first astronomical treatise that was published in the entire American continent, which is why it is emphasized here.

**Keywords.** Juan Pablos, New World, Physica Speculatio, Aristotle, Tractatus de Sphaera, astronomical text

## 1. Alonso de la Veracruz and the Physica Speculatio

In 1551 the Royal University of Mexico was created, beginning courses in 1553. Among the first professors was friar Alonso de la Veracruz, who was trained at the University of Salamanca, Spain, where, before moving to the New World, he had taught courses in Natural Philosophy. Within the university structure of the time, this was where students were taught disciplines such as astronomy, physics and geometry. In 1557 he wrote and published in New Spain a voluminous text in Latin, entitled *Physica Speculatio*, which he used to teach to the young university students the foundations of the Aristotelian physics. In the part that he dedicated to explain geocentric astronomy, he discussed Aristotle's *De Caelo*. However, because de la Veracruz considered the cosmogony model of the Stagirite insufficient, he included as an appendix of his work a complete geocentric book. This followed the geometric ideas, that in the second century A.D., Ptolemy had written to explain the movement of the stars and planets.

## 2. Giovanni Campano de Novara and the Tractatus de Sphaera

This book was the *Tractatus de Sphaera* written by the 13th century Italian astronomer Giovanni Campano de Novara, which was printed for the first time in 1518 (Toomer 1971). This work consists of 54 chapters dealing with topics such as the main themes of the *Almagest*, such as the shape of the Heavens, the central place of the Earth, the main circles of the celestial sphere, the movement of the wandering stars, the sphere of the fixed stars, as well as solar and lunar eclipses (De la Veracruz 2012). This medieval book, that

#### CAMPANVS

#### JINCIPIT TR ACTATVS DE Sphera editus a magistro Campano.

De origine dimensionum. Cap. 1. Vnetus motus describit linea. Cu enim babet situm in magnitudine er nullam babet partë veftigium motus etus non põc aliud efte gilö situdo Linea quog mota dfertbit superficië. Cu eni nibil babet de dimensione aliud nis lon gıtudinë: vestigiŭ motus eius non pot ese nifi latitudo, Rursus supficies mora describit cor pus: quonia cu nibilbabeat de dimensione ni fi longum, e latum : veftigium motus eius non potest ese aliud & folidum.Corpus veró mo-tum aluud deferibere no potest & corpus quo niam.cum super suam superficiem moueatur: vestigium motus eius no potestesse alud o ve Stigium motus ipsius superficiei. Hoc aut (vt dictum est )non potest ese aliud & cor pus. Sit igitur tres dimensiones tantum longitudo in li nea:latitudo in superficie: profunditas vero in folido Et plures bis reru na no recipit:co qu per motum corporis quarta dimensio non pot adıungi. Et punetus quide fi a fitu in fitu trafiens minima describit distantia:tune vestigi um motus eius erit linea recta. De cuius proprietateeft vt extremum eius coopiat omne medium. Si autem punctus a situ in situm tra fiens minimam distantiam non describat:moueatur tamen regulariter vt equidistanter cuilibet vni puncto fixo in feipfum conuertet motum, diceturés vestigium motus eius circu ferentia circuli, omnifáp punctus i ca fitus que libet alium respicit. Superficies veró que a de fcripta linea ambitur dicitur circulus. Pune tus autem cui equidistanter factus est motus dicitur centrum circuli,a quo omnes linee ad cırcunferentiam recte ducte equalcs erunt.Et omnis linea transiens per centrum, et extremi tates suas applicans circunferentie dicitur di ameter cir culi, diuidens fimul circulu in duas partes equales, or dicitur vtrag pars circuli semicirculus: quoniam a diametro, co medie tate circunferentie ambitur. Quecund vero alia linea recta, per aliud of per centrum transiens circulum dividit in duas partes inæ

### DE SPHERA.

quales: quarum vna maior,et altera minor dicitur.

De diffinitione Sphere. Cap. 2 Sligitur in quous femicirculo diametrum fixum intelligamus, or a quouis fitu femicirculorum illü circuducamus,quous pri orem ipfum situm reducamus: corpus quod scribitur ab ipso semicirculo fibera appella tur. Et superficies que describitur a circufe= rentia ipfius semicirculi erit superficies, ipsius fpbergiad quam omnes lineg relig a centro predici femicirculi ducte erut equales Propt quod illud centrum erit etiam centrum illius fine buius sphere. Cunche vero linee reche than ∫euntes per centrum applicantes extremita= tes ad circüferentiam∫pbere ex vira∯ parte dicuntur diametri. Sola veró manens imobilis in motu Spherę dicitur axis Spherę.Eiusq ter mini in Superficie Sphere dicuntur poli. V ndê axis addit fixionem in motu super rationem diametri

TDe coplexioe quatuor elemetoru. Cap.3. ESfe autesphere mundi, o omnium rerum contentarum, o fitus, o ordo earude est fecundum q dicam.Res omnium corporum q dam funt ingnabiles & incorruptibiles. Quedam veró generabiles, er corruptibiles. Ha= rű veró quedam füt fimplices Quedam mixte. Et fimplicium quedă funt quatuor elemen-ta Quorum duo fiit grauia. Terra abfoluté: A q respectiue. Et duo leuia. Aer respectiue.et ignis abfoluté. Singula eorum funt informata binis qualitatibus de gne duarum primarum contrarietatum,que junt calidum, er frigidüt bumidum, & ficcum. Et eft prima cotrarietas actiua, secunda passiua. V ndé singula elemen ta a predictis duabus varieta tibus recipiunt fingula extrema. Terra quidem, er agea reci piunt comuniter ab acliuo frigidu, sed terra a pastuis ficcum. Aqua vero bumidum. Item Aer, o ignis recipiunt communiter ab acliuis calidum. A paffiuis veró aer quidem bumidu. Ignis autem ficcum. Vnde fit vt terra fit frigida , ficca, et aq frigida, et bumida. Aer vero calidus, o bumidus, o ignis calidus, o ficcus. BIBLIOTECA NACIONAL MEXICO. TDe

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Figure 1. First page of the *Tractatus de Sphaera* in the Mexican edition of 1557 (De la Veracruz 2012).

also explained the retrograde movement of the planets, did not have the philosophical weight of the Aristotelian works, because it put emphasis on the geometric study of the movement of the stars and planets (Moreno-Corral 2004), more than the physical representation of the sky and its philosophical interpretation. To put that knowledge in context, it must be remembered that this was the astronomical science that was then taught in European universities, so it should not be surprising that the same happened in the courses of Natural Philosophy that from 1553 were taught in New Spain, using books like *Tractatus de Sphaera*.

#### 3. Conslusion

Without a doubt Campano's astronomical book was the first text that was used in the New World for the university-level teaching of astronomy. The students learned from him the generalities of geocentrism and the way in which this knowledge was applied to the practical determination of the movement of the celestial bodies and very particularly the calculation of eclipses, which were used in New Spain of the sixteenth century especially with cartographic purposes (Portuondo 2009). Another important fact of this work that has generally gone unnoticed is that although it is a text of geocentric astronomy, in it a brief mention was made of heliocentrism and geoheliocentrism, which happened at a time when neither of these two systems of the world were accepted. This makes the *Tractatus de Sphaera*, the first book published in America that referred to these issues, undoubtedly remarkable.

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#### References

De la Veracruz, A. 2012, *Physica Speculatio* (Mexico City: Facsimile edition edited by the National Autonomous University of Mexico)

- Moreno-Corral, M. A. 2004, La physica speculatio, primer libro de física escrito y publicado en el continente americano. Rev. Mex. Fís. E, 50(1), 74
- Portuondo, M. M. 2009, Secret Science. Spanish Cosmography and the New World (Chicago: The University of Chicago Press)
- Toomer, G.J. 1971, Campanus of Novara and Medieval Planetary Theory (Madison: University of Wisconsin Press)