

GUIDE 2:9 MAIMONIDES' FOUR HEAVENS

Overview

In Guide of the Perplexed chapter 2:9 Maimonides begins a new section, from 2:9 through 2:12, linking his astronomical ideas to the Jewish view of divine rule at the highest, the intermediate, and the lowest levels of the universe.

Our chapter, *Guide 2:9*, is the Introduction to this section. It is a brief essay on a forgotten ancient problem, whether to position Venus and Mercury above or below the sun relevant to an observer on Earth. Maimonides needed to resolve this problem by positioning those two planets *above* the sun. He needs this to support his doctrine that God rules the universe through a *tetradic structure*, i.e., that He designed forces and things in the universe with a *fourfold* nature. Placing Venus and Mercury above the sun reveals that four-ness, as we will explain. In *Guide 2:10*, he described his amazing four-ness doctrine, how it came to him in a divine vision, and how this quaternary principle arose from sources of Jewish thought. In *Guide 2:11*, he explained how divine influence can work through *emanation*. In *Guide 2:12*, he described the link between emanation and causation, thereby relating divine emanation to Aristotelian physics.

The problem of the location of Venus and Mercury agitated medieval thought, but it seems a strange and unappetizing subject for us. Maimonides' strategy may have been the same as he used in Guide 1:2, where the dry material in the Guide's *first* chapter might deter the unserious reader from reading the *second* chapter. I wrote there:

“This (Guide 1:2) should have been the first chapter. Where the first chapter is lexical and turgid, this second chapter is luminous and tantalizing. By interposing that different, though fundamental, first chapter, Maimonides may hope to dissuade the less qualified from reading this chapter. Those readers have a limited attention span and will think the rest of the book is like the first chapter. Some of the materials in this chapter would be *inappropriate* for that reader.”

In my *Commentator's Introduction*, I explained the problem with teaching this material:

“The context is the Mishna that established the law against public instruction in certain sensitive topics. That Mishna reads (*Hagigah* 11b):

The subject of forbidden sexual relations may not be expounded in the presence of three, nor the work of creation (Maaseh Bereshit) in the presence of two, nor the work of the chariot (Maaseh Merkava) in the presence of one, unless he is a sage and understands of his own knowledge....

“Maimonides' way to comply with Mishna *Hagiga's* law against publicly teaching these dangerous matters was to *lightly* conceal them ... Thus, Maimonides could reveal this lore to the ‘single virtuous man’ though ‘displeasing ten thousand ignoramuses.’”

This section of the Guide does touch on the *Maaseh Merkava*, the mystery of divine providence, which we should screen from the attention of the crowd. What better way to do so than to interpose a chapter on the obscure science of astronomical positioning?

Paradigm Shifts in the Counting of the Astronomical Spheres

"We have already made it clear to you that in Aristotle's time, the number of the *spheres* (Jud. Ar.: אלאפלאך) had not been accurately established, and that those who, in our time, count nine spheres, only count as one a *globe* (אלכרה) that includes several spheres, as is clear to whoever has studied the science of astronomy." (Pines translation, Guide 2:9, page 268. I used Pines in this chapter because of his relatively uniform treatment of the Judeo-Arabic terms אלאפלאך and אלכרה. *Italicization* supplied throughout).

Maimonides opened our chapter by critically reviewing historical *paradigm shifts* in the science of astronomy from the vantage of his own time, moving from ancient biblical and near-Eastern views, through Pythagorean adaptations, to Aristotle's system and Ptolemy's cosmology. He understood that scholars are always, without exception, locked into the paradigm thought-world that they grew up with and studied in their youth.

He also noted a persistent problem in Aristotle's astronomical paradigm: Aristotle's doubt over the number of concentric crystalline spheres moving the heavens that surround the earth.

Aristotle inherited a system that counted nine or ten spheres, but he and his predecessors had transmogrified that into a system of forty-seven or fifty-five spheres. Aristotle could not decide on any single number. According to Maimonides, it could have been as many as a hundred (Guide 2:4).

Claudius Ptolemy of Alexandria, in the second century CE, created an even more complicated astronomical paradigm. It hinged on an awkward meshing of multiple concentric spheres, epicyclic spheres, and eccentric spheres. Later astronomers increased their number to account for different celestial motions that they continued to discover and chart. This system dominated Western thought for over a thousand years.

Aristotle and Ptolemy were limited to the mathematics of their time, which Maimonides scorned, saying that the number of spheres had not been "*accurately established*" (*m'duyak*). What he meant was that in his own time, by the twelfth century, his fellow Andalusian astronomers and mathematicians had arrived at what they regarded as a simpler, more accurate, and more comprehensive view of the astronomical system.

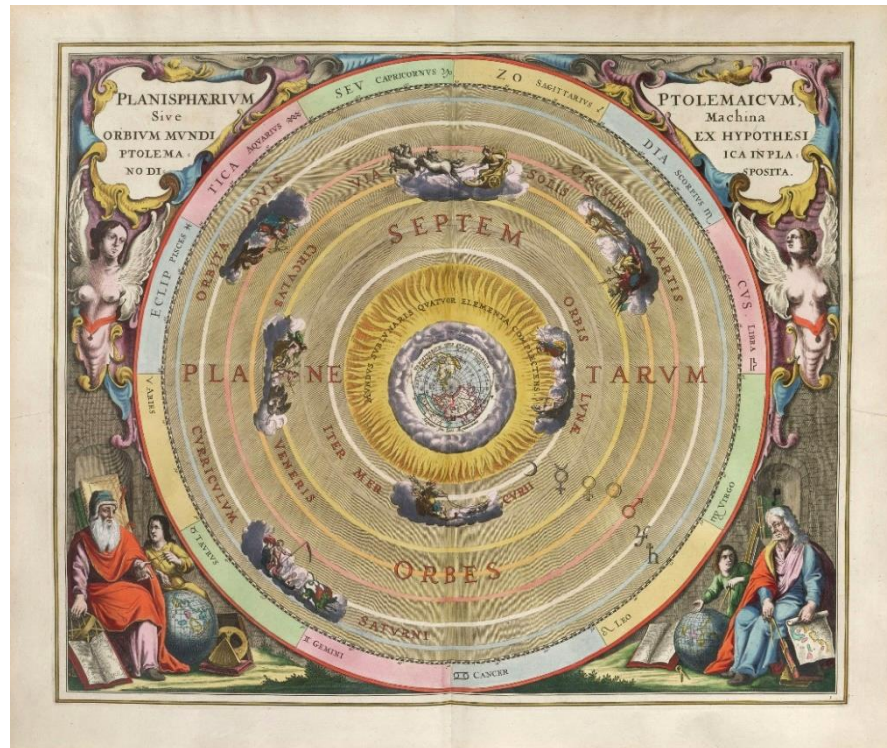
Since a fixed number of spheres governed each planet's *system* of motion, however high that number of spheres was, the astronomers realized that they could portray that system of spheres as a *single* mover, a single clockwork engine. They could count them as a unit without detailing their internal complications. This is what Maimonides means by his remark that we should "Count as *one* a *globe* (*kadur*) that includes several spheres." He had already introduced this concept in Guide 2:4.

(Paradigm shifts: Thomas Kuhn, *The Structure of Scientific Revolutions*, 1960. Aristotle "**inherited a system of nine or ten spheres**": that ten-sphere paradigm was originally associated with the Pythagorean spokesman, Philolaus, c. 470 – c. 385 BCE.

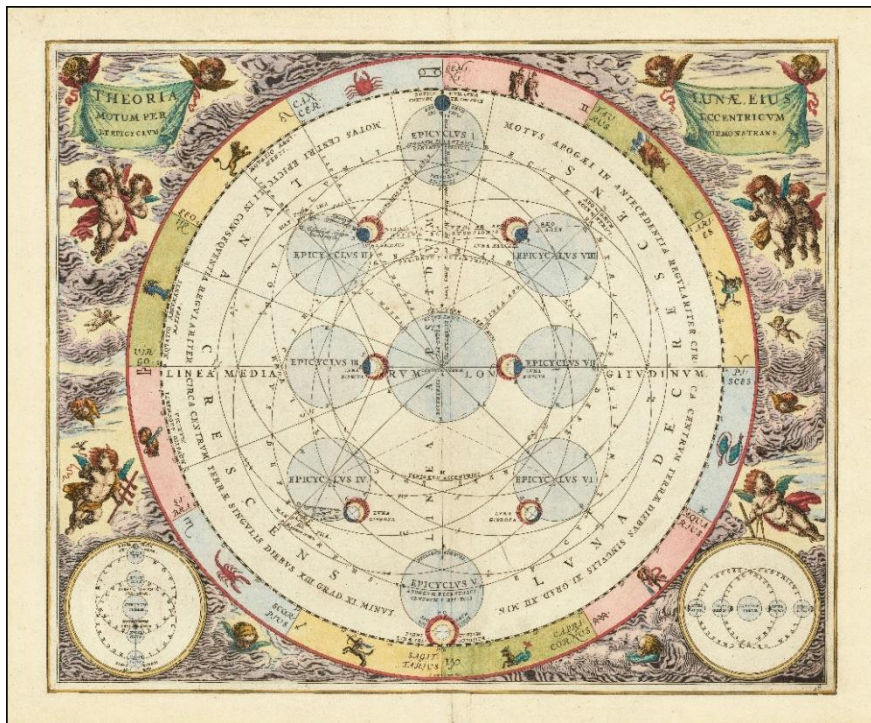
Globe: The Judeo-Arabic term that Moshe Pines translated as "globe" is אלאכר, in contrast with the term "sphere" אלאפלאך.

R. Friedlander erroneously claimed that the two terms were indistinguishable synonyms for "sphere"—see his note 1, Vol. II, ch. 4, p. 32. R. Ibn Tibbon, R. Haziri, and Michael Schwarz translate as *kadur*, while R. Kafih has *agul*. None captures the intended idea, see the section of my chapter-essay to Guide 2:4 titled "Maimonides Changes the Vocabulary of the Spheres." R. Even-Shmuel correctly called the *kadurim* "systems of spheres," *maarkhot galgalim*, i.e., that each *kadur* is a system in which there are several spheres. The idea goes back to the ninth-century astronomer Abu al-Farghani, see Guide 2:4. "...**However high that number of spheres was...**", see, Kuhn, *The Copernican Revolution*, page 68: "Systems employing half a dozen to a dozen minor epicycles [for each planet] were not uncommon in antiquity and in the Renaissance." We owe a debt of gratitude to Thomas Kuhn both for explaining paradigm shifts in science and showing how they prevailed in the thinking of medieval astronomers.)

The Ten Sphere Universe with Earth at the Center. Andreas Cellarius, 1661, Pub. Dom., Wikimedia Commons.



Cellarius' rendering of the path of the Moon, under the complicated *Ptolemaic paradigm*.



The Key: Reduce the Spheres to Cogs in Machines

The translation of אלאכר by Moshe Pines as “globe” is not particularly apt (R. Ibn Tibbon has the Hebrew *kadur*), but it does differentiate it from the idea of a sphere. It was a cosmic engine of many spheres. The spheres were its cogs and wheels. Instead of focusing on the individual parts, astronomers emphasized the single engine behind all the various movements of a particular planet. Those cogs and wheels mesh with each other (as in Cellarius’ portrayal of the motion of the Moon shown above). We could call the *kadur* a “heaven,” since many interacting spheres could be contained in a heaven.

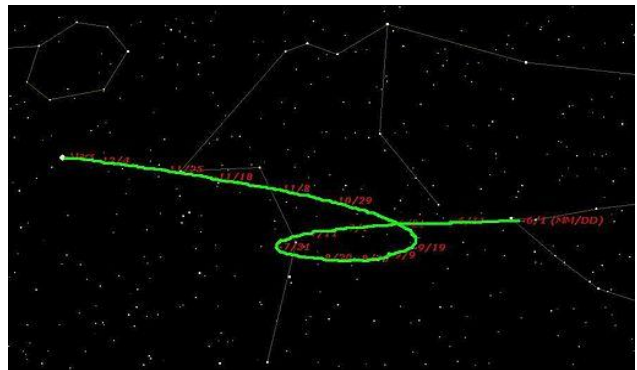


Antikythera Mechanism. Wikimedia, Marsyas, Creative Commons 2.5 generic license, Pub. Dom.

The ancients were familiar with such clockwork engines. As early as the 2d century BCE they developed primordial computers like the *Antikythera Mechanism*, whose internal cogs and gears approximated the motion of the known stars and planets. The machine was an almanac that could accurately predict eight different multiyear sports cycles like the Olympic games, as well as at least fifteen different stellar cycles, along with eclipse cycles of over fifty years in length. I do not contend that Maimonides was aware of this particular instrument, but he does write in Guide 1:73 of a *Book of Ingenious Devices* by the sons of Musa bin Shākir, “Which includes one hundred odd ingenious devices, all of them demonstrated and carried into effect” including a programmable automatic flute player, a differential pressure sensor, the first crankshaft, and various water clocks.

In Maimonides’ day, astronomers had restructured the cosmic system as *nine* such heavens. The astronomers had not eliminated the spheres but viewed them as parts of larger wholes, employing several spheres together to move the planet. The individual planet’s sphere-engine produced all its peculiar motions, such as *retrogression*, which were endlessly repeated. In those *kadurim* various kinds of spheres joined to produce the predictable endless motions that men see in the night sky.

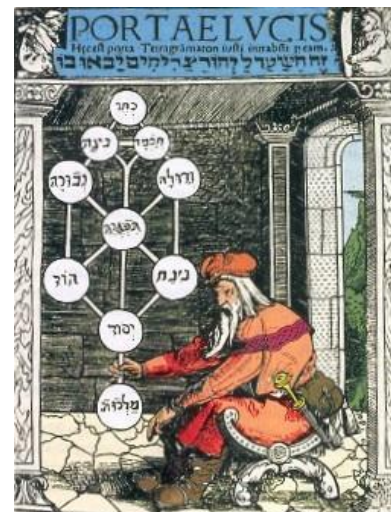
In the quoted passage Maimonides focused on the revival of a system based on *nine moving principles* plus a *tenth* outer sphere. In the rest of this chapter, Maimonides looked at other paradigms involving either *two* such heavens or engines, or *five*, and finally, a system that satisfied him, involving *four* such *kadurim*. Schoolmen of each school could and did support their own paradigm with good arguments.



Retrogression of Mars: Celestial path (green) of planet Mars, from June 1, 2003 (right) through December 8, 2003 (left, white terminal point), looping from June 20 – October 10. Wikimedia Commons. Author: Robert J. Ballantyne..

A system of ten universal principles was a manageable system that seemed natural. Our total of ten fingers makes such decimal systems organic. The ten-sphere universe has historic resonance in Jewish thought. It survived, from even before the collapse of the earth-centered paradigm until today, as the ten “vessels” of the *Sefirot*.

(Nine or Ten? We know that there were only nine such heavens or engines because Maimonides did not call the outer tenth sphere a *kurra* but a *falak*: i.e., a *sphere* and not a *globe-engine*, presumably because the starless outer sphere held all the other *kadurim* in a single containing sphere which was the outer edge of the universe. **The Book of Ingenious Devices** is available in English translation on *Amazon*. **The Antikythera Mechanism:** Its accuracy was unsurpassed until Kepler’s time, according to *Wikipedia*. It is now the subject of a major motion picture. **The engine metaphor** should not be overdone; Maimonides’ natural order was not an automaton like Spinoza’s pantheist conception of nature. As we have seen, in Guide 1:72, 2:4, 2:6 and 2:7, Maimonides invested every process in our world with personality and intelligence.)



The Ten Sefirot: R. Yosef Gikatilla, *Shaarei Ora*, Mantua, 1561, Pub. Dom. Wikimedia Creative Commons

The Integrity of the Ancient Biblical Doctrine of a Two-Sphere Universe

“For this reason, you also should not regard as *blameworthy* (*mozrim* / Jud. Ar.: תסחשנע) this dictum of some of the Sages, may their memory be blessed (*Hagigah* 12b): ‘There are *two* firmaments; for it is said: *Behold, unto the Lord thy God belongeth the heaven, and the heaven of heavens,*’ (Deut. 10:14). For he who says this counts the whole *globe* of the stars — I mean the spheres in which there are stars — as one *globe*, and again counts the *globe* of the all-encompassing sphere in which there is no star as the second *globe*. Consequently, he says: *There are two firmaments.*” [Compare the Talmudic doctrine of the seven heavens, also on *Hagigah* page 12b].

Maimonides, in this second comment in our chapter, argues that we should not regard the ancient rabbinic belief in a two-sphere universe as “blameworthy.” Why? We might have thought it blameworthy because later astronomers posited many more than two spheres. Given the real complexity of astronomy, an observer might have thought that it was naïve or unschooled to write of *only* two moving principles in the universe.

Maimonides’ argued, to the contrary, that the *same logic* that made all predictable stellar movements result from *nine* large engines inspired the *two-sphere* paradigm of the Talmudic sages and of the biblical prophets:

“For he who says this counts the whole *globe* of the stars — I mean the spheres in which there are stars — as one *globe*.”

Since astronomers could predict and chart the paths of both the fixed and the moving stars, it made sense to include them *all* in one sphere or firmament, and to sheath that in another “heaven of heavens” containing the “waters above the firmament” but no figured heavenly bodies.

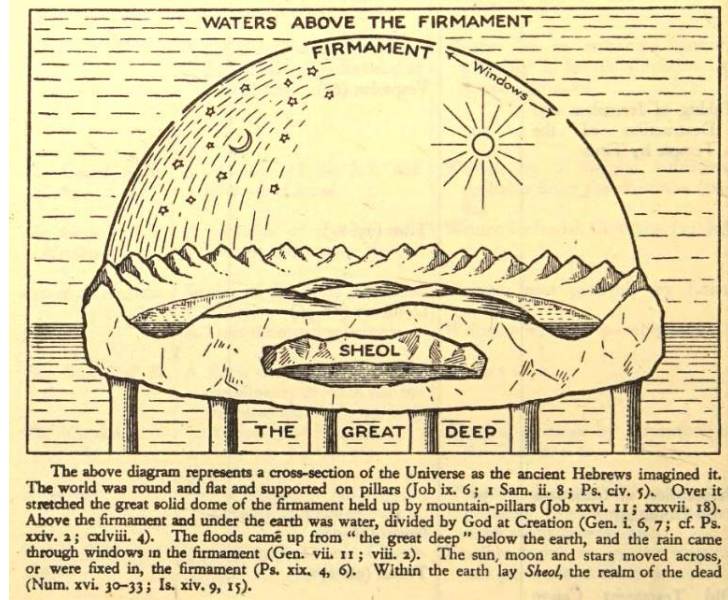
That outer sphere was the outer husk of the universe, the one that enclosed the whole.

People believed in this paradigm for eons according to Thomas Kuhn, in his chapter entitled “The Ancient Two-Sphere Universe”:

"Though primitive conceptions of the universe displayed considerable substantive variation, all are shaped primarily by terrestrial events, the events that impinge most immediately upon the designers of the systems. In such cosmologies, the heavens are merely sketched in to provide an enclosure for the earth... For example, in one principal form... the earth was pictured as an elongated platter... its curved and rippled rim was the mountains bounding the terrestrial world.

Above the platter-earth was air,...

supporting an inverted platter-dome which was the skies. The terrestrial platter in its turn was supported by water,..., and the water rested upon a third platter which bounded the universe symmetrically from below.... Clearly, several of the main structural features of this universe were suggested by the world that ...[he] knew: he *did* live in an elongated platter bounded by water in the only direction in which he had explored it; the sky viewed on a clear day or night *did* and *does* look dome-shaped; a symmetric lower boundary for the universe was the obvious choice in the absence of relevant observations. Astronomical appearances were not ignored, but they were treated with less precision... The stars were painted in the vault of the heaven... Fragments of cosmologies similar... can be found in all those ancient civilizations... of which we have records.” (*The Copernican Revolution*, pp. 5 – 6)



The Two-Sphere Universe. The “Waters Above the Firmament” would be the *second sphere* of the ancient Two-Sphere Universe. H. Martin, *The Teacher’s Commentary*, p. 406, 1940, Archive.Org.Pub.Dom.

And, speaking of the astronomers’ labors to understand the confusing behavior of what we *now* call *planets*:

“We shall examine some of the ancient explanations of these [planetary] deviations... But first notice, as the ancients also did, how far it is possible to proceed by neglecting the planetary irregularities and assuming simply that all orbits are at least approximately circular.” (p. 51)

Despite what Maimonides took to be the admirable simplicity and compression of the ancient rabbinic system, he knew that it had to be expanded to at least five (or, ultimately, *four*) *kadurim* to account for the different movements of its parts. That was because the motion of the “wandering” stars was vastly different from that of the “fixed” stars. Maimonides’ *divine inspiration* of the four-fold nature of the providential conduct of the universe (Guide 2:10) then served to confirm his cosmological thinking.

But first, he had to sort out a nagging problem that had bedeviled astronomers from ancient times until his own: What should be done with Venus and Mercury?

The Paradigm of the Five-Sphere Universe

“Now I shall first set forth for your benefit a *preface* needed *for the purpose that I have in view* in this chapter. This preface is as follows. Know that regarding the *spheres* of Venus and Mercury, there is a difference of opinion among the early mathematicians about whether they are *above* the sun or *below* the sun. For there is no demonstration proving to us what the position of these two *spheres* is.”

(Pines should have translated both uses of the term “spheres” here as “globes” to preserve consistency. Pines strayed here from his uniform treatment of the Jud.-Ar. term אֵלֶכְרָה. He acknowledged this in his footnote five, p. 268).

Maimonides now relates, “*for the purpose that I have in view*,” the history of the thorny ancient dispute over whether Venus and Mercury were above or below the sun *à propos* viewers on Earth. This takes more than half of the chapter.

Since we regard Mercury and Venus as *planets* rotating the sun, the question does not arise, because sometimes they really are above the sun, and sometimes below it. The threshold problem in those days, however, was that the paths of Mercury and Venus were not clear to the unaided vision. As Kuhn explained:

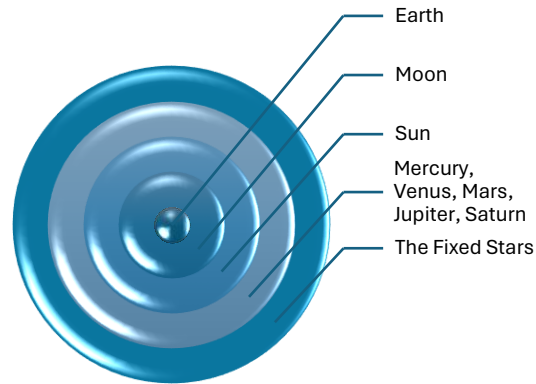
“Interrupted by periodic westward retrogressions, the five *wandering* stars [Mercury, Venus, Mars, Saturn, and Jupiter: called *wandering* because of their retrogressions] behave quite similarly. But there is an additional characteristic of their motion which divides them into two groups; this is the correlation between their position and the sun’s. Mercury and Venus, the two so-called *inferior* planets [*inferior* relative to their perceived position *vis-à-vis* the sun], never get very far from the sun. Mercury is always found within 28° of the sun’s moving disc, and Venus’s maximum ‘elongation’ is 45°. Both planets move in a continuous slow shuttle, back and forth across the moving sun, then retrogress across its disc, and finally reverse themselves to overtake the sun once more. When to the east of the sun, either of these inferior planets appears as an ‘evening star,’ becoming visible shortly after sunset and then rapidly following the sun below the horizon. After retrogressing westward across the sun’s disk, the planet becomes a ‘morning star,’ rising shortly before dawn and disappearing in the brilliant light of sunrise. But in between, when close to the sun, *neither Mercury nor Venus can be seen at all*. Therefore, until their motion was analyzed with respect to the sphere of the stars, neither of the inferior planets was recognized as the same celestial body when it appeared as a morning or as an evening star. For millenniums Venus had one name when it arose in the east shortly before dawn and another when, weeks later, it again became visible just over the western horizon shortly after sunset.”

(Kuhn, *ibid.*, 48-49, 54. Instead of the common term “wandering” that Kuhn used here to describe the five planets, Maimonides actually called them the “perplexing,” i.e., the problematic planets: *nevukhim* in R. Ibn Tibbon’s translation, Jud.Ar.: אֵלֶמְתַּחֲרִין; compare the Arabic title of the Guide: دَلَالَةُ الْفَالِقِ).

The question of whether Venus and Mercury were above or below the sun could not be solved by the usual tests just because of this observational difficulty. Otherwise, astronomers would have fixed their positions, either by the planets’ observed height in the sky, or by the length of the “year” of their eventual return. The only other foolproof test was eclipse data. As R. Shemtov Falaquera (1225 – c. 1290) explained in his

commentary on the Guide, “The lower [planet] always eclipses the higher.” But there was no observed eclipse behavior on the part of Venus or Mercury.

The “purpose” that Maimonides “has in view” was to reveal the universal applicability of his *tetradic* principle of divine organization. To get to the required number of *four moving principles* he had to start by placing Mercury and Venus above the sun. In this way, he could group them with Mars, Jupiter, and Saturn in one heaven between the heaven of the fixed stars and the heaven responsible for the sun’s motion.



Maimonides' Five-Sphere Universe. With the earth at the center, **the fifth sphere** is the outer rim, the sphere that has no stars. The other “spheres” are his four *kadurim*, engines that used as many spheres as necessary to move their heavenly bodies. By placing Mercury and Venus above the sun, Maimonides could explain that all the predictable motions of his five “perplexing” stars were the result of *one* celestial clockwork engine.

The problem was that everyone did not agree with him. Still, he argued that “all” of the *original* astronomers and the *rabbis* placed Mercury and Venus above the sun. This *five-sphere paradigm* commanded respect, even though astronomers in Maimonides’ own time disagreed on the issue:

“The doctrine of *all* the ancients was that the spheres of Venus and Mercury are *above* the sun. *Know this and keep it entirely present in your mind.* Then Ptolemy [c. 100 CE – 170 CE] came and decided in favor of the opinion that they were both *below* the sun, saying *that the greatest likeness to a natural order would be manifested (sh’hu ha-yoter nirei b’ofen tivi)* in the sun’s being in the middle with three planets above and three below.”

Maimonides’ phrase “*Know this and keep it entirely present in your mind*” is typical of the phrases that he used to signal that an issue was subject to the rule of Mishna *Hagigah* against public instruction. That there were four divine moving principles pervading the universe was clearly a topic in *Maaseh Merkava*, the concealed subject of the system of divine providence.

Maimonides' account in the quoted passage is consistent with what we know of the development of astronomy. In Kuhn’s words:

“Until the second century BC most astronomers placed the sun’s orbit just outside the moon’s, Venus’s outside the sun’s, then Mercury’s, and then Mars’s. After that date, however, the order...[of] Mercury, Venus, sun, Mars, *etc.* – became increasingly popular. In particular, it was adopted by Ptolemy, and his authority imposed it upon most of his successors.” (Kuhn, p. 54)

Why did Ptolemy change the planetary positions? According to Maimonides, Ptolemy placed the sun between the planets because it manifested “the greatest likeness to the natural order.”

Rabbi Even-Shmuel explained Ptolemy’s theory as the idea of heavenly *harmony*. Just as there would be three planets above the sun, they would be *balanced* by three *below* it (moon, Mercury, Venus). Compare this to similar ideas of the harmony of the alleged “music of the spheres” of the last chapter, Guide 2:8. He suggested that such Pythagorean considerations of scientific elegance prevailed upon Ptolemy, who otherwise “Had no demonstrative proof for his position... it was a hypothesis that would neither have been necessary nor accepted but for the fact that [the great] Ptolemy proposed it.” (My translation of R. Even-Shmuel here and throughout this essay).

Nonetheless, according to Maimonides, the pendulum in Spain had swung back to the pre-Ptolemaic paradigm:

“Then came latter-day groups of people in Andalusia who became very proficient in mathematics and explained, conforming to Ptolemy’s [underlying] premises, that Venus and Mercury *were* above the sun. In fact, Ibn Aflah of Seville, whose son I have met, had written a celebrated book about this.”

The Muslim astronomer Abu Muhammad Jaber Ibn Aflah of Seville [1100–1150] flourished in Spain during Maimonides’s youth. His “celebrated” book on astronomy was the *Iṣlāḥ al-Majisti*, “The Correction of the *Almagest*.” It was an abridgment of Ptolemy’s *Almagest*. Ibn Aflah made a scholarly selection from Ptolemy’s encyclopedia, keeping what he felt was worthwhile while criticizing much of the rest of it, especially its mathematics. Ibn Aflah introduced spherical trigonometry to solve astronomical problems. He famously amended Ptolemy’s theory of the order of the “wandering stars” by positioning Venus and Mercury back *above* the sun. Maimonides declared with pride that he knew Ibn Aflah’s son.

The Arab historian Al-Qifti (c. 1172–1248) relates that he knew the “Rabbi Joseph” to whom Maimonides addressed the Guide of the Perplexed, R. Yosef ben Yehuda ibn Shimon. The historian recounted that Rabbi Joseph had brought his family’s copy of Ibn Aflah’s book from Morocco to Maimonides, and that they together produced a revised edition of it.

(Sources: Footnote 6 in the commentary of R. Even Shmuel; Bernard Lewis, “Maimonides, Lionheart, and Saladin,” at *JSTOR*; *Wikipedia* article on Ibn Aflah; and “A Maimonidean Life, Joseph Ben Judah ibn Shimon of Ceuta’s Biography Reconstructed,” Reimund Leicht, 2022, *Maimonides Review of Philosophy and Religion*, I, Brill, at *Academia*. Al-Qifti’s book was *The History of Learned Men, Ta’rikh al-Hukamā*, a biographical dictionary of famous scholars).

While Maimonides welcomed Ibn Aflah’s work to restore the five-sphere paradigm, an even greater fellow Spaniard, the philosopher Ibn Bajja, rejected it. Maimonides wrote,

“Thereupon the excellent philosopher Abu Bakr ibn al-Saigh (Ibn Bajja), under the guidance of one of whose pupils I have read texts, reflected on this notion and showed various ways of argumentation — transcribed by us from him — by means of which the opinion that Venus and Mercury are *above* the sun may be shown to be *improbable*.”

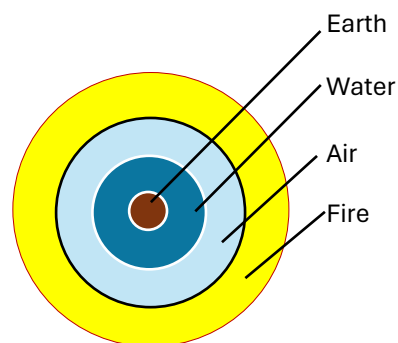
Ibn Bajja of Zaragoza, Aragon (c. 1085 – 1138), the Latin *Avempace*, was the first Muslim philosopher in Spain. He was a physician, astronomer, botanist, and poet in the generation before Maimonides. Maimonides mentioned him and his remarkable theories four times in the Guide (Guide 1:74, 7th Method; 1:75; and *below*, in 2:24 and 3:29). Maimonides boasted that he had studied with Ibn Bajja’s student. Maimonides held Ibn Bajja in high regard even when he did not agree with him. Ibn Bajja wrote a famous work called *The Conduct of the Solitary*, in which he argued that reclusive philosophical speculation was the true path to human improvement, since isolation was the only way that a philosopher could protect his work from societal corruption. His view came from his own experience of politics. He had twice achieved the rank of Vizier but also twice suffered imprisonment. He was notorious for his controversial doctrine of the unity of mind, which Maimonides discussed in Guide 1:74 and 1:75.

Ibn Bajja revived Ptolemy’s theory that Venus and Mercury were *below* the sun, writing that it was “improbable” that they were above the sun. But if the sun was *between* the five wandering stars Maimonides would not be able to gather those planets together in one *kadur*. Maimonides’ doctrine of a five-sphere universe would have been wrong.

Rabbi Efodi (c. 1350 – c. 1415) provided a reason in his commentary to the Guide:

“Maimonides asked, regarding those who thought that the five planets moved the *elemental sphere of the air*, how, if the sun [which ruled the *sphere of fire*] is *between* those five planets, could it move *the sphere of fire*? That is why Maimonides said: It is necessary to postulate that the sun should be placed *below* Venus and Mercury.” (My trans.)

In other words, not only would the revival of Ptolemy’s theory split the universe into six heavens (1. moon, 2. Mercury/Venus, 3. sun, 4. Mars/Jupiter/Saturn, 5. the fixed stars, and 6. the outer rim), but it would also make it impossible for the sun to directly rule the element of fire. According to Aristotelian theory the four terrestrial elements had as their *proper places* their own spherical bands. Elemental earth formed the central sphere, surrounded and ultimately permeated by the sphere of water, surrounded by the sphere of air, which was surrounded by a sphere of fire. Assume that each of these elemental spheres was moved by one of the *kadurim* and that the sphere of fire was ruled directly by the *kadur* of the sun. How could the *kadur* of the sun move the sphere of fire if its action was interrupted and blocked by an impassable *kadur* of Venus and Mercury?



The Spheres of the Four Terrestrial Elements

R. Efodi’s argument was impressive, but it entailed more assumptions than Maimonides would have wanted to make. Maimonides instead employed a three-step argument that was far more subtle. *First*, he denied that Ibn Bajja’s argument was sufficient to change his mind:

“The argument set forth by Abu Bakr (Ibn Bajja) is one purporting to show that this opinion is *improbable*, not one purporting to disprove it entirely.”

In other words, while Ibn Bajja had argued that it was “improbable” that Venus and Mercury were above the sun, he had not said that it was *impossible*. This clever move is a foretaste of Maimonides’ eventual argument

against Aristotle's eternalism: while the miracle of creation *ex nihilo*, as in the book of Genesis, may have been *improbable*, Aristotle could not prove that it was *impossible*.

Maimonides' *second* step also presaged his future defense of creationism. He relied on *historical tradition*: "All the early mathematicians [astronomers] put Venus and Mercury above the sun." Here he called upon the integrity of the ancient cosmological paradigms that simplified the heavenly picture. Contemporary Andalusian astronomers' urge to simplify also motivated the *original* astronomers as well as the biblical prophets' two-sphere universe. Rabbi Even-Shmuel illuminates Maimonides' second step:

"Even if it were said that these scholars [like Ibn Bajja and Ptolemy] were right, this does not detract from the value of what we already mentioned above, that there was no dispute among the *Rishonim* before Ptolemy regarding the place of Venus and Mercury, as to whether they are above the sun; The *prophets* were, therefore, not the only ones to hold this opinion, which was the accepted opinion in all the circles of the Rabbinic *Rishonim*."

(R. Even-Shmuel, v. III, pp. 133-134. The *Rishonim* were the *ancients*. Maimonides used this term in our Guide chapter indiscriminately and purposely for *both* the ancient astronomers and the venerable sages of the Talmud—Jud.Ar.: אלהאקדמין.)

His *third* step was to argue that it didn't matter whether Ibn Bajja was right!

"Whether this matter be so or not, all the *early* mathematicians put Venus and Mercury above the sun." (*klalu shel davar, yihyei ha-davar kakh o lo yihyei, hinei kol ha-rishonim hayu m'saderim noga v'kokhav m'al ha-shemesh*).

This third step was a corollary of the second step. "Whether it be so or not" that *in fact* Venus and Mercury were above the sun made no difference if it worked out *mathematically*. After all, the mathematicians had no heavenly foothold to judge the correctness of their theories. Maimonides emphasized that we should never confuse the theories of the astronomical mathematicians with *truth*:

"I have explained to you already *vivâ voce*, that these difficulties do not concern the astronomer: for he *does not profess to tell us the existing properties* of the spheres, but to suggest, *whether correctly or not*, a theory in which the motion of the stars is circular and uniform, and yet in agreement with our observation." (Guide 2:24, R. Friedlander trans.)

Since the rabbis, like everyone else in ancient times, *believed* that Venus and Mercury were above the sun, that doctrine infused and constituted the paradigmatic language that the *prophets* used to express their revelations.

Now, finally, Maimonides could turn his attention again to the language of prophecy.

Maimonides' Four Heavens

"Whether this matter be so or not, all the early mathematicians put Venus and Mercury above the sun. For this reason, they counted **five** *kadurim*: namely, 1) the *kadur* of the moon, which undoubtedly is contiguous with us; 2) that of the sun, which is necessarily above it; 3) that of the five planets; 4) that of the fixed stars; and 5) the all-encompassing *sphere* in which there are no stars. **Accordingly** (*nimtza*), the number of *informed kadurim*, I mean to say the *kadurim* with *forms* (*tzurot*), in which there are stars — for as is generally *known from their books*, the ancients called the stars *forms* — is **four**; namely, 1) the *kadur* of the fixed stars, 2) that of the five planets, 3) that of the sun, and 4) that of the moon; while above all of them, there is one empty *sphere* in which there is no star."

(Maimonides' original has *kurra* rather than *falak*, except in his two mentions of the outer sphere. I have corrected Pines using the Tibbonide Hebrew *kadur* here. Enumeration supplied throughout.)

If the principle of the tetradic universe was so important to Maimonides (and it was), how did he move from his *five-part* cosmos in the first part of the passage to a *four-kadur* heaven in the latter part?

The transition depended upon his insistence that some heavenly bodies are *figured*, or as Pines translates, “informed...with forms.”

With no further transition than the term *accordingly*, he launched into a discussion of the *four figured* sphere-engines. They are the *kadurim* whose spheres moved the stellar *figures* seen at night.

The figured spheres. This terminology of *figured* or *informed spheres* is slippery. While there is no lexical chapter on form/*tzur* (Judeo-Arabic: אֵלֶּמְצוּרָה), it occurs often in the Guide, and appears in its first sentence:

“Some have been of the opinion that by the Hebrew *z'elem*, the shape, and figure of a thing is to be understood, and this explanation led men to believe in the corporeality [of the Divine Being]: for they thought that the words ‘Let us make man in Our *z'elem*’ (Gen. 1:26), implied that God had the *form* of a human being (*v'heshvu ki hashem k'tzurat/צורה adam*), i.e., that He had *figure* and *shape*, and that, consequently, He was corporeal.” (Guide 1:1)

He meant that the *tzur* does not have the same conceptual dignity as the *tzelem*, which Maimonides understood to be the *active intellect* we share in an inarticulable way with God. *Tzur* was merely the so-called *corporeal form*, which, in scholastic parlance, was the incorporeal *form principle* in its first conjunction with the principle of *incorporeal matter*. In that first compound the “element” is still in an *incorporeal* state. It manifests itself then as one of the formal elemental *principles* of earth air fire and water before their embodiment as actual *corporeal* earth air fire and water. We would never apply the term to God. God could only be “thought” (*heshvu*) of as divine *figure* and *shape* in our misguided *imagination*s, never by our rational intellect. This is the same explanation that R. Israel Efos provided for *tzur* in *The Philosophical Terms in the Morei Nebukim*:

“1) *form*, i.e., the actuality or *energia* of *matter* which is potential or *dunamis*. It is the essence of the thing, the *logos tis ousias* [the intelligible principle of a substance], that which gives being to a [*corporeal*] thing and its essential attributes. It is the formal cause of [such] being.
2) *star*. Strictly speaking, however, the term denotes a zodiacal *constellation*.”

Efos then spent several pages sorting out phrases involving the *tzur* (pp. 102-104), including a page-long dissertation dividing between this sort of corporealizing Aristotelian “natural form” (*tzura tivit*), and its very different use in Guide 1:69 in the formula “God is the *highest form* (*tzura akhrona*) for the whole universe... being without beginning and without end... transcendent intellect.” The *contrast* shows that what Maimonides meant by *tzur* in the first sentence of Guide 1:1 was “natural form” as opposed to divine transcendent form.

However, in the current context of *figured kadurim*, *ha-kadurim ha-mitzuyarim*, the commentators tended to emphasize one of the two definitions of *tzur* in Efos' second entry: either as *kadurim* with *stars* or *kadurim* with *constellations*. R. Even-Shmuel emphasized the *tzurot* as stars, and R. Narboni as constellations. Pines takes the term as it is, translating the term as “informed spheres,” meaning *kadurim* with forms, but he left it unclear whether by “forms” he meant stars, constellations, “natural forms,” or emanated form.

Rabbi Narboni on the “Figured Spheres,” and the Problematic of Ancient Rationalism

R. Moshe Narboni (d. after 1362) brings us closest to a prophetic reading of *tzur* in his astonishing commentary. Alone among the Guide’s interpreters, he tried to explain the *figured spheres* in detail:

“You should understand [the purport of] Maimonides’ decision to divide the figured *kadurim* into four, as he explained. He needed this [to arrive at] four *khayot* (Ezek. 1:5). And this is possible, provided that Venus and Mercury, among the problematic [*nevukhim*] stars, are placed above the Sun. Otherwise, how can we place the five *kadurim* [one for each of the planets] in one *kadur*, if the sun is in the middle? It is impossible. But when we place Venus and Mercury above the Sun it is possible to reach the number of four. They are the four *khayot*. We can then unite the *kadurim* with the four *elemental* spheres, and to each one of the four unique forces, as Maimonides will explain in Guide 2:10. *And there were four faces for each khaya* (referring to Ezek. Ch. 1, but not quoting it). Regarding this Maimonides said: ‘*Know this and keep it entirely present in your mind,*’ because his interpretation of *Maaseh Bereshit* depended on this.... It was the ancient opinion; it was also the opinion of the prophets. It is like the idea of the sound of the wings of the *cherubim* (Ezek. 1:24, R. Narboni on Guide 2:8, see my chapter-essay). Grasp this and explain it in this manner, just as Maimonides explained it: ‘For this reason they counted five *kadurim*.’ And [then, next, arguing for *four kadurim*] he said: ‘Because the *rishonim* called the stars *forms*.’ This suggested the [prophecy of] the faces of the *khayot*. This is the greatest of secrets because it suggested an important doctrinal principle of the ancients about such astronomical configurations when inscribed in amulets by craftsmen. This is the question of the likeness of the *inferior forms* [i.e., terrestrial] to the *superior forms* [cosmic forms or figures appearing in constellations], specifically the instantiation from God of the form that motivates man. [Maimonides referred this use of *figured forms* to ‘their books,’ thus...] Ptolemy said in the *Centiloquium*, *The Hundred Aphorisms*, [known in Arabic as] *The Book of the Fruit*: ‘*The forms in our world of composition are subordinate to [nishmaot] the forms/figures of the spheres, and it is for that reason that the craftsmen of talismans engrave their amulets with that circuit of those stars which corresponded to the need of the recipient of the amulet.*’ The commentator Abu Jaber ibn Aflah said, ‘*This dictum of Ptolemy sustained the tradition of the talismanic craftsmen.*’ The forms in the world of composition are the species of animals and the plants [that the talisman craftsmen needed]. Each species comes under the form of the zodiacal *constellation* that resembles the shape of a member of the same species with that resemblance attribute. Just as the crabs are subject to [*nishmaot*] the shape of the Crab (*Cancer*) in its zodiacal constellation.... Astrologers [*baalei hatzalamim*] look to the circuits of the stars with these zodiacal figures as they rise from the East, and then engrave these forms in [precious] stones for the times with which they are associated, when they wanted to repair or change their temporal [portents], or when they sought to decrease their disadvantage, expelling them from their land. Consider the enduring result they could thus achieve. They could bring an account [*mashal*] of wonderful things that occurred and testify to the wonder eloquently. As the prophet said: ‘*May Your word be fixed in the heavens forever,*’ (Ps. 119:89).” [My translation.]

It is fair to say that Maimonides would never have written what R. Narboni wrote. Maimonides opposed and derided astrology and amulets in all their forms.

(Maimonides on astrology as “stupidity,” and the “folly of amulet writers:” see Guide 1:61; Mishneh Torah, *Tefillin* 5:4; the *Epistle to Yemen*, and the *Epistle on Astrology*. The Talmud, *Shabat* 61a-b, on the issue of talismans and amulets taught, however, that if the talisman worked on three occasions it was not mere hocus-pocus and its maker was an expert rather than a fraud.)

Nonetheless, we may not ignore R. Narboni’s account. The fact that actual astronomers thought that the constellations in their figured manifestations had something to do with their emanation of form upon matter is

most interesting. Note that of all Maimonides' early commentators, historians regard R. Narboni as the most rational, the most Aristotelian, even Averroistic. The fact that he seemed to take the *formal emanational* influence of these *figured* presences seriously reminds us that such transcendental emanationism prevailed in actual philosophical and scientific circles.

Similar figures of the period who combined Medieval rationalism and astrology come to mind, such as R. Avraham ibn Ezra (not to mention Ptolemy himself in late-ancient times). We should never make the mistake of confusing modern "rationalism" with historic rationalism. Indeed, R. Narboni listed such philosophers as R. ibn Ezra, Avicenna, Ghazali (in the philosophical *Maqāṣid al Falāsifah*), and even (based only partly on pseudepigrapha) Averroes himself (!) as sources for Rabbi Narboni's doctrine that prophecy and the prophets' miracles come from the human mind functioning as the two-way transmitter of celestial consciousness. As a scholar recently noted:

"Narboni reflected on the link between human souls and the souls of the celestial spheres. In his opinion, al-Ġazālī [c.1058–1111] suggested that human souls do not merely function in a similar fashion to celestial souls, but that they are, rather, *part of the same entity*. Narboni interprets al-Ġazālī as saying that human souls are in fact celestial souls functioning within human bodies, and states that this conception was also shared by Averroes and Abraham ibn Ezra.... According to Narboni, both theories [R. ibn Ezra's and Ghazali's] maintain that miracles can occur once an individual human soul cleaves to the supreme celestial entity. Nonetheless, they differ regarding the *platform* on which these miracles are conducted. According to Narboni, al-Ġazālī portrays a method in which celestial souls operate in the sublunar world through individual souls, thus generating deeds that are perceived as miracles. In contrast, the theory that he attributes to both Ibn Ezra and Averroes depicts the individual soul's reversion to its supreme origin, thus performing miracles in the heavenly sphere."

[From the article, "*Persecution and the Art of Commentary, Rabbi Moses Narboni's Analysis of al-Ġazālī's Maqāṣid al Falāsifah (Aims of the Philosophers)*," by the fine scholar Gitit Holzman, in *Maimonides Review of Philosophy and Religion* 1 (2022) 49–78, at Brill.com, based on manuscript documents. Prof. Holzman provides the biblical examples in her article that R. Narboni used to substantiate the two "platforms" she described. She rightly called for Hebrew and English printings of the underlying manuscripts. **The Centiloquium:** Here is the passage that Rabbi Narboni quoted from the *Centiloquium*, in Henry Coley's 17th Century English translation: Dictum #9: "*In generation and corruption, earthly forms are subordinate to the celestials; wherefore they that frame images (talismans) do then make use of them, by observing when the planets do enter into those constellations or forms.*" Coley's translation reflects the same understanding of this passage that both R. Narboni and Ibn Aflah endorsed. A Greek version of the *Centiloquium* of unknown provenance, and a recent similar translation of its Dictum #9 by Darin Hayton are at <https://dhayton.haverford.edu/blog/2018/02/15/o-karpos-aphorisms-6-10/>. Though we know that Ptolemy did write a major work on astrology, the *Tetrabiblos*, contemporary scholarship agrees that an unidentified medieval Pseudo-Ptolemy composed the *Centiloquium*, despite that Medieval scholars all thought that it was genuine Ptolemy. Maimonides does *not* say what book he had in mind when he wrote: "*Accordingly, the number of informed kadurim, I mean to say the kadurim with forms, in which there are stars — for as is generally known from their books, the ancients called the stars forms—is four.*" I believe that R. Narboni assumed, perhaps with merit, that Maimonides knew of this passage in the *Centiloquium*, and referred to it obliquely as "their books" in this passage, for the *Centiloquium* does refer to figures and images in the stars. Nonetheless, I am not aware at the time of writing of any way to verify such a supposition on the part of R. Narboni. Contemporaries were familiar with the *Centiloquium*: R. Ibn Ezra used it and Aquinas referred to it. R. Abraham bar Hiyya, 1070-1136, translated the *Centiloquium* into Hebrew. For general information on the *Centiloquium*, see *Henricus Bate, William of Moerbeke, and the Centiloquium of "Ptolemy,"* by Carlos Steel (online). **On Averroes' changing views:** "The Medieval Astrologization of Aristotle's Biology: Averroes on the Role of the Celestial Bodies in the Generation of Animate Beings," Gad Freudenthal, *Arabic Sciences and Philosophy*, vol. 12 (2002) pp. 111-137, available on *Academia*].

Conclusion And Introduction

Maimonides closes our chapter by introducing the next chapter. Though the philosophers and the rabbis never explicitly uttered his doctrine of the *tetradic nature of the universe*, he felt that hints inevitably leading to this revelation must appear from a deep study of those authorities:

“Now this number [four] is for me a very important basis for a notion that has occurred to me and that I have not seen explicitly stated by any philosopher. I found, however, in the dicta of the philosophers and the discourse of the Sages indications that drew my attention to it. I shall accordingly mention them and explain the notion in the following chapter.”

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