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Definition, Uses and Urgency of Islamic Astronomy

Sulistia Ningrum [1]*, Nidya Fabianti [2]
[1,2]Universitas Muhammadiyah Sumatera Utara, Indonesia
Email: sulistianingrum87@gmail.com

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ABSTRACT

This study explores astronomy as the science of understanding celestial bodies, particularly the Earth, Moon, and Sun, and their movements within defined orbits. A qualitative research method was employed, with the author as the primary instrument. Data collection and analysis were conducted continuously from the study's outset to data interpretation. These movements enable precise calculations of celestial positions and times on Earth. Astronomy has been recognized historically as one of the oldest sciences and has developed over centuries. It now includes applications critical to religious observances tied to time and space. This paper aims to trace the development of astronomy and its scope, especially its role in Islamic worship practices. Key focus areas within Islamic astronomy are Qibla direction, prayer times, the Islamic lunar calendar's beginning, and eclipses. These elements underscore astronomy's essential role in Islam, as accurate worship practices depend on precise astronomical knowledge.

I. Introduction

Astronomy is a science that studies the movement of celestial bodies, especially the moon and the sun, in their orbits systematically and scientifically. The word falak in Arabic means orbit (circulation) of celestial bodies (Al-mador yaibahu fihi al-jim as- samawy) in the Qur'an, this word is stated twice, and the meaning of orbit or trajectory is in QS Al-ambiya (21) verse 33 in Qs yasin (36) verse 40. Carlo Nillino in his work said that the word falak stated in the Qur'an does not come from Arabic, but comes from the Babylonian language, namely "pulukku".

By definition, Falak is a combination of two words from the origin of the words "science" and "falak". These two words are an absorption of words from the Arabic language. Knowledge comes from the word ilm (علم) which is a derivative of 'alim-ya'lam-'alim wa 'ilm (علم -يعلم -علم), which has the meaning of knowledge (knowing). The word ilm can also mean understanding, truly understanding, and feeling. The word "falak" is the same as the word "science" which comes from the Arabic absorption of "al-Falak" which is isim of the word flk (فلك) which is a derivative of the word falaka–yafluku–falakun (فلك -يفلك –فلك) which means "round". The word falak (الفلك) is a synonym of madar (المدار), which means the orbit, line or place of travel of celestial bodies.8 Ibn Mandzur explained that the word falak means "madr an-nujum" (مدار النجوم) the trajectory of the stars, with the plural form of aflak (أفلا) [1].

Meanwhile, at-tahanawi (12th century) , "astronomy" in the illustration of the astronomical sphere at the center of the astronomical observatory and geophysics of Egyptian animals says the astronomy is a science that studies everything related to the Universe in the form of celestial bodies outside the Earth's atmosphere, such as the sun, moon, stars, galactic systems, planets, satellites, comets, and meteors in terms of their origin, physical and chemical motion, and even biology [2].

According to the language of astronomy, an orbit is the orbital celestial body [3] Therefore, astronomical knowledge is the understanding of celestial bodies, especially earth bodies, and the moon and sun in each orbit to determine the position of each celestial body between one and the other and the time of day on the Earth's surface.

This science is called Falak science because this science studies the trajectory of celestial bodies. This science is also called hisab science, because this science uses calculations [4]. This science is also called rashd, and this science requires observation. This science is often called the science of miqad, because this science studies the limits of time. Of the four terms above that are popular in the community, they are "Falak science" and "Hisab science." [5]

From the various definitions above, it can be concluded that the formal object of astronomy is celestial bodies, while the material Object is the trajectory of celestial bodies.

Within the framework of Islamic law, Islamic teachings cannot be ignored when discussing prayer times, fasting days, and fasting days with all disputes. Determining the time of worship with the help of astronomy in the current period is still relevant and useful. Many technical problems of worship cannot be solved by hand, including the requirement for Falak contributions. Because of this urgency in literature, the author claims that "Fiqh is not pure without the guidance of Falak literature." Sometimes, the meaning of Ilm Falak is not interpreted as mentioned above; it is interpreted as the science of astrology, which is the science that can predict a person's future fate. This science is commonly called Astrology (the science of Astrology). Thus, the difference between astronomy and astrology is as follows:

1. Astronomy is a science of calculation that is studied to know the location, motion, size and circle of celestial bodies based on science. Then, with that knowledge, we can determine the number of years, months, and eclipse times. Meanwhile, astrology is a science of astrology that is studied by relating to predictions about events that have not yet occurred, including about the fate of human beings

2. Astronomers, on the other hand, are often fooled by the past. This means that the results of astronomy education can be formally confirmed. Many astrologers base their

predictions on rambles and rambles, so their results will be as follows before they can be confirmed.

3. Believing in the results of astronomical calculations, which means believing in an event based on facts, but believing in the results of astrological calculations, which according to Islamic teachings can threaten the non-acceptance of prayers for 40 nights, as stated in the hadith of the Prophet PBUH, which states, "Whoever comes to a fortune teller and asks for a prophecy and then believes in the results of the prophecy, then his prayer is not accepted for 40 days".

Astronomy, as defined, covers a vast range of topics, requiring not only foundational knowledge from fields such as Natural Sciences, Life Sciences [6], Surveying, and Algebra but also demanding highly complex investigations. Given the field's breadth and intricacy, astronomers have divided it into specialized areas: Astrometry, which involves determining positions and distances on Earth and in the sky and measuring the magnitude of celestial bodies; Astromechanics focused on the study of celestial motion, including rotation, orbital paths, changes in movement, and the laws governing these phenomena; Astrophysics, which explores the physical properties of celestial bodies, including temperature and atmospheric composition [7]; and Cosmogony, which examines the structure, form, and evolution of the Universe. Through this article, the author also intends to refresh our thinking about the world of science, especially in astronomy. This refreshment process must be carried out because we want to continue positioning astronomy as a recognized field of science that is always relevant to today's science and technology development. Do not forget that the results of the thinking in this paper should require criticism so that it can produce a common view and be useful for developing the field of Astronomy in Indonesia.

II. Method

This study employs a qualitative research methodology, where the author serves as the primary instrument for data collection, observation, and analysis. In this approach, data is gathered continuously throughout the research process, allowing for iterative analysis and reflection that enhances the depth and accuracy of the findings. Direct observation is a central technique in this study, enabling the researcher to examine the object of study within its natural context, ensuring that the observations align closely with the research scope and objectives. Additionally, relevant theoretical frameworks are integrated to support and contextualize the analysis, allowing a comprehensive exploration of the topic in line with the study's specific focus areas. Through this continuous observation and analysis, the study aims to yield insights grounded in authentic interactions with the research subject, supported by relevant theoretical perspectives.

III. Results and Discussion

The science of astronomy, also known as astronomy in Islam, has various definitions, uses, and urgency—astronomy studies celestial bodies such as the sun, moon, stars, and

planets. Astronomy uses include determining the direction of the Qibla and the time of prayer and finding out the events of the solar or lunar eclipse. The urgency of astronomy in Islam lies in determining the beginning of the month of Ramadan, the month of Zulhijjah, eclipse prayers, zakat calculations, and the determination of Islamic holidays.

According to Muhammad Hadi Bashori, astronomy is studied to determine the position of each celestial body, and it has an important role in worship purposes, such as determining the direction of the Qibla and the time of prayer [8]. In addition, astronomy is also used to find out solar or lunar eclipse events. Studying astronomy revolves around four things: knowing the direction of the Qibla, the time of prayer, eclipse events, and the arrangement of celestial bodies. The urgency of astronomy in Islam lies in determining the beginning of the month of Ramadan, the month of Zulhijjah, eclipse prayers, zakat calculations, and the determination of Islamic holidays [9].

If viewed superficially, when Philosophy of Science is reviewed with Philosophy of Science, we have not found a writing specifically discussing Philosophy of Philosophy (this is what the author experienced during his search). But if you look carefully, the discussion has been widely mentioned through various writings, even listed in every book of the Philosophy of Science itself. This phenomenon occurs because of the naming of Astronomy, which has several other names, including Astronomy and Cosmology. When explaining the division of science, these two different names are always mentioned in various Philosophy of Science books. Cosmology is even considered one of the branches of philosophy [10].

Based on these various definitions, it can be concluded that Astronomy is an integrative field of science that studies things about objects in the Universe, including planet Earth, whether related to humans or not. Thus, it can be said that the breadth of this aspect of discussion distinguishes the field of Astronomy from other fields of science. Therefore, it is not difficult to explain the philosophical meaning of Astronomy, which, in principle, shows the relationship and approach of Astronomy with other fields of study. All the circumstances that take place in the Universe, whether examined through the perspective of space, physical, time, religion or others, are the formers of the field of study of Astronomy. Through the same process, other fields of study, such as Astronomy, Cosmology, and many others, were born. Thus, research results in other science fields will enrich (proliferate) the scope of Falak research.

Similarly, the results of research by Astrologists on certain topics can trigger the development of other fields of science. In this context, there is room for the formation of divergence symptoms in various branches of science that are more specific (specialization). Specializing in Astronomy is very easy if you look at the super broad dimensions of the study. The science of astronomy is also needed to determine the beginning of the month of qamariyah, which is the initial guideline for rukyat experts to carry out rukyatul hilal activities. With the science of Falak or the science of hisab, people can ascertain where the Qibla for a place is going. on the Earth's surface. With the science of Falak or the science of hisab, it can be determined that the time of prayer has arrived or the sun has set to break the fast. With it, the person who performs the rukyatul hilal can direct his gaze to the position of the hilal .

The core values of Islam are still largely dictated by prayer, fasting, pilgrimage, and other religious obligations. In addition, the core values of Islam require Muslims to understand the

passage of time, day and night, and to do so by using the text of Falak or Hisab. Thus, the science of Falak or the science of hisab can increase a person's confidence in performing worship so that his worship is more solemn.

In classical Islamic treasures, astronomy has a variety of terms, including hai'ah, astrological astronomy, miaat and rasd. These various terms emerged as a result of human observation of celestial phenomena. In addition to these terms, there is one more term for this science that developed in the past: astronomy, 'astro' means star, and 'nomia' means science. This term appeared and developed since the Greek civilization.

In the Middle Ages, this science was better known as hai'ah than falak. According to Al-mas'udi, the term hai'ah is the equivalent of an astronomical term developed in the Greek period. However, astronomy is more widely circulated and used in this era. The use of the word falak anatar is also listed in "al-fihrist" by An-Nadim where when explaining the biography of Ya'qub bin Tariq, An-Nadim mentions the word falak as a branch of science that studies celestial bodies.

The urgency of astronomy / Important things in studying astronomy

The existence of Astronomy is one of the important Islamic thoughts. As one of the inseparable studies in the Islamic world, this science is increasingly felt in the Middle Ages, where many scholars (experts) such as Jabir bin Hayyan, Al-Fazari, Ibn Yunis, Al-Biruni, and many more were born. The importance of Astronomy in Islam has been realized since the time of the Prophet. Furthermore, the discussion has been clearly stated in the Qur'an al-Karim and al-hadith al-Syarif. Historically, the relationship between Astronomy and religion, including Islam, has played an urgent role in its existence. This is because its emergence as a science aligns with human needs for that knowledge. Falak Science follows the driving factors for the emergence of philosophy and science, especially in thauma (admiration). Humans have a sense of admiration for what the Creator has created, including admiration for the Sun, the Earth, itself and so on. This admiration then prompts humans to try to know what the Universe is "What and how did it originate?" (Cosmological problem).

Astronomy still exists today because it has great usefulness and beneficial value for Mankind, including being a reminder of God's greatness, the importance of protecting the Universe, and so on. For the sustainability of knowledge, it functions as the development of knowledge whose application can improve human welfare. However, since science is neutral, Astronomy's knowledge, whether it will be useful or even cause disaster for Mankind, is basically determined by the scientists themselves. For example, If satellite coordinate data is provided deliberately to mislead other parties, it is a disaster for its users because the information is inaccurate. As a result, satellite users do not provide the information they need after consuming many resources. In a war, coordinates can be a reliable weapon to outwit and defeat the enemy because the coordinates are deliberately changed so that the enemy weapon does not hit the target. However, this behaviour can cause innocent victims. In the dimension of worship, incorrect coordinates will also cause all calculation concepts to be inaccurate and inappropriate both in terms of time (such as; prayer time), as well as the accuracy of the direction (such as; determination of the direction of the Qibla) [11].

As Muslims, studying astronomy is very important so that this knowledge is not consumed by the times and lost in the future. Astronomy has a very large role in human life, whether it concerns worship or other matters. Without astronomy, then:

1. Without astronomy, Muslims will have difficulty determining the beginning of the prayer time, especially if it is cloudy or rainy. However, by knowing the science of astronomy, one can find out the beginning of the prayer time according to the desired place.
2. Without astronomy, Muslims will have difficulty in determining the direction of the Qibla. With this knowledge, Muslims can determine the direction of the Qibla easily and accurately, either using the help of compasses, theodolites, GPS or with the shadow of the sun.
3. Without the science of astronomy, Muslims will find it difficult to perform rukyatul hilal in determining the beginning of the month of qomariyah, especially the beginning of Ramadan, Shawwal and Dzulhijah.
4. Without astronomy, Muslims cannot know when a solar or lunar eclipse occurs, if when a solar and lunar eclipse occurs, Muslims are obliged to perform eclipse prayers

If the science of astronomy in its process is related to nash (the text of the Qur'an and Hadith), then it is only a tool to help human beings to know the will of nash, according to the limits of its method. In understanding nash, this science is like other auxiliary sciences to know God, which can be used as a means for humans to be able to grasp God's will that comes from the metaphysical region (for example, to know the direction of the Qibla, the beginning and end of prayer, the beginning of the beginning of the moon and to know the occurrence of an eclipse). Although astronomy is included to discuss the metaphysical realm, it does not necessarily mean that astronomy is part of the science that is in the transcendental realm. It remains in the realm of science with its empirical and logical nature.

IV. Conclusion

The existence and position of science in Islam have been recognized directly or indirectly by the pros and cons. This was marked by the birth of the discipline of astronomy, which bridged the encounter between science and religion within the framework of fiqh and ended the rush and polemic surrounding the relationship between science and religion (Islam) so far. However, this article is not about ending or discussing the conversation. However, in certain cases, science and religion are encountered. For example, in determining the direction of the Qibla, the existence of Astronomy reencounters Science and Religion in a narrative of integration and interconnection. The direction of the Qibla is related to the rites and rituals of worship, while the establishment activities are carried out using scientific approaches and methods.

Astronomy is a science that studies the movement of celestial bodies, especially the Earth, moon and sun in their respective circulations, to be taken for their phenomena in the context of human interests. This knowledge is especially useful for Muslims in determining the times of worship, such as prayer, fasting, Qibla, etc.

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