

## Muslim Prayer Times on Astronomy and Fukaha

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Article Info	ABSTRACT
<b>Article History</b> Received 09-10-2024 Revision 08-11-2024 Accepted 14-11-2024	<p>Prayer is an obligation for every Muslim and one of the five pillars of Islam. The five daily prayers are a means of communicating with Allah throughout the day and night. Prayers are tied to certain times that cannot be carried out regularly. Still, they must follow the instructions of the Al-Qur'an and As-Sunnah. In this research, the problem to be studied is the influence of altitude and the sky's brightness on prayer times. To answer this problem, the author uses a qualitative descriptive-normative approach. In this modern era, it will not be difficult to know prayer times because there are many Islamic mass organizations, and even the government makes prayer time schedules as a reference performance of prayer. However, we need to know prayer times based on natural phenomena, so our knowledge is more comprehensive. Da- In practice, several scholars hold the same opinion regarding interpreting hadith and determining prayer times, exemplified by the Prophet. But there is. Some scholars have different views regarding the interpretation of determining some prayer time. For example, regarding the opinions of Imam Syafi'i and Imam Hanafi regarding the beginning of the time for the 'Asr prayer and the Isha prayer, there are different opinions on the interpretation of the hadith of the Prophet Muhammad.</p>
<b>Keywords:</b> Prayer Times Astronomy Fukaha	<p>This is an open-access article under the <a href="#">CC-BY-SA</a> license.</p> 

### I. Introduction

Muslim prayer times, known as Salat, hold significant religious importance as one of the Five Pillars of Islam. These prayer times are determined by the Sun's position, leading to their

varying schedules throughout the year, depending on geographical location. The five daily prayers—Fajr, Dhuhr, Asr, Maghrib, and Isha—are each linked to specific solar events, such as Dawn, midday, afternoon, sunset, and nightfall [1]. Accurate determination of these times has long been a subject of interest for Muslim scholars, particularly in astronomy (Ilmu Falak) and jurisprudence (Fiqh).

Traditionally, the determination of prayer times relied on direct observation of the Sun's position, as practised by early Muslim communities [2]. However, with the advent of modern technology, astronomical calculations have become increasingly precise, allowing for the creation of prayer time schedules that are both reliable and accessible to Muslims worldwide [3]. This technological advancement has enabled Muslims to observe their religious duties more conveniently, even in regions where the Sun's natural visibility is limited.

This study explores the development and importance of accurate prayer time determination, focusing on the historical evolution of methods used by Islamic scholars and the integration of modern astronomical tools in the contemporary Muslim world. Furthermore, the study will examine the challenges Muslims face living in extreme latitudinal locations, where traditional methods may not provide sufficient guidance for determining prayer times [4]. Understanding the science behind prayer time calculations and their religious implications offers valuable insight into the dynamic relationship between science and religion within Islam.

Prayer, or salat, is a central pillar of Islam that Allah SWT commands all Muslims to observe daily. This essential act of worship is not only a personal duty but also a collective obligation, establishing a spiritual rhythm that connects Muslims across the globe. Prayer is mandated five times a day and night—at Dawn (Fajr), midday (Dhuhr), mid-afternoon (Asr), sunset (Maghrib), and night (Isha)—each marking specific intervals that align with the position of the Sun. This ritual is designed to remind Muslims of their devotion to Allah, integrating worship into daily life and reinforcing a continuous awareness of their faith.

The concept of prayer is foundational in Islam, as it represents both a duty and an opportunity for personal growth, humility, and spiritual reflection. The precise timing of each prayer is significant, as Allah SWT has ordained distinct times for each of the five prayers. These times are not arbitrary but based on divine wisdom and order, intended to structure a Muslim's day. As such, prayer cannot be performed at any random time but must align with the stipulated timings set forth by Allah SWT.

This strict adherence to prayer times is supported by clear guidance in the Qur'an and Hadith. Numerous Quranic verses, such as in Surah Al-Isra (17:78), instruct Muslims on the timing of prayers: "Establish prayer at the decline of the Sun until the darkness of the night and [also] the Qur'an of Dawn. Indeed, the recitation of Dawn is ever witnessed." Such verses underscore the necessity of performing prayer within its prescribed time window, without which the act would be deemed invalid.

Therefore, adhering to these timings is not merely a recommendation but a fundamental aspect of Islamic worship, ensuring that prayer is aligned with the divine will. In fulfilling this obligation, Muslims strengthen their connection with Allah SWT, continuously reinforcing the pillars of their faith through disciplined worship. **Surah Al-Isra (17:78)**

أَقِمِ الصَّلَاةَ لِذُلُوكِ الشَّمْسِ إِلَى عَسْقَ الظَّلَلِ وَقُرْآنَ الْفَجْرِ إِنَّ قُرْآنَ الْفَجْرِ كَانَ مَشْهُودًا

**Means:** "Establish prayer at the decline of the Sun [from its meridian] until the darkness of the night and [also] the Qur'an of Dawn. Indeed, the recitation of Dawn is ever witnessed."

This verse refers to multiple important daily prayer times and guides when they should be observed, marking significant periods in a Muslim's day. Let's break down the key phrases:

1. **الذُّلُوكُ الشَّمْسِ" (at the decline of the sun)**

This phrase refers to when the Sun begins its descent from its zenith or highest point in the sky. This is traditionally interpreted as the time for the *Dhuhr* prayer (midday prayer), which begins when the Sun has passed its highest point.

2. **إِلَى غَسْقِ اللَّيْلِ" (until the darkness of the night)**

This part of the verse covers the timeframe from the afternoon until nightfall, indicating two other prayer times:

- *Asr* (afternoon prayer) is observed after *Dhuhr* and before sunset.
- *Maghrib* (sunset prayer) is observed right after the Sun sets, marking the beginning of nightfall.

The word *غَسْقٍ* means deepening darkness, which could also imply *Isha* (the night prayer), observed after twilight has completely ended and full darkness has set in.

3. **وَقُرْآنَ الْفَجْرِ" (and [also] the Qur'an of dawn)**. It refers to the *Fajr* prayer, observed at Dawn before the Sun rises. The term "Qur'an of dawn" emphasizes the recitation of the Qur'an during the *Fajr* prayer, highlighting its significance. The Qur'an mentions that the angels witness this prayer, making it a highly virtuous time for worship.

4. **إِنَّ قُرْآنَ الْفَجْرِ كَانَ مَشْهُودًا" (Indeed, the recitation of dawn is ever witnessed)**. This statement stresses the spiritual importance of the *Fajr* prayer, witnessed by angels and the faithful who rise early to worship. Many commentators interpret this to mean that the angels attend this prayer, adding to its blessings.

This verse from Surah Al-Isra emphasizes the importance of establishing the five daily prayers by mentioning specific times linked to solar events: the decline of the Sun (*Dhuhr*), afternoon (*Asr*), sunset (*Maghrib*), night (*Isha*), and Dawn (*Fajr*). It underscores the harmony between the cycles of nature and acts of worship, reminding believers of the importance of maintaining these daily prayers at their specified times. Additionally, it highlights the special virtue of the *Fajr* prayer, which is witnessed by angels, marking it as a particularly blessed time of day for worship and Qur'anic recitation.

In this way, the verse connects the natural phenomena of day and night to the spiritual discipline of maintaining regular prayer, demonstrating Islam's integration of celestial signs into religious practices.

### Surah Hud (11:114)

"وَأَقِمِ الصَّلَاةَ طَرَفَيِ النَّهَارِ وَزُلْفًا مِنَ اللَّيْلِ إِنَّ الْحَسَنَاتِ يُذْهِبُنَّ السَّيِّئَاتِ وَذَلِكَ ذِكْرٌ مَلِي لِلَّذِاكْرِينَ"

**Translation:** "And establish prayer at the two ends of the day and the approach of the night. Indeed, good deeds do away with misdeeds. That is a reminder for those who remember."

This verse refers to key prayer times:

- *Fajr* (Dawn) as the "first end of the day."
- *Dhuhr* or *Asr* (midday/afternoon) as part of the daytime.
- *Maghrib* (sunset) as the approach of the night.

The verse highlights the importance of performing prayers during these critical periods of the day to maintain regular worship and spiritual discipline.

### Surah Taha (20:130)

أَفَاصْبِرُ عَلَىٰ مَا يَقُولُونَ وَسَتَّنْ بِحَمْدِ رَبِّكَ قَبْلَ طُلُوعِ الشَّمْسِ وَقَبْلَ غُرُوبِهَا وَمِنْ آنَاءِ اللَّيْلِ فَسَنَّحْ وَأَطْرَافَ اللَّهَارِ لَعَلَّكَ تَرْضَىٰ " ۝

**Translation:** "So be patient over what they say and exalt [Allah] with praise of your Lord before the rising of the sun and before its setting; and [in part] of the night exalt [Him] and at the ends of the day, that you may be satisfied."

This verse outlines several prayer times:

- *Fajr* (before sunrise).
- *Maghrib* (before sunset).
- *Isha* (during part of the night).

It emphasizes praising and remembering Allah during these times, connecting daily prayers to key solar transitions (sunrise and sunset) and nighttime worship.

### Surah An-Nur (24:58)

يَا أَيُّهَا الَّذِينَ آمَنُوا لَيْسَتِنُكُمُ الَّذِينَ مَلَكُتُ أَيْمَانُكُمْ وَالَّذِينَ لَمْ يَأْلُغُوا الْحُكْمَ مِنْكُمْ ثَلَاثَ مَرَاتٍ ۝ مِنْ قَبْلِ صَلَاةِ الْفَجْرِ وَحِينَ تَضَعُونَ ثِيَابَكُمْ ۝ مِنَ الظَّهِيرَةِ وَمِنْ بَعْدِ صَلَاةِ الْعِشَاءِ ۝ ثَلَاثَ عَوْرَاتٍ لَكُمْ ۝ لَيْسَ عَلَيْكُمْ وَلَا عَلَيْهِمْ جُنَاحٌ بَعْدَهُنَّ ۝ طَوَّافُونَ عَلَيْكُمْ بَعْضُكُمْ عَلَىٰ بَعْضٍ ۝ كَذَلِكَ ۝ أَيَّتِنَّ اللَّهُ لَكُمُ الْأَيَّاتِ ۝ وَاللَّهُ عَلِيمٌ حَكِيمٌ ۝

**Translation:** "O you who have believed, let those whom your right hands possess and those who have not yet reached puberty among you ask permission [to enter] at three times: before the dawn prayer, when you put aside your clothing for rest at noon, and after the night prayer. These are three times of privacy for you. There is no blame upon you or them beyond these [periods], for they continually circulate among you — some of you, among others. Thus does Allah make clear to you the verses; and Allah is Knowing and Wise."

This verse mentions three specific times for privacy:

- *Fajr* (before dawn prayer).
- *Dhuhr* (midday, when people rest).
- *Isha* (after night prayer).

It indicates that these are private moments for rest and reflection, showing the structured rhythm that prayer times bring to a Muslim's daily life.

The term early prayer time has been very popular among the community. However, does the beginning of the prayer time exist? The Qur'an has no term for the beginning of prayer time. What exists is only the term kitaban mauquta [5]. Then where can the term "beginning of prayer time" be found? Therefore, the term "beginning of prayer time" is the result of the scholars' ijtihad when interpreting the verses of the Qur'an and hadith related to the time of prayer.

The interpretation of the beginning of the prayer time carried out by the scholars has not been able to complete the problem. The interpretation of the beginning of the prayer time is still limited to natural signs, such as the time of Dhuhr, when the Sun has slipped to the west, the time of Ashar when the shadow is as long as the Object, and so on. This can be done when the weather is sunny, but if the weather is cloudy or even rainy, these signs cannot be obtained, so even the beginning of the prayer time cannot be obtained.

Prayer is obligatory for Muslims at night when the Prophet performs isra' mi'raj, which is about one year before the hijrah. According to the scholars of the Hanafi madhhab, the obligation to pray is set at night when the Prophet Muhammad SAW performs isra', the night of Friday on the 10th of Ramadan, one and a half years after the hijrah. Ibn Hajar al-Asqalani stated that the date was 27 Rajab, one and a half years before the Prophet Muhammad (SAW) migrated to Medina [6]. Prayer contains various wisdom for life. In terms of religion, for example, prayer is a rope that connects and binds a servant with his Creator. Through prayer, a servant can glorify the greatness of Allah SWT, get closer, surrender to Him, and create a sense of peace for those who pray in going through various problems in life. Through prayer, a servant gets forgiveness of sins and achieves victory.

Another wisdom of prayer is that there is peace in the heart, and one will not feel anxious when hit by a disaster. Loneliness can negate patience, which is the main reason for happiness. Kindness will not be prevented by those who always do it. Therefore, prayer is the main religion in Islam [7]. Prayer is to give thanks for all the blessings of Allah that have been given to humans, and prayer is one of the pillars of Islam that must be upheld under the word, except in certain circumstances.

In Indonesia, the sky's brightness is dimmer daily due to pollution and global warming. The sky brightness level in an area is highly dependent on the composition of aerosol particles and cloud particles present in the atmosphere of an area. A Bandung University of Technology solar expert, Dhani Herdiwijaya conveyed this [8]. From the results of research that has been carried out in several places in Indonesia, namely Kupang, Lembang, Yogyakarta, Cimahi and Bandung, a result has been obtained on the sky brightness data that varies from region to region. Kupang ranks in the sunniest areas, followed by Yogyakarta [9] and Lembang [10], and the last ranks are Cimahi and Bandung [8].

Based on the problems mentioned, it is necessary to make a breakthrough by integrating science and religion to answer the issues related to the beginning of prayer times. It will allow later results to be obtained about the right and accurate prayer time without depending on weather conditions and denying the existing evidence, both from the Qur'an and al-Hadith.

## II. Method

This research adopts a literature study approach, exploring existing knowledge and scholarly perspectives on the subject matter. The data utilized in this study consists of a wide array of opinions, interpretations, and viewpoints from Islamic scholars gathered from various literary sources, including classical and contemporary works. These sources encompass books, articles, and journals providing insights into the subject from historical and modern contexts.

The collected data is then carefully examined and analyzed by referencing *nash-nash al-Qurān* (explicit textual evidence from the Qur'an) and *nash-nash al-Hadīs* (authentic narrations from the Hadith of the Prophet Muhammad, SAW). These primary Islamic sources serve as the foundational framework for assessing the scholars' opinions, allowing for a thorough analysis that aligns with the core principles of Islamic teachings. The method ensures that the interpretations harmonize with Islamic jurisprudence (Fiqh) and theology, thus providing a balanced understanding of the subject.

This study aims to critically engage with the diverse scholarly interpretations, assessing their relevance and application in contemporary contexts. The research highlights traditional views and explores how these teachings can be applied in modern-day scenarios. Integrating classical scholarship and scriptural analysis ensures a nuanced and well-rounded approach to the topic under investigation.

## III. Results and Discussion

### Method of Determining Prayer Time

The determination of prayer times in Islam is closely related to astronomy, as it relies on the positions of celestial bodies such as the Sun, moon, and Earth. Understanding how these heavenly bodies move and interact is essential for accurately determining the precise moments for Salat, the five daily prayers. In astronomy, celestial bodies like the Earth, moon, Sun, and stars serve as study material objects, as they are the entities under investigation [11]. The formal Object of astronomy, however, refers to the trajectories or orbits of these celestial bodies. In the context of determining prayer times, the formal Object is of particular importance, as it involves tracking the Sun's movement about the Earth's horizon – key to identifying times like Fajr (Dawn), Dhuhr (midday), Asr (afternoon), Maghrib (sunset), and Isha (night).

The formal object is particularly important in determining prayer times because it involves tracking the Sun's movement concerning the Earth's horizon. The Sun's apparent movement across the sky is a key determinant in identifying the five daily prayer times prescribed in Islam: Fajr (Dawn), Dhuhr (midday), Asr (afternoon), Maghrib (sunset), and Isha (night). Each prayer time is linked to specific sun positions, which makes the formal object of astronomy – the study of the trajectories and orbits of celestial bodies – essential for accurate calculation. Explanation of Prayer Times Based on Sun Movements:

#### 1. Fajr (Dawn)

The Fajr prayer begins with the first light of Dawn, known as *Subh Sadiq* (true Dawn), which occurs when the Sun is approximately 18 degrees below the horizon. At this point, a

faint light appears on the eastern horizon before sunrise. This marks the beginning of the day in Islamic tradition, symbolizing spiritual awakening and purity as the day's first prayer. Tracking the Sun's position about the horizon is crucial to ensure the correct time for Fajr because it must be performed before the Sun rises.

## 2. Dhuhra (Midday)

The Dhuhra prayer is observed when the Sun declines after reaching its zenith, or highest point in the sky. This moment, known as Zawal, marks the midpoint of the day. As the Sun crosses the zenith and starts its descent, shadows start to lengthen again, signalling the entry of Dhuhra time. The position of the Sun in the sky, particularly its zenith and post-zenith decline, is essential for determining when this midday prayer should be performed.

## 3. Asr (Afternoon)

Asr prayer begins in the late afternoon when the shadow of an object is equal to its length, or in some Islamic jurisprudential interpretations, twice its length. It ends just before sunset. The determination of Asr thus relies on measuring the length of shadows as the Sun continues to descend. This prayer marks the transition from the day toward the evening, and its timing is directly linked to the changing angles of sunlight and the shadows they cast.

## 4. Maghrib (Sunset)

Maghrib prayer is performed immediately after the Sun has completely set when it disappears below the horizon. This is when the day officially ends, and the night begins. The sunset is a critical time marker, as Maghrib must be prayed before the twilight fades. The exact timing depends on observing the Sun's disappearance, which is one of the easiest prayer times to confirm visually due to the clear horizon reference.

## 5. Isha (Night)

The time for Isha begins when the red twilight after sunset has completely vanished, and the sky is fully dark. This marks the end of twilight and the onset of true night. The Isha prayer can be performed any time during the night until Fajr, but it is preferred that it be done earlier. Isha's timing is based on observing the disappearance of twilight, which relies on astronomical knowledge of the Sun's position below the horizon.

The formal object in this context refers to the paths, positions, and movements of the Sun and other celestial bodies, which must be observed and calculated to determine precise prayer times. Islamic scholars have historically relied on astronomical principles (Ilm al-Falak) to develop methods for calculating these times accurately. Before modern timekeeping, Muslims used the position of the Sun and shadows as natural clocks to determine when each prayer was due. Today, astronomical calculations are crucial in determining prayer schedules, especially in regions where weather conditions or geographic locations (e.g., extreme latitudes) make direct observation difficult [12].

For example, Muslim astronomers calculate solar declination and use it to generate tables or algorithms for precise prayer times throughout the year. These calculations also account for factors like the equation of time, atmospheric refraction, and the observer's geographic location, ensuring that prayer times are accurate and consistent across different regions [5].

From this perspective, the determination of prayer times integrates various astronomical principles, particularly those related to the Earth's rotation and relationship with the Sun. Islamic scholars and astronomers utilize tools and methods derived from these scientific principles to create accurate schedules for daily prayers. For example, the Fajr prayer is based

on the first appearance of light at Dawn, scientifically determined by the Sun's position 18 degrees below the horizon. Similarly, Maghrib corresponds to the moment of sunset, when the Sun crosses the horizon. These calculations, grounded in astronomy, have been refined over centuries and remain crucial for Muslim communities worldwide.

### **Data in Prayer Time Calculation**

In the calculation of prayer time, knowing the data used in solving the formula is very important because it is the heart of the calculation of prayer time, in the sense that the correctness of the results of the calculation of prayer time is very dependent on the accuracy of the data used. Therefore, the researcher feels discussing the data needed to complete the prayer time determination formula is important.

#### **a. Latitude and Longitude of the place,**

In every calculation of prayer time, the latitude and Longitude of the place are very important because the results of the calculation will not correspond to an area if the latitude and Longitude do not match the latitude of the place, which is usually symbolized by  $f_i$  ( $\phi$ ) is the distance of the imaginary line measured from the equator to a place to the pole. If the area is north of the equator, it is called North Latitude (LU) with a positive value (+), while the area in the southern hemisphere of the equator is called South Latitude (LS) with a negative value (-). 18 For example, Lhokseumawe  $+05^{\circ} 10' 48.36''$  and the city of Semarang  $-07^{\circ} 00'$ . From these two areas, it can be confirmed that the city of Lhokseumawe is in the northern hemisphere of the equator with a distance of 5 degrees 10 minutes 48.36 seconds, and the city of Semarang is in the southern hemisphere of the equator with a value of 7 degrees 00 minutes. The determination of the equator as latitude 0 is not politicized by any party, where this determination occurs in line with the development of science about the Earth owned by humans.

#### **b. Sun Angle**

The angle of time of the Sun is the arc distance along the Sun's daily circle calculated from the upper culmination point to the Sun's presence. 20 The value of the Sun's time angle is 0 degrees when the Sun is at the upper culmination, or when the Sun is right on the celestial meridians, and 180 degrees when the Sun is at the lower culmination point. The value of the Sun's time angle is marked positively (+) when the Sun is in the Western Hemisphere and has a negative value (-) when the Sun is in the East. The Sun's time angle is formed at a single angle of 90 degrees at the North Pole.

#### **c. Solar Declination**

It is the value of the distance of a celestial body from the celestial equator, which is calculated based on the length of the time circle in degrees, minutes, and arc seconds; the declination value is usually symbolized by delta ( $\delta$ ). With the value of the Sun's declination known, the Sun's position relative to the Earth can also be determined. This is very useful in finding out how far the shadow reached by sunlight on the Earth's surface is the main data in determining prayer times and knowing the time benchmark in calculating prayer time.

### **Prayer Time According to Fukaha**

### 1. Zuhur Time

According to Shafi'iyyah scholars, the time of Zuhur begins when the Sun slips or is called "zawal asy-syams". Imam Shafi'I said that the beginning of Zuhur has arrived if one knows with certainty the arrival of the time of Zawal in the middle of the orbit of the sky (wast al-falak). According to Shafi'iyyah, the time of Zuhur consists of three times: 1. The main time (waqt al-fadilah), 2. Time of choice (waqt al-ikhtiyar), 3. Time of 'uzr (waqt al-'uzr). The main time of the period is at the beginning of time. The selected period starts after prime time and lasts until the end. And the time of 'uzr is the time of Asr to the person who closes' Zuhu and Asar because he is on his way (traveller) or because it is raining.

### 2. Asar Time

According to Shafi'iyyah, the time of Asar arrives when the shadow of an object is the same length. However, according to Abu Hanifah, the beginning of the Asar time arrives when the shadow of an object is twice the size of that object. This difference is due to the phenomenon that is used as a basis for two possible Asar periods; according to Imam Al-Ghazali (d.505/1111) there are four: 1. The main time (waqt al-fadilah) is at the beginning of the time, 2. The time of choice (waqt al-ikhtiyar) is the beginning of the time until the length of the shadow of an object is doubled, as stated by Gabriel, 3. Relative time (waqt al-jawaz) is after the chosen time until the Sun turns yellow (al-isfirar), 4. The forbidden time (al-karahiyyah) is when the Sun turns yellow.

### 3. Maghrib Time

According to Shafi'iyyah, the time Maghrib arrives at sunset is based on the hadith of Jibril's imamah and other narrations. During this Maghrib prayer, there are two opinions of Imam Shafi'I (qadim vow and jadid vow). In the qadim vow, Imam Shafi'I said that the Maghrib time continued until the red cloud disappeared (shafaq). Meanwhile, in the al-al-athula, Imam Shafi'i said the Maghrib prayer time is only short since the Sun sets.

### 4. The Time of Isha'

Scholars agree that the beginning of the time of Isha' is when the "ash-shafaq" (cloud) disappears. Meanwhile, about the end of the time of Isha', there are two popular opinions (famous) among scholars; the first opinion states that the time of Isha' ends until a third of the night, and the second opinion states that it is until midnight.

### 5. Dawn Time

The time of Fajr prayer is from the Dawn of sadik (true Dawn) to the sunrise of the Sun. Scholars agree that Dawn begins when the second Dawn (al-fajr as-sany) is called al-fajr as-sadiq (the true Dawn) [13]. While the time of Dawn ends at sunrise.

## Astronomical Data of Prayer Times

The most important astronomical data in determining the prayer schedule is the Sun's position in the horizon coordinates, especially the altitude, zenith distance, Dawn, sunrise, culmination, sunset and late dusk. In this case, astronomy plays a role in interpreting the phenomena mentioned in the Qur'an and Hadith and is applied as a formula for prayer times. In general, the data needed in the calculation (hisab) of the prayer time are latitude of the place, Longitude of the place, correction of regional time (KWD), horizon lowness, semi-diameter of the Sun, solar refraction, declination of the Sun, time equalizer, and ihtiyat.

The method of calculating the prayer time influenced by the sky's brilliance is the prayer time set by the shari'i based on the refraction of the Sun's light. This can be ascertained in the calculation of the time of the Isha and Fajr prayers because these two prayers are determined by the Qur'an and hadith based on the bias of dawn light and dusk light [10]. So far, the twilight level, the benchmark for the beginning of the Isha prayer time, is set when the Sun is at -18 degrees below the western horizon. In comparison, the level of Dawn light, which is the benchmark for the beginning of the Fajr prayer time, has been determined when the Sun occupies a position of -20 degrees below the eastern horizon [12].

#### IV. Conclusion

The formal object—tracking the Sun's trajectory relative to the Earth's horizon—is foundational in determining Islamic prayer times. Each prayer time corresponds to a specific solar event, from Dawn to nightfall, which has both religious significance and practical implications in the daily lives of Muslims. The reliance on the Sun's movements underscores the deep connection between Islamic practices and the natural world and the importance of astronomical knowledge in fulfilling religious obligations. This verse from Surah Al-Isra emphasizes the importance of establishing the five daily prayers by mentioning specific times linked to solar events: the decline of the Sun (Dhuhr), afternoon (Asr), sunset (Maghrib), night (Isha), and Dawn (Fajr). It underscores the harmony between the cycles of nature and acts of worship, reminding believers of the importance of maintaining these daily prayers at their specified times. Additionally, it highlights the special virtue of the Fajr prayer, which is witnessed by angels, marking it as a particularly blessed time of day for worship and Qur'anic recitation.

In this way, the verse connects the natural phenomena of day and night to the spiritual discipline of maintaining regular prayer, demonstrating Islam's integration of celestial signs into religious practices.

#### References

- [1] S. Azhari, "AWAL WAKTU SHALAT SUBUH DI DUNIA ISLAM," *Al-Mazaahib J. Perbandingan Huk.*, vol. 5, no. 2, 2022, doi: 10.14421/al-mazaahib.v5i2.2858.
- [2] T. Amri, "Waktu Shalat Perspektif Syar'i," *Asy-Syari'ah*, vol. 17, no. 1, 2014, doi: 10.15575/as.v17i1.640.
- [3] A. H. Sultan, "Sun Apparent Motion and Salat Times," *Journal Article*. 2004.
- [4] R. H. Hasan, "ASTRONOMICAL INTERPRETATION OF EARLY PRAYER TIMES (Study of Differences in Determination of Early Prayer Times From The Text and Astronomical Perspective)," *Al-Hilal J. Islam. Astron.*, vol. 2, no. 2, 2021, doi: 10.21580/al-hilal.2020.2.2.6640.
- [5] D. Rahmadani, "Telaah Rumus Perhitungan Waktu Salat : Tinjauan Parameter dan Algoritma," *Al-Marshad J. Astron. Islam dan Ilmu-Ilmu Berkaitan*, vol. 4, no. 2, pp. 172-186, 2018, doi: 10.30596/jam.v4i2.2442.
- [6] Muhajir, "Awal waktu shalat telaah fiqh dan sains," *J. Stud. Islam*, vol. 6, 2019.
- [7] Kustiana Arisanti, "Ilmu Falak dalam Prespektif Sejarah," *Bahtsuna*, vol. 3, no. 285,

2021.

- [8] D. Herdiwijaya, "On the beginning of the morning twilight based on sky brightness measurements," in *Journal of Physics: Conference Series*, 2020, vol. 1523, no. 1. doi: 10.1088/1742-6596/1523/1/012007.
- [9] D. Herdiwijaya, "Sky brightness and twilight measurements at Jogyakarta city, Indonesia," *J. Phys. Conf. Ser.*, vol. 771, pp. 1-5, 2016, doi: 10.1088/1742-6596/771/1/012033.
- [10] D. Herdiwijaya *et al.*, "Measurements of sky brightness at Bosscha Observatory, Indonesia," *Heliyon*, vol. 6, no. 8, 2020, doi: 10.1016/j.heliyon.2020.e04635.
- [11] H. Putraga, *Astronomi Dasar*. Medan: CV. Prima Utama, 2016.
- [12] A. Izzuddin, *Ilmu Falak Praktis*, 2nd ed. Semarang: Pustaka Rizki Putra, 2012.
- [13] H. Putraga, A. J. Rakhmadi, M. Hidayat, and M. D. Firdaus, "Penentuan Waktu Malam Menggunakan Sky Quality Meter Dengan Pendekatan Moving Average," *ORBITA J. Kajian, Inov. dan Apl. Pendidik. Fis.*, vol. 8, no. 2, p. 313, 2022, doi: 10.31764/orbita.v8i2.11363.
- [14] M. Khazin, *Ilmu Falak dalam Teori dan Praktik: Perhitungan Arah Kiblat*. Jakarta: Buana Pustaka, 2004.
- [15] Direktorat Jenderal Bimbingan Masyarakat Islam, *Buku Saku Hisab Rukyat*. Tangerang: Kementerian Agama RI, 2013.