CHAPTER IV

THE STUDY OF ISLAMIC ASTRONOMY'S MODEL APPLIED BY CONCENTRATION OF ISLAMIC ASTRONOMY OF FAMILY LAW MAJOR OF SHARIAH FACULTY OF WALISONGO STATE INSTITUTE FOR ISLAMIC STUDIES

A. The Epistemology of Study of Islamic Astronomy Applied by Concentration of Islamic Astronomy of Family Law Major of Shariah Faculty of Walisongo State Institute for Islamic Studies

Knowledge is the realm of mental wealth, which enriches our lives either directly or indirectly. The function of knowledge is to answer the certain type of questions asked. Therefore, to optimize our knowledge, we must know what answer might be given by the certain knowledge **is**. However, we expect the right answer, not just an arbitrary answer. The next question, which will appear, is that how do we build the true knowledge? The answer is by epistemology.[1]

Epistemology, derived from the Greek words *episteme* (knowledge) and *logy* (theory), is the theory or philosophy of knowledge.[2] It addresses the question "how is knowledge acquired?" Therefore, talking about the epistemology of the study of Islamic Astronomy applied by Concentration of Islamic Astronomy (KIF) of Family Law Major of Shariah Faculty of Walisongo State Institute for Islamic Studies (IAIN Walisongo) means

[1] Jujun S. Suriasumantri, *Filsafat Ilmu Sebuah Pengantar Populer,* Jakarta: Sinar Agape Press, Ed. II, 1985, p. 104 and 105

[2] Juyaha S. Praja, *Aliran-Aliran Filsafat dan Etika,* Bandung: Yayasan Piara, 1997, p. 16

figuring out how IAIN Walisongo acquires the theory of knowledge to design the study of Islamic Astronomy at Concentration of Islamic Astronomy (KIF).

As discussed in the previous chapter, the initial process of KIF's curriculum designing, officials of Shariah Faculty of IAIN Walisongo had obsession to restore the glory of Islamic Astronomy as its glory in the medieval ages.[3] That time, experts of Islamic Astronomy were people who studied *'Ilm al-Falak* as an astronomical science. In fact, they found several theories of astronomy, which are very useful for the development of Astronomy. They wanted to design this program freely. Therefore, this program is orientated to combine Islamic Astronomy *('Ilm al-Falak)* in the jurisprudence and pure astronomy perspective.[4]

Based on the explanation above, this discussion will analyze how IAIN Walisongo acquires the theory of knowledge about the design combining Islamic Astronomy *('Ilm al-Falak)* in the jurisprudence and pure astronomy perspective.

Astronomy is an observational science that involves investigating the workings of the universe. It encompasses cosmological observations on the scale of the entire universe, observations of the planets in our local Solar System, and everything in the intervening range.[5] Astronomy was one of the

[3] An interview with Musahadi who was Dean Assistant I of Sharia Faculty of Walisongo State Institute for Islamic Studies, period 2006 – 2010 on April 28, 2012.

[4] Ibid

[5] Andrew J. Norton (Ed), *Observing the Universe*, The Open University: Cambridge, 2004, p. 1. Read also Carlos Jaschek, *Data in Astronomy*, University Press: Cambridge, Ed. I, 1989, p. 1

oldest, most developed, and most esteemed exact science of antiquity. Initial interest in astronomy had its roots in astrology and the fascination with the powers and mysteries of the heavens. Practical considerations, such as finding one's direction during night travel or understanding the correlation between the seasons of the year and the positions of the planets, provided additional incentives for the study of astronomy. Astronomy has a central role in forming a scientific view of the world. "a scientific view of the world" means a model of the universe based on observations. Observations are always the ultimate test of a model: if the model does not fit the observations, it has to be changed, and this process must not be limited by any philosophical, political, or religious conceptions or beliefs.[6]

As mentioned in classical literatures, *'Ilm al-Falak* is called *'Ilm al-Haiah, 'Ilm al-Ḥisāb, 'Ilm al-Rasd, 'Ilm al-Mīqāt* and Astronomy.[7] It is called Astronomy because it is the science studying the path of celestial objects, such as Sun, Moon, stars, and others in order to determine the celestial objects' position.[8] This science is developed based on observations. The observation data is the primary data.

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[6] Hannu Karttunen (Ed), dkk, *Fundamental Astronomy*, Springer: New York, Ed. IV, 2003, p. 4

[7] Ahmad Izzuddin, *Ilmu Falak Praktis (Metode Hisab Rukyat Praktis dan Solusi Permasalahannya)*, Semarang: Kamala Grafika, 2006, p. 1

[8] Susiknan Azhari, *Ensiklopedi Hisab Rukyat*, Yogyakarta: Pustaka Pelajar, Ed. I, 2005, p. 55

Based on the explanation above, it appears that as an observational science, both Astronomy and *Ilm' al-Falak* are the sciences developing based on the continuous observation. To make easier in understanding it, it is needed an example.

Arabs have the knowledge about Astronomy before the advent of Islam. They had an intimate knowledge of Sun, Moon, and the changing night sky throughout the year, as well as the metrological phenomena associated with the season.[9] Then, in the Muhammad PBUH's era, Astronomy has not been developed yet. Arab's knowledge about the Astronomy was still limited as a guide in the desert at night. They did not have the sophisticated knowledge about it.[10]

Since Sun, Moon, stars, and winds are specifically mentioned in Holy Quran, there was considerable interest in the heavens, both in the early Islamic community of the Hejaz.[11] During the millennium, which followed the introduction of a far more sophisticated mathematical Astronomy from Indian, Sasanian and Hellenistic sources to the vigorous cultural scene of Abbasid Iraq in the eighth and ninth centuries, Muslim scholars made substantial contributions to all aspect of Astronomy, spherical astronomy, timekeeping, instruments, and astrology.[12]

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[9] David A. King, *Islamic Mathematical Astronomy*, London: Variorum Reprints, 1986, p. 1

[10] Tim Majelis Tarjih dan Tajdid PP Muhammadiyah, *Pedoman Hisab Muhammadiyah*, Yogyakarta: Majelis Tarjih dan Tajdid PP Muhammadiyah, 2009, p. 14

[11] David A. King, *Islamic Mathematical Astronomy*, Loc. Cit.

[12] Ibid

The origins of Islamic Astronomy are varied, deriving from early Indian, Persian, and Greek treatises and observations.[13] Muslim astronomers owed an enormous debt to the work of the Greek astronomer Ptolomy who had written extensively about the motion of the moon and the planets.[14] Muslims translated Ptolomy's works into Arabic during the 800s and 900s and then refined and advanced his idea. Al-Battani, for example, predicted eclipses of Sun, and Abdurrahman al-Sufi produced the accurate chart of the constellations.[15]

Muslims astronomers conducted their studies from observatories, one of which they conducted at Maragha. Historians consider it is the first observatory.[16] The astronomer Nasiruddin al-Tusi worked there during the 1200s, perhaps influencing the observations and writing of Nicolas Copernicus, the Polish astronomer who discovered, in the 1400s, that Sun was the center of the solar system.[17]

Based on the explanation above, it appears that as an observational science, both Astronomy and *Ilm' al-Falak* are the sciences developing based on the continuous observation. Then, the observation results will be able to correct the previous astronomical theories and give birth to the new astronomical theories and astronomical data.

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[13] John L. Esposito (Ed), *The Islamic World Past and Present*, Oxford University Press: New York, Volume 1, 2004, p. 55

[14] Ibid, p. 56

[15] Ibid

[16] Ibid

[17] Ibid

In the observation activity, there are two activities. The first activity is learning some astronomical theories and the second activity is applicating these theories to calculate the astronomical data of the celestial objects. Then, observation will correct the accuracy of the calculation result. If the calculation result is not correct, the theory needs to be changed. Both of them have a mutual symbiosis. The first activity is called *'Ilm al-Falak al-'Ilmī (Theoretical Astronomy)* and the second activity is called *'Ilm al-Falak al-'Amalī (Practical Astronomy or Observational Astronomy).*

'Ilm al-Falak al-'Amalī is a science to know the positions of celestial objects by calculation and observation. Many mathematical sciences were originally developed to facilitate the astronomical research, such as observation.[18] It means that to get the best accurate result, observation has to be supported the natural sciences, such Mathematics, Physics etc. In this activity, an astronomer has to understand these natural sciences before he calculates and observes a celestial object.

The natural science refers to *'Ilm al-Falak al-'Ilmī.* Its scope comprises Cosmogony (theory and concept of celestial objects in the origin and development aspects),[19] Cosmology (the form and the set aspects of celestial objects),[20] Cosmography (the circulation description of celestial objects),[21] Astrometry (the size and the distance of celestial objects),[22]

[18] John L. Esposito (Ed), *The Oxford History of Islam,* Oxford University Press: New York, 1999, p. 161

[19] Muhyiddin Khazin, *Kamus Ilmu Falak,* Yogyakarta: Buana Pustaka, Ed. I, 2005, p. 16

[20] Ibid

[21] Ibid

Astromechanics (the motion and the gravity of celestial objects),[23] and Astrophysics (the characteristic and element of celestial objects based on Physics).[24]

Based on explanation above, as an observational science, Islamic Astronomy is developed based on observations. The observation data, which can correct the Ephimeris' data, is the primary data. To result the best accurate, it has to be supported the natural science, such Mathematics, Physics etc. It means that Islamic Astronomy is developed based on epistemology of observational science.

In addition, Islamic Astronomy is also related to the Islamic worship, such as *ṣalāt, ḥajji*, fasting, etc. In Holly Quran, Allah commands Muslims to perform Islamic worships in the certain times. The natural phenomena are as indication of these times. For example, In Holy Quran, Chapter. al-Isra' verse 78, Allah commands Muslims to pray when Sun begins in the top culmination point until night. Another axample is the command of *ḥajji* . In Holy Quran, Chapter al-Baqarah verse 189, Allah makes new moon as the indication of the obligation to do *ḥajji*. The other examples are mentioned below:

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[22] Astrometry is the basis for determination of the coordinate system of Astronomy, both path and motion of the celestial objects. Ibid, p. 9

[23] Ibid

[24] Astrophysics is the basis for the emission study received from celestial objects, Ibid, p. 8

1. **Determination of the Sacred Direction *(Qibla)***

   The purpose of *'Ilm al-Falak* discussing about the determination of the sacred direction *(Qibla)* is to calculate how many degrees the angle, which is flanked beween meridian passing through a place whose sacred direction is counted with the great circle passing through that place and Kabah *(Ka'bah).* In addition, it is to calculate when Sun goes path across Kabah.

2. **Determination of the Prayer Times**

   The purpose of *'Ilm al-Falak* discussing about the determination of the prayer times is to calculate the grace period between the times when Sun is in the top culmination point with the time when Sun is in the position indicating the beginning of the prayer times. One of methods to know this indication is Sun's shadow.

3. **Determination of the Biginning of the Months of Hijri Calender**

   The purpose of *'Ilm al-Falak* discussing about the determination of the beginning of the months of Hijri Calender is to calculate the time when Sun and Moon are in the same astronomical longitude (*Ijtimā'* or Conjunction) and to calculate where the position of new moon (*Hilāl*) when Sun sets on the day of that conjunction.

4. Determination of Eclipses

The purpose of *'Ilm al-Falak* discussing about the determination of eclipses is to calculate when Moon covers and outs of Sun in the solar eclipse and when Moon begins to enter and gets out from umbra shadow of Earth in the lunar eclipse.

It means that Islamic Astronomy is related to the Islamic law because it learns the position of the celestial objects including Sun's position and Moon's position. Therefore, it gives the epistemology that Islamic Astronomy is also related to the Islamic law.

Epistemology applied by Walisongo State Institute for Islamic Astronomy to organize the study of Islamic Astronomy is combinative epistemology, which combines the epistemology of astronomical science and Islamic law epistemology. As an observational science, Islamic Astronomy is a science to know the positions of celestial objects by calculation and observation. Therefore, the observation data is the primary data that can annul the Ephimeris data. Many mathematical sciences are originally developed to facilitate the astronomical research, such as observation. In addition, Islamic Astronomy also related to the Islamic worship. In Holly Quran, Allah commands Muslims to perform Islamic worships in the certain times. The natural phenomena are as indication of these times. Therefore, Islamic astronomy is part of Islamic law.

B. The Praxis of Study of Islamic Astronomy Applied by Concentration of Islamic Astronomy of Family Law Major of Shariah Faculty of Walisongo State Institute for Islamic Studies

Praxis is rooted in the word "Praxeis," a Greek term whose literal meaning is action.[25] Praxis has implied the integration of theory and practice. Praxis is used to appraise professional learning in practice. It stresses the development of informed and disciplined understandings of personal rituals of practice turned to specific concrete cases and complex or ambiguous situations. In the process, they call on intuitive and simultaneous thinking, connecting between environment, persons (with their beliefs ideologies), and actions.[26] Therefore, discussing about how the praxis of the study of Islamic Astronomy at Concentration of Islamic Astronomy is, means discussing about how epistemology is implemented.

On the previous discussion, writer has explained that Islamic Astronomy Concentration is oriented to combine Islamic astronomy *('Ilmu al-Falak)* in the perspective of both jurisprudence and pure science. The implementation of that orientation design is the curriculum framework that covers both the substansif courses and supporting courses, such as Mathematics, Methodology of Science, Astronomy, Computing, and Instrumentations. Look at the table mentioned below:[27]

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[25] Lily Orland Barak, *Learning to Mentor-as-Praxis: Foundation for a Curriculum in Teacher Education*, New York: Business Media, 2010, P. 24

[26] Ibid, p. 23

[27] Paper *"Pengembangan Kurikulum Ilmu Falak Di PTAI (Belajar Pada Prodi AS Konsentrasi Ilmu Falak IAIN Walisongo)"* presented by Ahmad Izzuddin in the national seminar of development of Islamic astronomy and the meeting of lecturers of Islamic astronomy all over

KINDS OF COURSES		COURSES	SKS
Supporting Courses	Mathematics	Matematika I	
		Matematika II	2
	Methodology of Science	Metodologi Studi Sains	2
	Astronomy	Astronomi I (Tata Surya)	2
		Astronomi II (Hukum-Hukum Ilmu Orbit)	2
		Astronomi Bola I (Dasar-Dasar)	2
		Astronomi Bola II (Aplikasi Praktis)	2
	Computing	Algoritma dan Dasar Pemrograman Hisab I	2
		Algoritma dan Dasar Pemrograman Hisab II	2
	Instrumentations	Perangkat Rukyat I (Rubu al-Mujayyab, Sundial)	2
		Perangkat Rukyat II (Sistem Optik dan Teleskop)	2
		Laboratorium Falak I (Astrofotografi, Arah Kiblat)	4
		Laboratorium Falak II (Praktek Rukyatul Hilal)	4
Substantive Courses		Pengantar Ilmu Falak	2
		Kajian Kitab Falak I	2
		Kajian Kitab Falak II	2
		Hisab Gerhana Bulan	4
		Hisab Gerhana Matahari	2
		Fiqh Hisab Rukyah I	2
		Fiqh Hisab Rukyah II	2
		Sistem Penanggalan	2
		Hisab Awal Bulan Qamariyah Kontemporer	2
Total			48

Table 4.1: Concentration of Islamic Astronomy's Courses

Indonesia held by Shariah Faculty of Walisongo State Institute for Islamic Studies on Tuesday to Wednesday, 2 to 3 of December 2009 in Walisongo State Institute for Islamic Studies, p. 7-8.

Eksplanation of the supporting courses:

1. Mathematics included the basic materials, especially trigonometry
2. Methodology of Science included the understanding basic motion and interaction between two objects
3. Astronomy included the historical development of Astronomy, solar system, basic concepts of Astronomy about times and positions, and celestial coordinate system
4. Computing included the programming algorithm
5. Instrumentations included the basic of both optical and non-optical devices in astronomical observations.

Phenomenon in above reveals that the structure of the curriculum is not enough to balance between the *'Ilmu al-Falak* in the jurisprudence perspective and *'Ilmu al-Falak* in the science perspective. To balance these two perspectives is needed not only the curriculum structure but also some means of it (curriculum structure).

Therefore, after the annual evaluation meeting had been held, Sharia Faculty reorganized the teaching staff structure in the second generation. Since then, the lecturers who are involved in teaching and learning activities are from not only the internal lecturers but also the external lecturers of Sharia Faculty of IAIN Walisongo. Then, Sharia Faculty cooperates with the several parties, such as Tarbiyah Faculty of Walisongo State Institute for Islamic Studies in Mathematics, Geodetic Engineering Department of Engineering Faculty of Diponegoro University in Astronomy, Experts of

Computing in programming algorithm, and Bandung Institute of Technology (ITB) and Bosscha Observatory in Instrumentations. This proves that Sharia Faculty of IAIN Walisongo has both high consistency and high commitment to design Islamic Astronomy Concentration as epistemology of Islamic Astronomy.

Writer arugue that Sharia Faculty has the high commitment to design Concentration of Islamic Astronomy as the combinative epistemology. Some discussion which have been held by Sharia Faculty and the Concentration of Islamic Astronomy's scientific works have also proved both high consistency and high commitment of Sharia Faculty to design Concentration of Islamic Astronomy as epistemology of Islamic Astronomy. Both of them discuss about the subjects of *'Ilmu al-Falak* (Qibla direction, prayer times, *Qamariyah* months, and eclipses) from not only jurisprudence perspective but also science perspective.

1. The Sacred Direction

In the term of the Qibla direction, Sharia Faculty of Walisongo State Institute for Islamic Studies has tried to analyze some measuring methods of Qibla direction of both previous and current scholars by comparing them to the methods, which are developing at this time.

As National Seminar, *"Menggugat Fatwa MUI No.3 Tahun 2010 Tentang Arah Kiblat"* held by Concentration of Islamic Astronomy (KIF) and Community of Santri Scholar of Ministry of Religious Affairs (CSS MoRA) of IAIN Walisongo on Mey 27, 2010 at First Auditorium of First

Campus of IAIN Walisongo.[28] It tried to analyze The Indonesian Council of Ulama (MUI)'s Instruction *(fatwa)* No.3 Year 2010 about Indonesia's Qibla direction.[29] This *fatwa* refers to a problem in jurisprudence related to the procedures of facing the Qibla whether facing the building of Kabah or facing the direction of Kabah. This *fatwa* is based on the scholars of jurisprudence's opinions, which explain that for people who are not be able to see Kabah, they just need to face the direction of Kabah. Therefore, in the context of Indonesia, they just need to face West without to think about the building of Kabah.[30]

The Indonesian Council of Ulama (MUI)'s instruction *(fatwa)* No. 3 year 2010 just reviews on the jurisprudence perspective without reviews on the scientific perspective.[31] In this era, experts of astronomy can accurately determine the direction of Qibla by science. They use the reason why science is not used to determine the Qibla direction. That national seminar has contributed to the revision of this *fatwa.* Therefore, on July 1, 2010, The Indonesian Council of Ulama (MUI) issued the Instruction *(Fatwa)* of MUI No. 5 Year 2010 as a revision to the

[28] CSS MoRA IAIN Walisongo is Community of Santri Scholars of Ministry of Religious Affairs in Walisongo State Institute for Islamic Studies.

[29] This instruction *(fatwa)* consists of three instructions. To know it, you can look at The Indonesian Council of Ulama (MUI)'s instruction *(fatwa)* No. 3 year 2010 about Indonesia's Qibla direction.

[30] Aulia Syamsul Reza, Zaenuddin Nurjaman, "Arah Kiblat Biarkan Masyarakat Memilih", in *Zenith*, Ed. IV July 2010, p. 8

[31] Siti Tatmaiunil Qulub, "Studi Analisis Fatma MUI No. 3 Tahun 2010 Tentang Kiblat (Kiblat Umat Islam Indonesia Menghadap Ke Arah Barat)", Undergraduate Thesis, Semarang, IAIN Walisongo Semarang, 2010, p. 142

Instruction of MUI No. 3 Year 2010.[32] This *fatwa* is the instruction based on both jurisprudence and modern science.[33]

Another seminar is National Seminar, *"Arah Kiblat: Antara Mitos dan Sains"* which was held by Sharia Faculty of IAIN Walisongo on April 30, 2012. This seminar is a follow-up to the re-measurement problem of the Great Mosque of Demak *(Masjid Agung Demak)* has done by experts of *'Ilmu al-Falak* on 15 to 16 of July 2010.[34] This measurement used some determining the Qibla direction methods, such as determining True North by Sun's shadow method, determining True North by theodolite and GPS method, and *rashdu al-qiblat* at 16.27 pm on that day. Based on three methods that the Qibla direction deviation of Great Mosque of Demak is 2° 1' to the South.[35]

At first, Demak's scholars accepted that re-measurement because they only need to change the Great Mosque of Demak's row prayer *(Shaf Shalat)*.[36] However, in January 2012, they changed the Great Mosque of Demak's Qibla direction as before.[37] They believe that the Walisongo's relics do not need to be changed.[38] This phenomenon indicates a conflict

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[32] To know it, read The Indonesian Council of Ulama (MUI)'s instruction *(fatwa)* No. 5 year 2010 about Indonesia's Qibla direction.

[33] According to Google Earth is that the position of Indonesia is not in the East of Saudi Arabia but in the East slanting to the South approximately 24^0.

[34] http://suaramerdeka.com/v1/index.php/read/cetak/2010/08/04/119252/Kalijaga-dan-Kiblat-Masjid-Demak

[35] It means that the Qibla direction of the Great Mosque of Demak's position, which is on latitude 6^0 53' 40.3'' LS, and on longitude 110^0 38' 15.3'' LE, is 294^0 25' 39.4". Ibid

[36] Ibid

[37] Ibid

[38] It is based on the selfexpression of Nurul Huda who is the guardian of Roudlotul Tholibin Islamic Boarding School. http://news.okezone.com/read/2012/01/06/340/553106/arah-kiblat-masjid-agung-demak-diubah.

between scholars' faith to the Qibla direction that has been measured by Walisongo with the measurement result of science and modern technology. That National Seminar tried to solve that conflict by finding the best solution. The conclution of this seminar is experts of *'Ilmu al-Falak* will measure the Qibla direction when they are requested for it. They are oriented to the Qibla direction of mosques, which will be built. They are not oriented to the Qibla direction of mosques, which have existed. However, when they are requested by public to do that, they will do it well.[39]

2. Prayer Times

In the discussion of prayer times, Concentration of Islamic Astronomy (KIF) tries to analyze the concept of prayer times in perspective of both jurisprudence and astronomy.

One of example is study of the beginning of Dawn Prayer time *(salat subuh)* in perspective of both jurisprudence and astronomy.[40] This study focuses on the relevance of the sun's altitude to the appearance of the true dawn *(al-Fajr al-Ṣadīq)*. In jurisprudence perspective, the true down is a sign of the beginning of the dawn prayer time.[41] Whereas according to the perspective of astronomy that it is the scattering of

[39] Recording result of the conclution of National Seminar "Arah Kiblat Antara Mitos dan Sains," held by Sharia Faculty of Walisongo State Institute for Islamic Studies on April 30, 2012.

[40] Ayuk Khirunnisak, "Studi Analisis Awal Waktu Shubuh (Kajian Atas Relevensi Nilai Ketinggian Matahari Terhadap Kemunculan Fajar Shadiq)", Undergraduate Thesis, Semarang, IAIN Walisongo, 2011

[41] It poureds forth in Chapter al-Baqarah verse 187.

sunlight by particles where is in air surrounding the earth [42] The conclution of this study is the true down will appear at the altitude of the Sun -14º to -15º.[43] It applies to all places because the calculation uses the altitude correction, which affects *Dip (Kerendahan Ufuk)* and refraction.

Another example is study of the beginning of Asr Prayer time in perspective of both jurisprudence and astronomy. This study focuses on the analysis of the sun's altitude at the beginning of Asr Prayer time in astronomical perspective in Semarang District.[44] In jurisprudence perspective, Asr Prayer time is begun when an object's shadow is either as long as that object or twice the length of that object. Whereas in the perspective of astronomy that the beginning of prayer times including Asr Prayer time related to the phenomenon of the sun.[45] Therefore, in this perspective, the sun phenomena are interpreted by the sun's position.

3. *Qamariyyah* Months

As discussed in the previous chapter that as a science, which is developed based on observations, *'Ilmu al-Falak* is developed through both Mathematics and Physics. Both of them are the natural sciences, which constantly develop along with the development of technology.

Related to that, to classify the experts of *'Ilmu al-Falak*'s method for determining the beginning *Qamariyah* moths, it is needed an effort to

[42] Ayuk Khirunnisak, Op. Cit., p. 17
[43] Ibid, p. 89-90
[44] Siti Mufarrohah, "Konsep Awal Waktu Salat Asar Imam Syafi'i dan Hanafi (Uji Akurasi Berdasarkan Ketinggian bayang-bayang Matahari Di Kabupaten Semarang)", Undergraduate Thesis, Semarang, IAIN Walisongo Semarang, 2011
[45] Muhyiddin Khazin, *Ilmu Falak Dalam Teori dan Praktik*, Op. Cit., p. 89

review their masterworks. It is important because as the development of science, there are several methods that can not be used a guidance on determining the beginning *Qamariyah* moths. Based on this phenomenon, some students of Concentration of Islamic Astronomy (KIF) try to analize the experts of *'Ilmu al-Falak*'s method by reviewing their masterworks (either the books or softwares). Then, they classified them based on their accuracy levels because every classification has specific criteria.[46]

One of example is study analysis of the book entitled *Badiah al-Mithāl fī Hisāb al-Sinīn wa al-Hilāl* written by KH. Ma'shum Bin Ali Al-Maskumambangi, [47] that its calculation system has used theory of spherical trigonometry by using *Rubu' al-Mujayyab* as a computing tool. Although this book is still relevant in this era, but the astronomical data that is used is not up to date. In addition, the correction data is still

[46] According to the result of "Seminar Sehari Hisab Rukyah" on April 27, 1992 in Tugu, Bogor, West Java that *ḥisāb Ru'yah* methods in Indonesia classified based on their level accuracy. *First,* The *ḥisāb Ru'yah* method, which has low level accuracy *(ḥisāb Haqīky Taqrībi),* such as *Sullamun al-Nayyirain* written by Muḥammad Manṣūr bin 'Abdul ḥamīd Damiri al-Batawi, *Tadzkirah al-Ikhwān* written by Aḥmad Dahlan Semarang, *Al-Qawā'id al Falakiyyah* written by 'Abdu al-Fatḥ, *Al-Shamsu Wa al-Qamar* written by Anwār Kathīr, *Risālah al-Qamarain* written by Nawāwi Muḥammad, *Shamsu al-Hilāl* written by Abū Saifu al-Mujāb Nūr Aḥmad, etc. *Second,* The *ḥisāb Ru'yah* method, which has the high-level accuracy but it is the classical method *(ḥisāb Haqīky bi al-taḥqīq),* such as *al-Khalāṣah al-Wafiyyah* written by KH. Zubair 'Umar al-Jailanī, *al-Maṭla' al-Sa'īd* written by ḥusain Zaid, *Nūr al-Anwār* written by Abū Saifu al-Mujāb Nūr Aḥmad etc. *Third,* The *ḥisāb Ru'yah* method, which has the high-level accuracy but it is the contemporary method, such as *Almanak Nautika* created by Indonesia Navy for Hydro Oceanography Agency, *Ministry of Religious Affairs' Ephimeris, Islamic Calender* created by Muhammad Ilyas, etc. Ahmad Izzuddin, *Ilmu Falak Praktis (Metode Hisab Rukyat Praktis dan Solusi Permasalahannya),* Kamala Grafika: Semarang, 2006, p. 135-136

[47] M. Rifa Jamaluddin Nasir, "Pemikiran Hisab KH. Ma'shum Bin Ali Al-Maskumambangi (Analisis Terhadap Kitab Badiah Al-Mitsal Fi Hisab Al-Sinin Wa Al-Hilal)", Undergraduate Thesis, Semarang, IAIN Walisongo, 2010.

rounding off, so it has not been able to achive the high level of accuracy as *Hisab Hakiki Kontemporer*.[48]

Another example is study analysis on determining the beginning *Qamariyah* moths' method of Mawaaqit program created by Dr. Ing Khafid.[49] The conclusion of this study is that this method is accurate enough. Mawaaqit program can be categorized in *Hisab Hakiki Kontemporer* because it uses both theory and algorithms of VSOP87 whose accuracy level is better than both theory and algorithms of 0.01". The other proof of its accuracy is that its measurement result is comparable with the measurement result of Ephimeris System.[50]

4. Eclipses

In this study, Concentration of Islamic Astronomy (KIF) tries to explain the eclipses phenomena in the science perspective. The proof is that it held the national seminar entitled *"Gerhana Bulan Antara Mitos dan Sains"* on December 10, 2011.[51] This seminar where was held in Central Java Grand Mosque (MAJT)'s Library gets the conclution that the phenomenon of the eclipse is a natural phenomenon that can be calculated both when and where it will happen.[52]

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[48] Ibid, p. 110

[49] Eni Nuraeni Maryam, "Sistem Hisab Awal Bulan Kamariah Dr. Ing Khafid Dalam Program Mawaaqit", Undergraduate Thesis, Semarang, IAIN Walisongo, 2010.

[50] Ibid, p. 94

[51] It was held by Concentration of Islamic Astronomy in cooperation with MAJT *Hisab Rukyah* Team, The Independent *Al-Miiqaat Hisab Rukyah* Institution of Central Java, Community of Santri Scholars of Ministry of Religious Affairs (CSS MoRA) of IAIN Walisongo, Community of Islamic Astronomers of Indonesian Women (KFPI), and Community of Santri Astronomers of Indonesia (KSFI). Ani Zaidatun Ni'mah, Muh. Zaenuri, "Seminar dan Observasi Gerhana Bulan Total; Menggali Nilai Syari'ah Gerhana", In *Zenith*, Ed. VII December 2011, p. 11

[52] Ibid, p. 12

In addition, as discussed on determining the beginning *Qamariyah* moths that some students of Concentration of Islamic Astronomy (KIF) try to analize the experts of *'Ilm al-Falak*'s methods for determining both the beginning and the ending of eclipses (solar eclipse and lunar eclipse) by reviewing their masterworks. The purpose of this analysis is to classify these methods based on their accuracy levels. It is important because as a science, which is developed based on observations, *'Ilm al-Falak* is developed through both Mathematics and Physics. Both of them are the natural sciences, which constantly develop along with the development of technology.

The example is the comparative study between the method for determining both the beginning and the ending of eclipses in *al-Khalāṣah al-Wafiyyah* book written by Zubair 'Umar al-Jailanīy and the Ephimeris' method.[53] This study gets the conclusion that the method for determining both the beginning and the ending of eclipses in *al-Khalāṣah al-Wafiyyah* book is almost equivalent to the Ephimeris' method.[54]

Based on the explanation above, writer argues that IAIN Walisongo has the high commitment to organize the study of Islamic Astronomy as the epistemology of Islamic Astronomy. It based on three considerations, which are the curriculum framework covering not only the substantive courses, but also the supporting courses, such as Mathematics, Methodology of Science,

[53] Wahyu Fitria, "Studi Komparatif Hisab Gerhana Bulan Dalam Kitab Al-Khulashah Al-Wafiyah dan Ephemeris," Undergraduate Thesis, Semarang, IAIN Walisongo, 2011.

[54] Ibid, p. 104

Astronomy, Computing, and Instrumentations, and some practicum courses; the teaching staff structure involving the internal lecturers and the external lecturers of Shariah Faculty of IAIN Walisongo; and some discussions held by Shariah Faculty and scientific works. Both of them discuss about the subjects of *'Ilm al-Falak* (*Qibla*, prayer times, *Qamariyyah* months, and eclipses) from not only jurisprudence perspective but also scientific perspective.