AL-MARSHAD: JURNAL ASTRONOMI ISLAM DAN ILMU-ILMU BERKAITAN
ISSN 2442-5729 (print) || ISSN 2598-2559 (online)
http://jurnal.umsu.ac.id/index.php/almarshad
DOI: https://doi.org/10.30596/jam.v11i2.28131 || Vol. 11, No. 2 Desember 2025

The Development of Assalaam Observatory from the Perspective of Amin Abdullah's Mit Paradigm

AR Sugeng Riadi[1*]
[1]UIN Sunan Kalijaga
(Jl. Laksda Adisucipto, Papringan, Caturtunggal, Kec. Depok, Kabupaten Sleman, D.I. Yogyakarta 55281)
[*]Email: 20300012004@student.uin-suka.ac.id

Abstract

Indonesian Islamic boarding schools (pesantren) face modernization challenges demanding knowledge integration. Observatories are significant legacies of Islamic civilization, serving to study celestial bodies and strengthen faith. Pondok Pesantren Modern Islam Assalaam Sukoharjo became the first pesantren in Indonesia with an official observatory, inaugurated on July 6, 2015. This research analyzes how Observatorium Assalaam implements Amin Abdullah's Multidisciplinary, Interdisciplinary, and Transdisciplinary (MIT) paradigm, which rejects the dichotomy between religious and general sciences. Although the observatory development predates the formal MIT theory publication, the actions taken align with the paradigm. Observatorium Assalaam functions as a laboratory integrating natural sciences (astronomy) with Islamic sciences (fiqh and sociology) for determining the hijri calendar, qibla direction, prayer times, eclipse phenomena, and enhancing astronomical literacy among students and the public. Challenges include the absence of astronomy in formal curricula and shortage of human resources. Through this approach, Observatorium Assalaam strives to produce Muslims strong in faith, noble character, and expert in science and technology.

Keywords: ***Amin Abdullah, MIT Paradigm, Observatory, Islamic Boarding School.***

Article Info
Received:
28 Desember 2025
Revised:
29 Desember 2025
Accepted:
30 Desember 2025
Published:
31 Desember 2025

A. Introduction

Islamic boarding schools (pondok pesantren), as the oldest Islamic educational institutions in Indonesia, have carved out a long historical trajectory in the development of Islam and national civilization [1]. Since their emergence during the era of the Walisongo, pesantren have functioned as bases for the development and dissemination of Islam and have assumed roles as social institutions that regulate and guide society in responding to the challenges of changing times [2]. Pesantren are widely recognized for their multi-aspect educational system, which not only shapes students (santri) into individuals who possess a

ISSN 2442-5729 (print) || ISSN 2598-2559 (online)
http://jurnal.umsu.ac.id/index.php/almarshad
DOI: https://doi.org/10.30596/jam.v11i2.28131 || Vol. 11, No. 2 Desember 2025

deep understanding of religious knowledge, but also equips them with leadership skills, independence, simplicity, perseverance, a sense of togetherness, and equality [3].

The existence of Islamic boarding schools in Indonesia is inseparable from the spread of Islam, which was initially introduced by Muslim saints (wali). Pesantren represent the oldest educational institutions in Indonesia and have made significant contributions to enlightening the life of the nation. These institutions deserve serious consideration in national development, particularly in the fields of education, religion, and morality. From a historical perspective, pesantren possess extraordinary experience in nurturing, educating, and developing the surrounding communities. Data from the Ministry of Religious Affairs indicate that there are 30,476 Islamic boarding schools distributed across all provinces in Indonesia. West Java has the largest number, with 9,310 pesantren, followed by Banten with 5,344, East Java with 5,121, and Central Java with 3,927 pesantren [4].

The scholarly tradition within pesantren initially emerged in the form of halaqah learning circles covering various disciplines and has since evolved into classical or madrasa-based education. This scholarly tradition has continued to live and has never disappeared; instead, it has continued to develop over time. The pesantren tradition represents an Islamic educational system that has grown since the early arrival of Islam in Indonesia [5].

However, along with the dynamics of the times and the rapid pace of modernization, pesantren are increasingly required to adapt and accept change [6]. The reality of the dichotomy between religious sciences and general sciences has become a chronic problem within the Islamic education system, resulting in the lag of Muslim communities behind scientific and technological advancement. This dichotomy has had fatal consequences for the development of knowledge and educational institutions, as religious education often studies only religious subjects without incorporating general sciences, and in some cases even claims them to be forbidden (haram) [7]. In fact, the Qur'an itself contains more than 750 ayat kauniyah (cosmic or natural verses) that should serve as the foundation for scientific development by Muslims [8].

In response to this dichotomous problem, Islamic educational thinkers have proposed various concepts of knowledge integration [9]. One prominent idea was introduced by Prof. Dr. H. M. Amin Abdullah, who offered the Integrative–Interconnective paradigm, also known as the Multidisciplinary, Interdisciplinary, and Transdisciplinary (MIT) paradigm [10]. This paradigm emphasizes that Islamic sciences cannot stand independently apart from general

ISSN 2442-5729 (print) || ISSN 2598-2559 (online)
http://jurnal.umsu.ac.id/index.php/almarshad
DOI: https://doi.org/10.30596/jam.v11i2.28131 || Vol. 11, No. 2 Desember 2025

sciences such as natural sciences, social sciences, and the humanities. Instead, these fields must be interconnected, engage in dialogue, and complement one another in order to form a holistic, comprehensive, and contextually relevant Islamic religious worldview that is responsive to contemporary challenges [11].

Within the context of the development of Islamic scholarship in Indonesia, various initiatives have emerged to implement knowledge integration in practice. One such initiative is the development of the Assalaam Observatory at Pondok Pesantren Modern Islam Assalaam Sukoharjo [12]. This observatory functions not only as a facility for education and research on celestial objects, but also as a means of integrating astronomical science with Islamic religious knowledge, particularly in determining times of worship such as prayer, fasting, ‘Id al-Fitr, ‘Id al-Adha, and the direction of the qibla.

In several pesantren, the study of Islamic astronomy (ilmu falak) has become a field of focused inquiry. Some pesantren have even established specialized laboratories for Islamic astronomy or observatories and have developed their learning processes by founding astronomy centers. This represents an extraordinary leap for pesantren, as it reflects an integrated approach that combines religious scholarship with scientific disciplines, particularly astronomy.

An Astronomy Center, officially referred to as an observatory, is a facility equipped primarily to conduct observations of celestial objects and study them, especially the Moon and the Sun, to assist Muslims in performing acts of worship, particularly prayer and fasting [13]. It is a place with permanently positioned instruments that enable the observation of celestial objects and astronomical phenomena. Historically, the term observatory can be understood in simple forms, such as the use of a sextant (an instrument to measure angular distances between celestial objects) or even monumental structures such as Stonehenge, which functioned as a tool to determine seasonal changes based on the position of sunrise and sunset. Modern observatories are more comprehensively equipped, featuring permanently installed telescopes housed within buildings with domes that can be opened and rotated vertically and horizontally according to observational needs.

This article analyzes how the development of the Assalaam Observatory reflects and implements the principles of Amin Abdullah’s MIT paradigm. Although the initiative to establish the Assalaam Observatory may have begun prior to the formal articulation of the MIT theory, the alignment between practical implementation and theoretical framework

ISSN 2442-5729 (print) || ISSN 2598-2559 (online)
http://jurnal.umsu.ac.id/index.php/almarshad
DOI: https://doi.org/10.30596/jam.v11i2.28131 || Vol. 11, No. 2 Desember 2025

presents an interesting subject of study. This research is expected to provide insights into a model of modern pesantren development that is capable of responding to contemporary challenges without losing its Islamic identity, while simultaneously contributing to the enhancement of scientific literacy and the holistic character formation of santri.

B. Method

This study employs a qualitative research approach using a case study design conducted at Pondok Pesantren Modern Islam Assalaam Sukoharjo. Data were collected through document analysis, particularly documents related to the history and procedures of the development of the Assalaam Observatory that have been well documented. In addition, interviews were conducted with the caretakers of Pondok Pesantren Modern Islam Assalaam, the managers of the Assalaam Observatory, as well as santri as the subjects involved in the observatory development. The selection of informants was based on their understanding of literacy conditions and the objectives underlying the development of the observatory within the pesantren.

The collected data were then compared with the multidisciplinary, interdisciplinary, and transdisciplinary (MIT) theoretical framework proposed by Prof. Dr. H. M. Amin Abdullah. This comparative process aimed to align and analyze the extent to which the steps taken in the development of the observatory at this pesantren correspond to the MIT theoretical framework. Data analysis involved data reduction, data presentation, and the drawing of conclusions [14].

C. Results and Discussion

1. History and Development of Pesantren in Indonesia

Pesantren are the oldest Islamic educational institutions in Indonesia, whose existence is inseparable from the spread of Islam carried out by Muslim saints (*wali*) [15]. Etymologically, the term *pesantren* is derived from the word *santri* with the affixes *pe-* and *-an*, meaning a place where *santri* live [16]. Initially, pesantren focused on religious education, with the *kitab kuning*—classical Islamic texts written in Arabic or other languages using

ISSN 2442-5729 (print) || ISSN 2598-2559 (online)
http://jurnal.umsu.ac.id/index.php/almarshad
DOI: https://doi.org/10.30596/jam.v11i2.28131 || Vol. 11, No. 2 Desember 2025

Arabic script and authored by Muslim scholars—as the core curriculum [17]. The learning of *kitab kuning* employed traditional instructional methods such as *sorogan* (individual learning with a teacher) and *bandongan* or *wetonan* (collective learning), as well as *halaqah*, which emphasized memorization [18].

Along with the development of the times, many pesantren have undergone processes of modernization. Modern pesantren are characterized by the prioritization of formal schooling systems, an emphasis on modern Arabic and English language instruction, and the inclusion of additional educational components such as vocational skills and Islamic arts [18]. These pesantren are more open to studying contemporary Islamic texts alongside classical works. This modernization also includes changes in leadership patterns, shifting from the charismatic authority of a single *kiai* toward more rational, participatory, and diplomatic leadership models [6]. Nevertheless, this modernization does not eliminate the identity of pesantren as guardians of classical Islamic scholarly traditions, as strong mastery of religious sciences remains a central component of their curricula [17].

Despite differing perspectives regarding the origins of pesantren, there is general agreement regarding the essential elements that constitute a pesantren. Zamakhsyari Dhofier identifies five main elements that define a pesantren institution: the dormitory (*pondok*), the mosque, classical Islamic texts (*kitab*), *santri*, and the *kiai* (Dhofier, 2019a).

Pesantren began to gain broader recognition and popularity in the early twentieth century, particularly as residential institutions or *pondok* characterized by simple buildings constructed from bamboo, which served as living quarters, learning spaces, and mosques. According to Zamakhsyari Dhofier, the term *pondok pesantren* gained popularity in the early second half of the twentieth century. At that time, pesantren education centers in Java and Madura were more commonly known as *pondok*, referring to residential facilities built from bamboo, or derived from the Arabic word *funduq*, meaning hotel or dormitory (Dhofier, 2019b).

In their development, in addition to the four core elements mentioned above, pesantren may also consist of madrasas, formal schools, and even pesantren-based higher education institutions, as well as sports facilities, vocational training centers for *santri*, and other

ISSN 2442-5729 (print) || ISSN 2598-2559 (online)
http://jurnal.umsu.ac.id/index.php/almarshad
DOI: https://doi.org/10.30596/jam.v11i2.28131 || Vol. 11, No. 2 Desember 2025

supporting elements such as specialized laboratories for Islamic astronomy (*ilmu falak*) or observatories.

Examples of modern pesantren in Indonesia include Darussalam Gontor in Ponorogo, East Java; As-Salaam Pabelan in Sukoharjo, Central Java; Darun Najah in Jakarta; and Al-Amin in Madura [2]. Pondok Pesantren Modern Islam Assalaam is among those that implement formal education systems, including *Madrasah Tsanawiyah* (MTs) and *Madrasah Aliyah* (MA) under the supervision of the Indonesian Ministry of Religious Affairs, as well as SMP TQS Assalaam, SMA Assalaam, and SMK Assalaam. Madrasah Aliyah PPMI Assalaam holds a vision of producing high-achieving students with strong religious expertise as future cadres of the Muslim community, supported by flagship academic and non-academic programs, including mathematics and science olympiads, youth scientific research (*KIR*), and active mastery of English and Arabic.

2. Observatories in Islamic Civilization and Indonesia

Observatories, which in the classical Islamic intellectual tradition are referred to as ar-raṣd, dār ar-raṣd, and bait ar-raṣd, constitute an important legacy and an original contribution of Islamic civilization [12]. Initially, observatories were established for the study and research of celestial objects. Over time, however, their functions expanded to include the teaching of astronomy and the facilitation of scholarly discussions. Observatories also serve as instruments for strengthening faith by reading and interpreting the cosmic verses (ayat kauniyah) that are abundantly found in the Qur'an [18]. The existence of observatories is highly strategic for Muslims in ensuring accuracy in determining the timing and orientation of religious practices, such as prayer times, the direction of the qibla, and the beginning of Hijri months.

In Indonesia, awareness of the importance of Islamic astronomy (ilmu falak) has continued to increase [19]. Islamic astronomy is taught in Islamic boarding schools, madrasas, and Islamic higher education institutions, with efforts to integrate Islamic intellectual heritage with modern scientific knowledge. Several pesantren, such as Pondok Pesantren Modern Islam Assalaam in Sukoharjo, Pesantren Tahfidz Yanbu'ul Qur'an Menawan in Kudus, Pondok Pesantren Al-Islam Joresan Mlarak in Ponorogo, Pesantren SMA Trensains in Sragen, and

ISSN 2442-5729 (print) || ISSN 2598-2559 (online)
http://jurnal.umsu.ac.id/index.php/almarshad
DOI: https://doi.org/10.30596/jam.v11i2.28131 || Vol. 11, No. 2 Desember 2025

Pondok Pesantren Modern MTA in Karanganyar, continue to preserve and develop ilmu falak by integrating modern astronomy and, in some cases, by establishing observatories.

The Assalaam Observatory at Pondok Pesantren Modern Islam Assalaam Sukoharjo represents a concrete example of this development. Initiated in 2005 and officially inaugurated on July 6, 2015, this observatory is recognized as the first observatory owned by a pesantren in Indonesia. The observatory is equipped with advanced instruments, including telescopes. Its primary activities include hilal observations for determining the beginning of Hijri months, training in eclipse observations, and the determination of the qibla direction [19]. The observatory supports the teaching of mathematics, physics, geography, and religious studies, particularly in character education, by enabling direct observation of celestial objects mentioned in the Qur'an.

The Assalaam Observatory was established in 2005 and officially inaugurated in 2015. The history of its establishment began with student activities in the field of astronomy organized through an extracurricular club officially named CASA (Club Astronomi Santri Assalaam). CASA was founded in conjunction with a major global astronomy event, Astro Day 2005. This event was commemorated at Assalaam on Saturday, April 16, 2005, and took place at the Assalaam office on the second floor [20]. From 2005 to 2010, astronomy learning activities were conducted on the rooftop of the dormitory due to the absence of a dedicated observatory building. In 2011, the foundation board and the leadership of Pondok Pesantren Modern Islam Assalaam approved a proposal to construct a building specifically dedicated to astronomy education and Islamic studies related to ilmu falak, which is now known as the Assalaam Observatory.

Prior to constructing and equipping the observatory building, the MPI Surakarta Foundation assigned the caretakers and field managers to conduct comparative study visits to the Bosscha Observatory of the Bandung Institute of Technology (ITB) in Lembang, Bandung, and the Jakarta Planetarium. These visits aimed to study proper observatory design and operational standards in accordance with astronomical principles. The visits to these official institutions, which already had established observatories, were conducted in 2010 and involved project implementers as well as teachers of physics (a scientific discipline closely

ISSN 2442-5729 (print) || ISSN 2598-2559 (online)
http://jurnal.umsu.ac.id/index.php/almarshad
DOI: https://doi.org/10.30596/jam.v11i2.28131 || Vol. 11, No. 2 Desember 2025

related to astronomy) and teachers of fiqh (an Islamic discipline directly related to acts of worship whose timing and orientation are determined through astronomical calculations).

The construction of the observatory building and the installation of its supporting equipment began in 2011 and were fully completed in 2012. In 2012, the observatory was informally used for the observation of the transit of the planet Venus, an event attended by hundreds of community members and covered by both print and electronic mass media. The observatory was officially inaugurated by the Indonesian Minister of Religious Affairs, Lukman Hakim Saifuddin, on Monday, July 6, 2015.

3. The Integrative–Interconnective (MIT) Paradigm of Amin Abdullah

Prof. Dr. H. M. Amin Abdullah is an Indonesian thinker and intellectual who has sought to reconcile the dichotomy between Islamic sciences and general sciences through his ideas on the integrative–interconnective relationship between religious knowledge and modern sciences [11]. This concept has been implemented at UIN Sunan Kalijaga Yogyakarta during his tenure as rector [7]. The paradigm views religious sciences and modern sciences as domains that must interact and engage in dialogue, since religious sciences that consider themselves sufficient without engagement with other disciplines will lose their contribution to the development of national character [21].

Amin Abdullah proposes three layers of Islamic scholarly domains that should not be studied partially, but rather in an integrative–interconnective manner [3]. These three layers are as follows:

a. Hadharah al-Nash (Textual Civilization): This domain encompasses religious practices, beliefs, and understandings of revelation as interpreted by scholars, religious figures, and society.
b. Hadharah al-‘Ilm (Scientific Civilization): This domain refers to the advancement of civilization derived from natural sciences and social sciences, which are designed systematically and methodologically. Disciplines such as ‘ulum al-tafsir, ‘ulum al-hadith, kalam, philosophy, tasawuf, law, history, and Islamic thought are situated within this domain.

ISSN 2442-5729 (print) || ISSN 2598-2559 (online)
http://jurnal.umsu.ac.id/index.php/almarshad
DOI: https://doi.org/10.30596/jam.v11i2.28131 || Vol. 11, No. 2 Desember 2025

c. Hadharah al-Falsafah (Philosophical Civilization): This domain represents the advancement of civilization grounded in ethics and philosophy.

These three domains are interconnected and must not be separated from one another. When knowledge relies solely on hadharah al-'ilm without engaging the other two domains, it tends to distance itself from social reality and neglect ethical and moral dimensions. Amin Abdullah also reformulates the development of epistemology within Islamic intellectual traditions through the perspectives of bayani, irfani, and burhani, which ideally must be interconnected within a unified framework to produce a comprehensive Islamic religiosity rather than a dichotomous and atomistic one. The bayani epistemology is supported by jurisprudential (fiqh) and theological (kalam) reasoning, while irfani epistemology relates to tasawuf and intuition. The burhani epistemology refers to empirical and rational modes of reasoning [21].

The MIT paradigm aims to construct a new, fresh, and transformative Islamic religious worldview that is relevant to social change and the development of knowledge. This paradigm requires fresh ijtihad across all aspects of life by integrating various disciplines, particularly modern sciences, social sciences, and contemporary humanities.

4. Implementation of the MIT Paradigm in the Development of the Assalaam Observatory

Pondok Pesantren Modern Islam Assalaam Sukoharjo, although it developed the Assalaam Observatory prior to the formal publication of Amin Abdullah's MIT theoretical framework, has adopted a mode of thinking that is closely aligned with this paradigm. The caretaker of PPMI Assalaam, Uripto Mahmud Yunus, has applied the MIT approach in addressing issues related to ilmu falak (astronomy) and religious practices, particularly in matters concerning the determination of the beginning of Hijri months, prayer times, and eclipse phenomena. This reflects an awareness of the necessity for dialogue among religion, astronomy, fiqh, and sociology in order to formulate appropriate strategies for the development of an astronomy center within a pesantren context. The Assalaam Observatory functions as a laboratory that integrates and interconnects natural sciences and Islamic religious sciences. This integration is manifested through several concrete practices.

ISSN 2442-5729 (print) || ISSN 2598-2559 (online)
http://jurnal.umsu.ac.id/index.php/almarshad
DOI: https://doi.org/10.30596/jam.v11i2.28131 || Vol. 11, No. 2 Desember 2025

First, the study of ayat kauniyah (cosmic verses). The observatory plays a significant role in supporting character education, as numerous verses in the Qur'an explicitly refer to celestial objects, which become more tangible through direct observation. This effort represents an attempt to return science to the Qur'an as a source of truth [8].

Second, the accuracy of religious practices. The Assalaam Observatory conducts hilal observations to determine the beginning of Ramadan and Shawwal, as well as training in eclipse observations for ritual purposes. This directly connects ilmu falak (astronomy) with fiqh and the daily practice of religious rituals [12].

Third, character education and scientific literacy. Literacy activities in the fields of astronomy and ilmu falak are centered at the Assalaam Observatory as part of non-curricular activities, grounded in the study of ayat kauniyah from the Qur'an and the Sunnah. These activities aim to produce santri who not only master religious knowledge but also possess strong competencies in science and technology as preparation for future challenges [20].

Fourth, curriculum integration. Although astronomy has not yet been widely incorporated into the formal curriculum, the Assalaam Observatory supports the learning of science subjects such as mathematics, physics, and geography through direct observation. This practice reinforces the MIT paradigm by integrating general sciences into Islamic studies through epistemological and axiological dimensions [10].

Fifth, public service. The Assalaam Observatory is open to the general public, receiving visits from schools and communities during natural phenomena and providing services such as qibla direction measurement. This aligns with the objectives of the MIT paradigm in producing resilient Muslim scholars who master both religious and general sciences and contribute to the well-being of humanity (rahmatan lil 'alamin) [22].

This development has not been without challenges. These include the absence of astronomy as a formal subject within pesantren and school curricula, as well as the limited availability of human resources or experts with specialized knowledge in astronomy. Nevertheless, through dialogue and the integration of multiple disciplines, the Assalaam Observatory strives to explain differences related to the determination of Hijri months and to

ISSN 2442-5729 (print) || ISSN 2598-2559 (online)
http://jurnal.umsu.ac.id/index.php/almarshad
DOI: https://doi.org/10.30596/jam.v11i2.28131 || Vol. 11, No. 2 Desember 2025

ensure that religious activities are carried out comfortably for santri and the pesantren community.

The foundational intellectual framework of Drs. Uripto Mahmud Yunus, M.Ed., is closely aligned with Prof. Dr. H. M. Amin Abdullah's theory concerning the romantic relationship between science and religion, namely the multidisciplinary, interdisciplinary, and transdisciplinary (MIT) approach. This paradigm represents a development of the earlier integrative–interconnective (I-Kon) framework proposed by Amin Abdullah. Amin argues that the relationship between science and religion cannot be dichotomized by rigid boundaries separating one field from another. He identifies at least three key concepts in the relationship between science and religion: semipermeable, intersubjective testability, and creative imagination (Amin Abdullah, 2020). These conceptual conclusions are derived from the ideas of Ian G. Barbour, Holmes Rolston, Abdulkarim Soroush, Nidhal Guessoum, and Jasser Auda.

Amin explains that the concept of semipermeable originates from the biological principle of survival of the fittest, meaning that those who are able to adapt most quickly are the ones who survive. Science operates on causality, whereas religion is grounded in meaning and value (meaning and value). The interaction between the two represents a process of mutual permeability. Although science and religion can be separated through their respective independence, within this concept they are understood as mutually permeating and dialogical. If left completely independent, conflicts between scientific and religious interpretations arise because the boundary between causality and meaning is semipermeable (Holmes Rolston III, 1987). Amin envisions a relationship in which science and religion are not divided by rigid walls that prevent dialogue. While the boundaries between the two remain clear, they are connected through relationships that are clarificatory, complementary, affirmative, corrective, verificative, and transformative.

The second key concept in integrating science and religion is intersubjective testability, a concept introduced by Ian G. Barbour in discussions on the workings of natural sciences and the humanities. Amin emphasizes that both the object of study and the researcher play significant roles in scientific activity. In other words, the data are not independent of the observer, because empirical situations are always influenced by scientists as experimental agents. Therefore, objective understanding must be refined into intersubjective testability,

ISSN 2442-5729 (print) || ISSN 2598-2559 (online)
http://jurnal.umsu.ac.id/index.php/almarshad
DOI: https://doi.org/10.30596/jam.v11i2.28131 || Vol. 11, No. 2 Desember 2025

wherein the broader scholarly community collectively participates in testing the validity of interpretations and meanings derived from research data.

The third concept is creative imagination. Even when logical reasoning is applied accurately, creative imagination is necessary to strengthen scientific inquiry. Amin argues that while logic is used to test theories, it cannot generate theories; thus, inspiration, intuition, feeling, sensitivity, experience, and insight are required. Amin's emphasis on imagination is grounded in the views of Koestler and Ghiselin, who argue that creative imagination in both science and literature often involves bringing together two distinct conceptual frameworks. The presence of creative imagination enables the connection of elements that initially appear unrelated.

Amin Abdullah's MIT theory resonates strongly with the approach adopted by Pondok Pesantren Modern Islam Assalaam Sukoharjo in developing and utilizing the Assalaam Observatory to enhance understanding among caretakers and santri regarding astronomy (as a natural science) that is integrated and interconnected with religious sciences in the performance of ritual worship within the pesantren environment. Amin asserts that contemporary Islamic studies (dirasat islamiyah) require multidisciplinary, interdisciplinary, cross-disciplinary, and transdisciplinary approaches. Linear and monodisciplinary approaches within religious sciences risk producing religious understandings that lose contact with social reality and relevance to everyday life. Instead, these disciplines strengthen one another rather than undermine each other. Amin explains:

"Each discipline is still able to maintain its own identity and existence, yet always remains open to dialogue, communication, and discussion with other disciplines. Not only can dialogue occur internally within the same scientific cluster, but disciplines must also be willing to engage and accept input from external fields, such as social sciences and the humanities" [10].

Uripto Mahmud Yunus, as the caretaker of Pondok Pesantren Modern Islam Assalaam Sukoharjo, has employed MIT thinking in addressing differences in the determination of Hijri months—particularly Ramadan and Shawwal—as well as issues related to ilmu falak and the religious practices of santri and the pesantren community. As a communal religious institution

ISSN 2442-5729 (print) || ISSN 2598-2559 (online)
http://jurnal.umsu.ac.id/index.php/almarshad
DOI: https://doi.org/10.30596/jam.v11i2.28131 || Vol. 11, No. 2 Desember 2025

with a large number of members, this pesantren serves as a source of religious legitimacy in policy-making, including decisions on the beginning of Ramadan and Shawwal, prayer times, and rituals related to lunar and solar eclipses, and it has become part of the Falakiyah Team of the Indonesian Ministry of Religious Affairs. Public scrutiny has placed the pesantren in a position that requires its leader to implement appropriate policies so as not to create anxiety among santri, the wider Muslim community, and other stakeholders.

To reach such a mode of thinking, Uripto Mahmud Yunus acknowledged that the development of astronomy for ritual purposes falls within the domain of natural sciences, which lies outside his primary expertise in religious sciences. He also recognized that disputes over the determination of Hijri months would persist over time, thus necessitating more serious development of scientific knowledge and supporting instruments.

At the semipermeable level, Uripto viewed himself, his institutional community, and his santri as needing to embody survival of the fittest in responding to differences. He realized that religious intellectual capacity alone was insufficient to resolve astronomical issues. Consequently, he initiated engagement with the field of astronomy by sending representatives to the Bosscha Observatory at ITB and the Jakarta Planetarium to explore potential collaborations.

Dialogue between the religious domain (the pesantren) and the scientific domain (Bosscha Observatory ITB and the Jakarta Planetarium) emerged as a means of addressing differences in Hijri month determination through the development of an astronomy center. In this process, Uripto did not prioritize religious authority over astronomical science; rather, astronomy was given a more prominent role. Dialogue materialized in concrete actions such as the preparation of development proposals for an astronomy center within the pesantren and the planning of its future expansion.

The outcomes of dialogue between these two domains ultimately necessitated infrastructural changes within the pesantren, including the construction of an observatory building, the recruitment of specialized personnel in astronomy, and the acquisition of optical instruments to support observations. The pesantren also recognized the need to acquire telescopes for observing celestial objects, particularly the hilal. These plans were realized

ISSN 2442-5729 (print) || ISSN 2598-2559 (online)
http://jurnal.umsu.ac.id/index.php/almarshad
DOI: https://doi.org/10.30596/jam.v11i2.28131 || Vol. 11, No. 2 Desember 2025

through the construction of a seven-story observatory building, consisting of office space, meeting rooms, optical equipment storage, shared observation areas, and a dome capable of vertical and horizontal rotation.

Intersubjective testability was implemented through various measures to ensure that the development of the astronomy center was appropriate and effective. The prepared proposal was presented to the foundation board and pesantren leadership. Construction was supervised by representatives from both the foundation and the pesantren, and the site was inspected multiple times by teams from the Bosscha Observatory ITB and the Jakarta Planetarium. During implementation, several weaknesses were identified, such as issues in concrete casting and floor color selection that caused glare during daytime sky observation. These shortcomings were addressed through revisions involving relevant stakeholders.

At the level of creative imagination, the focus shifted to bringing together disparate elements. Traditional pesantren educational practices, such as sorogan and simakan, were integrated with astronomical science, producing new configurations that allowed tradition to persist while accommodating astronomical accuracy. In the spiritual domain, several fiqh rulings were re-examined to address issues whose empirical foundations lay in astronomy. These included reassessments of congregational prayer alignment in mosques, the orientation of worship spaces, and the determination of qibla direction for communal prayer fields used during ‘Id al-Fitr and ‘Id al-Adha.

Creative imagination also manifested in the development of the Assalaam Observatory as a platform for nurturing santri with talents in natural sciences. Santri with an aptitude for astronomy were granted access to observatory facilities to develop their projects and participate in competitions. One such project achieved international recognition by winning a gold medal at an international astronomy competition in Malaysia in 2021, titled “Hunny Call: One Hundred Calendar.”

Despite careful conceptual planning and the integration of multiple scholarly frameworks, the observatory development program at Pondok Pesantren Modern Islam Assalaam Sukoharjo did not proceed without challenges. At least two major obstacles remain: the absence of astronomy as a formal subject within pesantren and school curricula, and the

ISSN 2442-5729 (print) || ISSN 2598-2559 (online)
http://jurnal.umsu.ac.id/index.php/almarshad
DOI: https://doi.org/10.30596/jam.v11i2.28131 || Vol. 11, No. 2 Desember 2025

limited availability of qualified human resources in astronomy. These challenges are also consequences of causal policy structures, whereby governmental decisions at the national level shape public implementation at the institutional level.

Although the central government has not yet formally incorporated astronomy as a branch of natural sciences within the national curriculum, Pondok Pesantren Modern Islam Assalaam has formally authorized school principals within the pesantren to independently design astronomy curricula for santri. One institution that has implemented this policy is the Madrasah Aliyah of PPMI Assalaam under the leadership of Farid Akbar, M.Pd. Since the 2020/2021 academic year, Madrasah Aliyah PPMI Assalaam has formally integrated astronomy into the curriculum through the prakarya subject and has included it as an intra-curricular subject for Grade X Science Plus and Grade XI Science Plus students.

Prof. Dr. H. M. Amin Abdullah, in his book Multidisciplinary, Interdisciplinary, and Transdisciplinary (MIT): Methods of Religious Studies and Islamic Studies in the Contemporary Era, seeks to strengthen a more intimate relationship between religious sciences and modern sciences. The integration–interconnection (I-Kon) among disciplines is expected to open broader spaces for religion without being confined by rigid boundaries. Through this integration and interconnection of knowledge, Amin hopes that Islam will be able to adapt effectively to global developments and, ultimately, regain its peak of scientific achievement as it once experienced during the medieval period.

In this book, Amin introduces the MIT paradigm, which has three main characteristics, namely semipermeable, intersubjective testability, and creative imagination. Semipermeable occurs when religion and other fields of knowledge mutually engage, intersect, and dialogue with one another, thereby eliminating dichotomies between disciplines; nevertheless, the boundaries between fields of knowledge remain clear and not blurred. Intersubjective testability allows for comprehensive testing of the outcomes of such dialogue, not only from the perspective of a single researcher, but also involving other academic fields, scholars, and researchers, in order to eliminate subjective elements inherent in individual interpretations. Meanwhile, creative imagination functions as a generator of theory; it attempts to penetrate two or more distinct dimensions of knowledge so that they can be brought into dialogue

ISSN 2442-5729 (print) || ISSN 2598-2559 (online)
http://jurnal.umsu.ac.id/index.php/almarshad
DOI: https://doi.org/10.30596/jam.v11i2.28131 || Vol. 11, No. 2 Desember 2025

despite their differences. The role of creative imagination is crucial, because it is at this level that theories—and even new forms of knowledge—are created.

Pondok Pesantren Modern Islam Assalaam Sukoharjo, as a religious educational institution, in developing its astronomy center through the construction of the Assalaam Observatory, does not merely apply Amin Abdullah's MIT theory at a theoretical level. Rather, this pesantren actively engages in dialogue among religion, astronomy, fiqh, and sociology. This interdisciplinary blending is undertaken to formulate an appropriate model for developing the astronomy center and the Assalaam Observatory, so that all santri and educators within the pesantren become enlightened in understanding differences related to the determination of the beginning of Hijri months and the issues accompanying them.

The initial awareness that was cultivated is that differences in determining the beginning of Ramadan and Shawwal, as well as problems related to qibla direction and Subuh prayer time, will not be resolved in a short period of time. Therefore, in order to educate santri and ensure that religious activities within the pesantren can be carried out comfortably, appropriate and consistent policy decisions are required. The development and management of the observatory as a center for learning astronomy and religious sciences based on fiqh muamalah have been designated as one of the collective activities of santri and are open to the general public during natural phenomena. This openness has fostered a more socially engaged pesantren environment, both toward fellow Muslims and non-Muslims alike, under the slogan "astronomer without borders."

The intersection of disciplines at the level of practice has been ongoing since 2010 and continues to this day. The consistency of this interdisciplinary engagement has further developed through joint hilal observations with the Muslim community, observations of eclipses and other natural phenomena involving both Muslim and non-Muslim communities, as well as scholarly visits from various institutions to the pesantren—particularly visits to the Assalaam Observatory as a laboratory that integrates and interconnects natural sciences and Islamic religious sciences.

D. Conlcusion

ISSN 2442-5729 (print) || ISSN 2598-2559 (online)
http://jurnal.umsu.ac.id/index.php/almarshad
DOI: https://doi.org/10.30596/jam.v11i2.28131 || Vol. 11, No. 2 Desember 2025

The development of the Assalaam Observatory at Pondok Pesantren Modern Islam Assalaam Sukoharjo represents a concrete manifestation of Amin Abdullah's Integrative–Interconnective (MIT) paradigm. This observatory effectively bridges the long-standing dichotomy between religious sciences and general sciences, particularly astronomical science, which has historically hindered the progress of Islamic education. Through the Assalaam Observatory, the pesantren not only preserves the Islamic scholarly tradition but also integrates the observation of celestial objects to ensure the accuracy of religious practices, such as the determination of the beginning of Hijri months, prayer times, and the direction of the qibla. In addition, the observatory strengthens character education based on the ayat kauniyah of the Qur'an and enhances the scientific literacy of santri and the wider community.

Although the development of the Assalaam Observatory was primarily practical in nature and began prior to the formal articulation of the MIT theory, the alignment between the pesantren's practices and Amin Abdullah's theoretical framework demonstrates that the integration of knowledge is both an inevitability and an urgent necessity in contemporary Islamic education. This model contributes to the formation of a generation of Muslims who are firm in faith (aqidah) and noble in character, while simultaneously possessing expertise in science and technology, in line with the vision of Islam as rahmatan lil 'alamin. Nevertheless, challenges such as the integration of astronomy into the formal curriculum and the availability of qualified human resources must continue to be addressed in order to optimize the potential of the Assalaam Observatory as a pesantren-based center of excellence in Islamic astronomy (ilmu falak).

References

[1] Abdurrahman, "Pemikiran Tentang Pendidikan Pesantren," Jurnal Pusaka, vol. 15, no. 2, pp. 48-70, 2018.

[2] A. Tolib, "Pendidikan di Pondok Pesantren Modern," Jurnal Risalah, vol. 1, no. 1, Dec. 2015.

[3] A. R. Assegaf, "Menimbang Paradigma Keilmuan Islam Yang Integratif-Interkonektif," Jurnal Penelitian Agama, vol. XVII, no. 1, 2008.

[4] Kementerian Agama RI, "Jumlah Pondok Pesantren, Guru, dan Santri Menurut Provinsi." [Online]. Available: https://satudata.kemenag.go.id/dataset/detail/jumlah-pondok-pesantren-guru-dan-santri-menurut-provinsi. [Accessed: Sep. 22, 2025].

[5] Z. Dhofier, Tradisi Pesantren Studi Pandangan Hidup Kyai dan Visinya Mengenai Masa

ISSN 2442-5729 (print) || ISSN 2598-2559 (online)
http://jurnal.umsu.ac.id/index.php/almarshad
DOI: https://doi.org/10.30596/jam.v11i2.28131 || Vol. 11, No. 2 Desember 2025

Depan Indonesia. Jakarta: LP3ES, 2011.

[6] M. Hasan, "Inovasi Dan Modernisasi Pendidikan Pondok Pesantren," KARSA: Jurnal Sosial dan Budaya Keislaman, vol. 23, no. 2, pp. 295-305, 2015.

[7] A. Yulanda, "Epistimologi Keilmuan Integratif-Interkonektif M. Amin Abdullah Dan Implementasinya Dalam Keilmuan Islam," TAJDID, vol. 18, no. 1, p. 79.

[8] M. A. Rosyidin, "Interaksi Pesantren Dengan Sains dan Teknologi," Ta'dibuna: Jurnal Pendidikan Agama Islam, vol. 4, no. 1, 2021.

[9] I. A. Batubara, "Integrasi Ilmu Sebuah Konsep Pendidikan Salam Ideal," Journeu-Laiason Academia and Sosiety, vol. 1, no. 1, pp. 759-771, 2022.

[10] M. A. Abdullah, et al., Implementasi Pendekatan Integratif-Interkonektif Dalam Kajian Islam. Yogyakarta: Pasca Sarjana UIN Sunan Kalijaga, 2014.

[11] M. I. Akmal, "Pemikiran Amin Abdullah Seputar Integrasi Keilmuan," Fathir: Jurnal Studi Islam, vol. 1, no. 2, pp. 120-136, 2024.

[12] A. Y. R. Butar-Butar, "Urgensi Dan Kontribusi Observatorium Di Era Modern," Jurnal Tarjih, vol. 13, no. 2, pp. 141-154, 2016.

[13] A. Y. R. Butar-Butar, Observatorium Peran dan Keberadaannya di Indonesia. Yogyakarta: Bildung, 2020.

[14] A. Maskur, "Penguatan Budaya Literasi di Pesantren," IQ (Ilmu Al-Qur'an): Jurnal Pendidikan Islam, vol. 2, no. 01, 2019.

[15] Abdullah, "Kurikulum Pesantren Dalam Perspektif Gus Dur: Suatu Kajian Epistemologis," Jurnal Pendidikan Agama Islam, vol. 4, no. 2, pp. 228-248, 2016.

[16] M. Rifauddin, et al., "Pembinaan Literasi Di Pondok Pesantren Sebagai Bekal Santri Hidup Bermasyarakat," Info Bibliotheca, vol. 1, no. 2, 2020.

[17] E. Setiawan, "Modernisasi pola sistem pendidikan pesantren (studi kasus pondok pesantren modern daarul fikri Mulyoagung dau Malang)," Ulul Albab, vol. 14, no. 2, 2013.

[18] A. B. Sado, et al., "Urgensi dan Kontribusi Observatorium Al-Afaq," Istinbáth Jurnal Hukum dan Ekonomi Islam, vol. 19, no. 1, 2020.

[19] S. Azhari, Studi Astronomi Islam. Yogyakarta: Pustaka Pelajar, 2017.

[20] PPMI Assalaam, "Profile CASA." [Online]. Available: https://blogcasa.wordpress.com/profile. [Accessed: Sep. 10, 2025].

[21] M. A. Abdullah, Multidisiplin, Interdisiplin & Transdisiplin, Metode Studi Agama dan Studi Islam di Era Kontemporer. Yogyakarta: IB Pustaka, 2021.

[22] Hamzah, et al., "Integrasi Pendidikan Islam dan Sains Perspektif M Amin Abdullah dan Imam Suprayogo," Jurnal Pendidikan Islam, vol. 14, no. 1, 2023.