Saudi Journal of Humanities and Social Sciences **ISSN 2415-6256 (Print)**
Scholars Middle East Publishers **ISSN 2415-6248 (Online)**
Dubai, United Arab Emirates
Website: http://scholarsmepub.com/

Atomic Concept During Medieval Muslim Scholarship

Dr. Ali Muhammad
In-charge- Head Islamic Research Academy, Brakpora 192201, Anantnag, Jammu and Kashmir, India

***Corresponding author**
Dr. Ali Muhammad

Article History
Received: 08.09.2017
Accepted: 17.09.2017
Published: 30.09.2017

DOI:
10.21276/sjhss.2017.2.9.7

Abstract: Scientific discoveries put forth new trends in the education during modern times. These trends influenced all aspects of human society. Scienticism is considered modern day religion, ideology and are more relevant and applicable for contemporary society. The perception, all matter being composed of small, indivisible particles called atoms is the base of matter, from which every object has its existence. From its earliest in the second century of the *hijra*, *kalam* has always been enthralled with the theory of atoms. In this paper an attempt has been made to discuss, elaborate and analysis with certain divergence the issue of atomism. The broad theory was generally endorsed by both the Mu'tazilite's and Ash'arites and their views, difference of opinion on the said issue, along with other medieval Muslim Scholars will be discussed at length. Their concept about the role of atom in matter formation in early Muslim scholar writings will serve the base for this paper.

Keywords: Atomism, hylomorphism, causality, atoms, mutakallimun, Ex-nihilo theory

INTRODUCTION

Muslim scholars have developed a spectrum of viewpoints on science within the context of Islamic concept of knowledge. The Qur'an exhorts Muslims to study nature and investigate the truth about the nature. Muslims often cite verse 239 from Surah Al-Baqara – *He has taught you what you did not know.* In support of their view that the Qur'an promotes the acquisition of new knowledge. Scientists of medieval Muslim civilization made many contributions to modern sciences. Among those contributions, Muslim contribution and concept of atom, its nature formation and existence is of great concern. Atoms are microscopic vital edifice protuberance of material. They are the minuscule particles of a chemical element that display all the chemical properties unique to that element. All the material on earth is balanced by assorted mishmash of atoms. The smallest parts were known in Arabic as "*Dharrah*" or "*Jawhar*" (the parts which are not divisible). These atoms play vital role in the formation of matter. Muslim theologians thought that a certain number of atoms was required to compose a matter [1]. Scientifically a row of 100 million atoms would be only about a centimetre long. Atomism and its role in matter formation is a hot debate in contemporary world, not only in politics but also in academia. Knowledge has been fashioned on the strategic grounds at present in order to have dominance over all aspects of life. The atomic theory has changed the discourse of the world from philosophical to practical or empirical life style. Philosophers from the very early discussed the nature and role of atom in matter formation. They put forth different views which were put forward by Greek philosophers, Muslim philosophers and Mutakallimun regarding the atomic nature and matter formation.

Muslim theologians by the last of the 9th century adopted the theory of atomism to interpret nature of the bodies and role of the atom in matter formation. Among the Muslim scholars who introduced atomic theory with much modification was Abu al-Hudhayl. According to him, "Atoms are the smallest indivisible particles, which are called atoms and in Arabic *jawhar*. Their function in a matter is, when some external attributes influence its activities. These characteristics are known in Islamic philosophy as *a'rm,* and accidents in English language. Both a'rm and accidents are not nature free but God has put some attributes in them which emerge at their fixed time for performing their activities. They exist always together and explain the unity function of bodies" [2]. These patterns of atoms help to understand that these are created by a supernatural force which in Arabic terminology called God. Abu al-Hudhayl undertakes the theory of atomism vows that all things consist of indivisible parts, called *jawahir*, the plural of *jawhar*. He considers that each *jawhar*, does not have any qualities in itself except that of existing and occupying space. However, it accepts the qualities which come successively to inhere in it [3].

God being the first cause of all bodies and is absolutely free from matter and accidents, bodies have a beginning and an end and will go through changes as all

other bodies do. Thus, if so God is the first cause and must be immaterial, with no relation to matter [4].

The building endeavours of God are demonstrated in the Mu'tazilite theory of atomism. They are of the view that, bodies comprised of parts, the minutest of which is the *jawhar*, the unit which according to them cannot be further divided. But some Mutazillian scholars like, al-Nazzim (d. AD 836/845) and other theologians from the Baghdad school envision, atom can be substantially divided, giving rise to the theory of the eternity of the world. These particles spring together from side to side with certain abilities, which come consecutively to inhere in them. These qualities are conjunction, *ijtimm'*, departure, *iftirmq*, movement, *araka* and rigidity, *suknn*. Conjunction makes the parts of the matter come together through movement and departure explain its perishing through rigidity [5].

Kalam interpretations contain clear and visible atomic thoughts and naturalistic philosophy. These interpretations can be categorised in three aspects; a) that bodies are constituted out of bundles of accidents. b) That sensible bodies are made out of a bundle of accidents. c) That bodies are constituted out of atoms and inherent accidents. Upholders of first doctrine (ashab al-a'rad namely, Dirar ibn 'Amr (d.200/815), Hafs al-Fard (fl. ca. 195/810), and al-Husayn al-Najjar (d. 835-845) believe that world is creation of accidents and bodies are constituted out of bundles of accidents which shape their attributes and properties [6]. The advocates of 3rd doctrine held world was created through corporeal atoms and incorporeal accidents which occur through atomic reactions by the combinations of atoms to form large units as observed in human life [7]. This concept of atomic combination and formation became primary source of kalam. Such an atomism in the 20th century helped to develop physical theories [8]. Evolutionary theorists proclaims, life is shaped by chance which goes against the basic theory of Islamism. According to this claim, inert and exhausted atoms organize themselves to formulate the cells and then formed other living things [9].

The world functions as it does, with apparent cause and effect, only because it is God's habit for it to do so. Miracles are nothing more than "breaches of habit." There are neither "laws of nature" nor natures intrinsic to things. God can alter His custom whenever He will; no reality exists in things themselves, despite appearances. All ultimately are fictive; subject to alteration or annihilation from moment to moment, and in the twinkling of an eye. Things as they are exist as they do only because God creates them, atom by atom, instant by instant, in continual rhythms of His will. All creations from its lower to higher and vice versa are integrated in a single in spite of their external diversity. Rather than being separate and atomistic units, both moving and immovable are linked on the one hand, and to 'absolute existence,' on the other. The atomistic view of perception can be true only for the sagacity of touching where we touch the different configurations of the atoms [10]. In this regard Ghazali stand was considered as radicle Occasionalism. According to M. Frank as he pointed out that Ghazali:

> *".....the radical Occasionalism according to which no created entity, whether an atom, a matter, or an accident, has any causal effect ... on the being of any other [11]."*

Ibn Sina's definition of the smooth, the coarse on one atomism, that the texture of a matter's surface occurs as a result of the size and regularity of atoms resting on the exterior side of the object. One then imagines these atoms rearranging themselves to produce a different effect [12].

Abd al-Jabbar, afterwards the Basrian Mu'tazilite theologian, promoted the theory of atomism while interpreting the nature of human being. Like all other creatures, man functions through the diverse accidents which come successively to remain within human being. While clarifying the nature of humans, he is of the view like all created things, humans consist of indivisible parts and accidents along with him, a good number of theologians of this passé state, called them indivisible parts (atoms) or substance, *jawhar* [13]. He also consider that substances, can consist of more than one atom and explains the element of stability having ability to transmit things to their species and genus [14]. Accidents, in contrast, occur merely in an ingredient or atom and prompt the elements of alteration which occur to the substance. Traditional theologians and the Mu'tazilite's certainly espoused atomism since it sustained only one dichotomy between God and the world. It is a fact nothing emanates by its own and without an external stimulus which will act upon it either to ignite it or to empower it. Has atom its internal capacity to disturb the existing structure of the existence. Nothing as such exists, therefore nothing acts by its own power except God; He frequently creates the accidents which provide the world with the power to act. 'Abd al-Jabbar and the Mu'tazilite's consider, God as the only power who certifies not atoms and accidents as source of His existence but all other beings and things are constituted from atoms, *Jawahar*, and accidents, *a'rm,*. The essence, for change in this theological system happens through the series of coincidences in the matter [15].

Understanding nature of atoms is a means to realise the physical world. More than 100 different elements subsist in nature, having their individual and distinctive atomic composition. The atoms contained by these elements retort with each other and produce different large quantity of chemical compounds [16]. So the Classical Muslim Scholars earlier consider accidental theory of matter formation with variation.

Some among them believe that they are basically accidents through which bodies are formed by merging of bundles of accidents, while others believed that there are only physical bodies and everything else is constituted out of the interpenetration of these bodies. Most Muslim theologians include both atoms and accidents in their ontology [17]. Ontology was justified with a proof for the world's sequential creation by first moment Known as creator. Thus there is who creates, God and what is created was divided further into what occupies space, namely, substances or atoms, and what does not accidents. Properties and accidents could also be established of subjects to provide further scientific statements, such as "All humans are capable of laughter (a property)" or "Some humans are black (an accident)." As per al-Kindı, One of the standard *kalam* arguments for the existence of God begins with a proof that an infinite is impossible as finite number of days and times is impossible. This evidently leads that there is a creator who put attributes within the creation for further production of matter [18].

Modern science has followed many trends of early Greek natural philosophy by reconsidering the problems which natural philosophers had tried to solve in their attempts to understand the surrounding world. For instance, on 4 of July 2012, physicists around the world celebrated one of the historical events of the 21st century when the LHC at CERN, Geneva observed the existence of a Higgs-compatible boson [19] about the nature of matter and the cosmos, doctrines of Buddha Jain and Nyaya-Vaisesika in Indian civilization are of vital importance at their times [20]. However a more modified and elaborated version of atomicity is found in the teaching of the theologians like Ash'arites, Maturidites, Mu'tazilite and the Ṣufīs in the Islamic Civilization.

Medieval Muslim world was full of philosophical discourses and two important and dominant schools of the philosophical thought emerged while discussing natural philosophy are *kalam* and *falsafa*. *Kalam*, or Islamic scholastic theology, in general come up to issues in physics from an atomistic perspective, which is considered by most of these theologians as composition of bodies along with motion and time as well. Later Islamic theologians in an occasionlist worldview, reserved causal agency for God alone. *Falsafa*, had its roots in the Greek rational thinking particularly in the philosophical thought of Aristotle. Their subsequent description begins with the atomistic theories originated among the Islamic theologians followed by the developments in Aristotelian natural philosophy, by Arabic-speaking philosophers and their unique contributions to the field of atomic and matter formation. In other words, it involves never-ending search in the said field in order to arrive at certainty on the nature of the universe its formation and cause of formation. Obviously these questions can be traced back to the pre-Socratic times when philosophers during that time tried to resolve the central problem namely, nature of being, its change [21] and one of the established school of thought during that era was the atomists formed by Leucippus and Democritus (d. 370 BC) through their theory of *atomos*.

The most thorough search to date was undertaken some seventy years by the late Shlomo Pines, who looked deeply into the Greek, Latin, Persian, and Sanskrit sources available to him [22]. In his recent essay reviewing research on the topic in the decades after Pines's landmark contribution, Josef van Ess still has no definitive answer to his contribution [23].

He limits himself to a few references to Galen's epitome of the *Timaeus*, a text that survives only in Arabic, but which has no discussion at all of atomism. However, he makes no mention at all of other Galenic writings, for example, "*On the elements*" according to Hippocrates. That text opens with a sustained critique of atomism. Moreover, it was the first of the sixteen Galenic works that formed the 'core curriculum' for medical students in late Antiquity. As such a version of the work, which contains significant additions and alterations, was included in the so-called "Alexandrian summaries" or *jawami'*.The one scholar who does mention *On the elements* is Harry Austryn Wolfson in his immensely scholarly works and still under-utilized *Philosophy of the kalam*. Isaac Israeli, a Jewish physician and philosopher worked in Qairou'an in the tenth century, discusses at length Galen and his theory of minimal parts as well as Mu'tazilite atomism, in his Book *"On the elements".* A line arise when books of Israeli and Galen are studied comparatively. While analysing similitudes between Israeli's book and Galen's tract of the atomism"when points are put together, a line arises" [24].

Hunayn translates *atomoi* by the phrase *al-ajza' allati la tatajazza'a*, which became the standard term for atom among philosophers but was frequently used by the *mutakallimun* as well. The insertion of *ajram*, (bodies) before each of the three adjectives makes it clear that three different theories have emerged, that the elements are minimal bodies, they are unattached bodies, or they are bodies without parts [25]. The first of these is the theory of minima, *elakhista*, and in Hunayn's described them as "extreme small bodies, than which nothing is smaller". It is the stage called in modern day scientist as cork an indivisible particle. *Elakhista* is the superlative form of the adjective *elakhos*, "small", and as such, *aqall* alone, the superlative of *qalil*, should suffice for translation. This clarity has base on the distinction between Epicurean minima, from the minima adopted by Galen in his own physics.

Hunayn being a medical researcher, he studies the distinction and transmitted fine details of the various theories, distinguishing between atomistic and non-

atomic ones. The remaining two views are rendered literally: *anarma* appears as *ajram la tattisilu*, "bodies that do not conjoin", and *amere* as *ajram la ajza' laha,* "bodies that have no parts". He once again inserts a noun before each one of the adjectives, but this time he chooses *juz'*, "part", rather than *jirm*, "matter". He used '*juz'* because of the Greek *atomon*, so as to be able to use the standard Arabic term, *al-juz' alladhi la yatajazza'u*. De Lacy remarks that "Galen pays little attention to the specific features of Epicurean atoms" [26] and clearly declared that atomistic difference does not need to be particularized while refuting common and general to all the schools" [27]. Nonetheless, Galen does take note of at least one difference: according to Epicurus, the "first bodies" are "unbreakable because of their hardness", whereas, according to Diodorus and Leucippus, "they are indivisible because of their small size" [28].

Two main theories were put forth by classical Muslim scholars who are worth to be considered as the base model for atomic theory and matter formation. One theory is called Hylomorphism (theory of matter and form) and the other is called atomism (theory of atoms and accidents). Both have been the two main Islamic physical theories attempting to account for the structure of the world, the former fortified by the philosophers (falasifah) and the other by the theologians (mutakallimun). Among the most coherent, scholarly and efficient advocate of atomism is the 6th/12th century mutakallim was Fakhr al-Din al-Razi. His views on geometrical design for atomism is accessible alongside in the midst of a clarification as to why the mutakallimun as entirely, are so steadfast to atomism and Occasionalism. Al-Razi, in his book *Secret of Secrets,* deal with that there were five types of atoms, which were conjoined and disjointed by emptiness [29]. It is density which defines the physiognomies of softness, hardness, lightness, etc., of the four major elements: earth, air, water and fire. The space between the atoms determined the motion of the elements, whether they would rise as air and fire, or descend as water and earth [30]. Abu al-Hudhail opined that a body has existence if possess a right and a left, front and rear, and top and bottom. A matter must, therefore, consist of at least six parts or atoms [31]. Some Muslims scholars, as did Abu Bishr al-Salihi, that only two atoms could come together, others believed that two atoms formed a plane and three a solid [32]. If one were to concede, according to al-Salihi, that one atom could touch a larger surface, then the entire world could be placed in a very small volume [33].

From genesis of the atomic thought process in Islamic world, two major but complementary theories of the original structure of the physical world remain of prime focus. One influenced by Aristotelian-Avicenna theory of form and matter (surah wa maddah = hylomorphism) represented by great majority of the falasifah and the other theory of atoms and accidents (jawahir wa a'rad = atomism) of the great majority of the Mu'tazilite and Ash'arite - Maturidies mutakallimun. The rational theory of bodies as encompassed of matter and form have a proclivity to characteristics a degree of causal autonomy to matter is viewed by the mutakallimun as problematic materially and theologically. For whom the world, including matter, is totally dependent on God for every spatio - temporal instant of its existence. In hylomorphism, it is sovereign nature of matter working on the basis of natural causal principles involve a necessary connection between physical causes and effects.

God is the vital transcendent inceptor mujid and muhdith designed the world in its proper order, and put all actions of atom under proper control for matter formation. He is also the immediate and ultimate sustainer (mubqi) and (mudabbir) of the world. According to Endress, "The affirmation of atomism had been one of the solutions found by Muslim theologians for upholding the cause of their theology. Aphorise with reference to the omnipotence and omniscience of God [34]."

Yahya ibn 'Adi (d. 363/974), an early mutakallimun set forth the idea of atomist polemics with valuable thought, especially the newly self-assured Ash'arites [35]. After a long gap Ibn Sina in his works Shifa [36], Najat [37], and 'Uyun al-Hikmah [38] draw a significant commitment with features of physical theories and atomism [39]. But was criticized by al-Beruni for rejecting kalam theory of atomism [40].

Abu Rashid, deliberated the problem of the leeway of one atom taking the place of two atoms [41]. He also specified that two atoms may be disjointed without the occurrence of a third one between them. Hollow space is thus postulated [42]. Abu Rashid also declared that the atom must have a dimension [43].

Abu Bakr Muhammad Zakariyya al-Razi (d.925) forwarded a new model of atomism, in which he emphasized on the concept of eternal entities a different version than mutakallimun [44]. Ibn Hazm have different view about the creation, ex-nihilo and castoffs both atomism and hylomorphism [45]. Taking into observation the whole scientific notions, which are not value-free, but value-laden [46]. Thus, it needs to critical examination of premises, general conclusions and the interpretations so that the problems faced by modern science are not being imported to the mind of Muslims scientists. As Naguib al-Attas puts it:

> *Modern philosophy has become the interpreter of science, organizes the results of the natural and social sciences into a world view. The interpretation in turn determines direction which science is to take in its study of nature. It is this interpretation of the statements and general conclusions of science and the*

> *direction of science along the lines suggested by the interpretation that must be subjected to critical evaluation, as they pose for us today the most profound problems that have confronted us generally in the course of our religious and intellectual history [47]*.

According to Mortimer J. Adler [48], "the subject matter of physics is the sensible word of *changing* matter in motion. If it is not involved with the phenomena of *change*, it no longer belongs to the realm of physics". Fakhr al-Dīn al-Rāzī also gave a similar definition of physics (*'ilm al-abī'ah*), the study of material bodies that go through *change* and are both in motion or rest [49]. Instead, metaphysics (*ilāhiyyāt*), means study of things 'beyond the Physical existence'. It looks that modern physics contemplates, change is to be the ultimate nature of reality; and is absolute. However reality in itself is both permanent and changeable. To assert that there is something permanent whereby change occurs [50].

In the development of scientific arena, some physicists such as Stephen Hawking in his book "The Grand Design" has claimed that philosophy is dead [51]. He vehemently forwarded his thought, philosophy has failed to answer important questions about the universe whereby physics has succeeded in giving solution to the problem. Against his view, some physicists argue that metaphysics still plays an important role because of its nature of understanding and doubt about the nature. The followers of this thought rely on issues based on the best available physics in contemporary era [52]. The reasons that physics is ever changing, therefore metaphysics also have to change in conformity with current understanding of physics and the vagueness of understanding about fundamental elements such as the understanding about God, the nature of the universe and its connection with God and the place of man in the universe. In this case, metaphysics is the *foundation* and the *interpreter* of physics. This is aligned with Ibn Sīnā's affirmation and concurred by Fakhr al-Dīn al-Rāzī that physics is derived not from physics itself but its origin is from metaphysics [53]. It is important for metaphysics to be the basis of physics so that we do not deviate from the purpose of studying nature as signs of God because science itself is a definition of reality [54]. For establishing the truth of matter and atomic design without denying explicitly or implicitly God's Power and Omnipotence. So atomic design and its occurrence in the nature needs to understood within the philosophy of matter formation. All matter has its origin from atom, which are known as building blocks and they come into existence by the will of God and its established philosophy of كُنْ فَيَكُوْن "be, it becomes"

Generally there are at least three main different views of the world throughout the history of Western science in which each of them arrived at different views on the nature and existence of God [55]. Those views belong to: (i) Aristotelian physics, (ii) classical physics and (ii) the contemporary physics drawn from the theory of relativity/quantum theory. In Aristotelian physics, God still has a place in his theory of atomic motion and matter formation. He is the unmoved mover or primary and final cause that causes motion in anything. However, Aristotle's God is like a craftsman, all motion He causes are eternal [56]. The world is eternal, having no beginning and end, it always existed and would always exist as per nature's will [57].

Modern philosophy is the interpreter of science [58] and the important character who contributes in the modern philosophy discourse was René Descartes (d.1650). In his *Discours de la Méthode* (1637) declared, "laws which God has put into nature". God has impressed the ideas of them on the human mind in such a way, that their universal validity cannot be doubted. His emphasis was, Matter formation by God's will allowed nature to develop from commotion in accordance to these laws. Even if God had created several worlds the "laws of nature" (*loix de la nature*) would be valid in all of them [59]. It was composed ultimately of absolutely hard, indestructible particles, equipped with the same characteristics which had now become familiar under the category of primary qualities. He also asserts that all changes in nature are regarded as separations, associations and motions of these permanent atoms. In his own words:

> "*All these things being considered, it seems probable to me, that God in the beginning formed matter in solid, massy, hard, impenetrable, movable particles of such sizes and figures, and with such other properties, in such proportion to space, as most conduced to the end for which he formed them; and that these primitive particles, being solids, are incomparably harder than any porous compounded of them; even so very hard, as never to wear or break in pieces: no ordinary power being able to divide what God himself made one in the first creation*" [60].

> "*Yet, had we proof of but one experiment that any undivided particle, in breaking a hard and solid matter, suffered a division, we might by virtue of this rule conclude that the undivided as well as the divided particles may be divided and actually separated to infinity*" [61].

The last one is contemporary physics that was much influenced by the birth of quantum theory and the theory of relativity since it ponders on the nature of the subatomic particles. There are many interpretations on the nature of the subatomic world in quantum theory and the most well accepted interpretation among the physicist is the Copenhagen interpretation propounded by Niel Bohr and Werner Heisenberg. The most

concern question with regard to quantum theory is the nature of reality; that there is no reality, that the physicist "creates" the reality, that there are many realities, that the reality is "spiritual" and so forth [62].

There are three different views on the origination of the physical world in the Islamic cosmology. First is the view taken purely from the Holy Qur'an that God is the Creator of the Heaven and the earth and all that is between them? This view has no further deliberation and is taken as a dogmatic system of cosmogony and theology. Second is the view that the world is brought into existence by the way of emanation of God instead of creation. This is the view of neo-platonic and Aristotelian conception of the world. Third is based on the first view but it was broadened by a metaphysical explanation, demonstrating not just the theory of the origination of the world but the continuous re-creation of the world [63].

The Ash'arites belongs to the third group. According to them that the nature of physical world in which the structure and the process of the cosmos include bodies, time, space and energy are discrete or discontinuous instead of continuous [64]. The world is being created from nothing into something (*creatio ex nihilo*) and the creation process occurs at every instant of time by God. In other words, it is always in the state of being created and annihilated. The perishing of things is called *fanā'* and the perpetual process of renewal is called *khalq jadīd*. Therefore, the world is ever *new* (*muhdath*) [65]. However, this continuous re-creation phenomena cannot be grasped by our ordinary senses because the process is too brief and we are ourselves part of this process. Even though it cannot be observed with our senses, it is accessible through intellectual reflection and spiritual experience, i.e. *trans-empirical* consciousness which is a valid channel of acquiring knowledge in the worldview of Islam. So atomistic cosmology based on the Holy Qur'an [66] is the rational proof to stress the absolute dependence of the world and everything in it on the power and the will of the Creator (*al-Khāliq*). To explain the nature of this ever-perishing existence, the Ash'arites scholars of the past assert that the world is composed of atoms (*jawāhir*) and accidents (a'rād) [67]. But God is neither atoms nor accidents. Therefore, we define the world; everything other than God [68], because this term *al-'ālam* is derived from *al-'ilm* that is knowledge; and everything that is providing knowledge of God and providing evidence of Him is an *'ālam* [69]. Any Knowledge about atom or its indivisible, self-subsistence has no magnitude, for magnitude requires atom to become infinitely divisible [70].

All bodies, are made of atoms and their combination is actually existence of bodies. All bodies are composed of akin atoms and the variance of bodies is caused by their variance in accidents. Accidents which give qualities to bodies, cannot sustain for two continuous moments; for it will expire upon coming into existence and being continually replaced by a new accident. These accidents are tremendously added to the substance and inseparable from all material things. There is no inherent nature in things because God creates a substance and simultaneously its accidents. It will destroy after its creation and other similar or different accidents take its place. This is the God's customary way of acting in creating and fashioning this world. Therefore, there is an unlimited possibility of phenomena in the world. The absence of a property is itself a property that exists in the matter. For example, rest is real as motion. They also assert that the idea of the infinite is inadmissible for God has determined everything according to His measures. To encourage Muslim scientists to increase in value the works of the medieval scholars' and creatively develop from them thoughts, potentially being ignored by the scientific community in the West. In this regard the importance of metaphysics and physics and the hierarchical order of both of them in understanding the nature of the universe is necessary and incumbent to prove the natural phenomenon with the tauhedic paradigm that God is sole creator of matter. It is he who embodied every minute particle with qualities of change so that new things will come into existence.

REFERENCES

1. Kiki Kennedy-Day. (2003). *Books of Definition in Islamic Philosophy, Routledge Curzon*, New York, 138.
2. Elkaisy-Friemuth, M. (2006). God and Humans in Islamic Thought, Rutledge, New York, 12.
3. Ibid p.53
4. Abd al-Jabbmr, Al-Majmn' fl al-Mu.ly bi-al-Takllf, ed. Sayd 'Azml, Cairo: al-Dmr al-Maxriyya li-ta'llf wa al-Nashr, n.d., pp. 172. 177-78.
5. Abd al-Jabbar, Shar., pp. 96–104, Al-Ash 'arl, Maqalat, p. 304, 'Abd al-Jabbar, al-Mu.hit, pp. 35–45.
6. Dhanani, AN. (1994). The Physical Theory of Kalam, *Atoms, Space, and Void in Basnan M uctazih Cosmology*, E.J. Brill New York, 1994 *p*:4.
7. Ibid, p.5.
8. Wolfson, H. (1976). Discusses kalam atomism in "Chapter VI: Atomism" in his The Philosophy of Kalam, (Cambridge: Harvard University Press, pp.466-517.
9. Yahya, H. (2003). True Wisdom Described in the Qur'an, Good-word Books, New Delhi, 111.
10. Kalin, I. (2001). Knowledge in Later Islamic Philosophy: Mulla Sadra on existence, intellect, and intuition, Oxford University Press, Inc., New York, 241
11. Frank, Richard M. (1992). *Creation and the Cosmic System: Al-Ghazâlî and Avicenna*. Heidelberg: Carl Winter, 1992, 36 quoted by Eric Ormsby, Makers *of the* Muslim World, One-world Publications, Oxford, 80, 101.

12. Kiki Kennedy-Day. (2003). *Books of Definition in Islamic Philosophy*, Routledge Curzon, New York, 135.
13. Peters. Created Speech, pp. 121, 122, see also Dhanani, Physical Theory, pp. 55–7.
14. Ibid pp. 119–21.
15. Maha Elkaisy-Friemuth, Op.cit, pp. 152-162.
16. Rogers, K. (2010). The 100 Most Influential Scientists Of All Time, (Edited) Britannica Educational Publishing, New York, p.80.
17. Wolfson, H. A. (1976). The Philosophy of The Kalam, Harvard University Press, 15.
18. McGinnis, J., & Riesman, D. C. (2007). Classical Arabic Philosophy: An Anthology of Sources (Trans.) Hackett Publishing Company, Inc. Cambridge, p.xxix.
19. Collab, A., & Aad, G. (2012). Phys. Lett. B 716, 1–29, CMS collab; S. Chatrchyan et al, Phys. Lett. B 716, 30–61.
20. Pines, S. (1936). Studies in Islamic atomism. Jerusalem: The Magnes Press, The Hebrew University, 1997, U. Mishra, Conception Of Matter: According To Nyaya-Vaisesika. Bank Road: Allahabad.
21. Pines, S. (1986). Studies in Arabic Versions of Greek texts and in Mediaeval Science (The Magnes Press, Brill, Leiden, 1986), p.355.
22. Pines's study. (1997). Beiträge zur islamischen Atomenlehre (Berlin, 1936), was his doctoral dissertation under the formal guidance of H. H. Schaeder. In the 1970s Michael Schwartz, in collaboration with Pines, prepared an English version, which incorporated some revisions and additions. After Pines's death, the typescript of this revised translation (which included some hand-written notes by an unidentified individual) was given over to me to prepare for publication. The English version, Studies in Islamic atomism, was published by the Magnes Press, Jerusalem.
23. Ess, J. V. (2002)."Sixty years after: Shlomo Pines's Beiträge and half a century of research on atomism in Islamic theology. *Proceedings of the Israel Academy of Sciences and Humanities, vii*, 19–41.
24. Wolfson, H. A. (1976). Philosophy of the kalam (Cambridge, MA, and London, 1976), 485.
25. de Lacy, P., Galen. (1996). On the Elements According to Hippocrates (Corpus Medicorum Graecorum, vi/2; Berlin, 164.
26. Ibid; 163.
27. Singer, P. (1982). "Levels of explanation in Galen", Classical quarterly, xlvii (1997), 525–42, p. 532, J. S. Wilkie and G. E. R. Lloyd, "The Arabic version of Galen's De elementis secundum Hippocratem. *Journal of Hellenic studies, cii*, 232–33.
28. Lacy, D. op. cit. (ref. 23), 62: 17.
29. Ruska, J. (1937). *Al-Razi 's Buch Geheimniss der Geheimnisse* (Berlin; 1937).
30. Heym, G. in *Ambix*; I; p. 188; in M. Levey: *Early Arabic Pharmacology*; op cit; p. 45.
31. In M. Levey: *Early Arabic;* p. 45.
32. Ibid.
33. Ibid.
34. Allday, J. (2002). Quarks, Leptons and the Bing Bang, 2nd ed. Bristol: Institute of Physics Publishing, p. 1.
35. Slezak, M. (2012). "New Particle, New Questions," *in New Scientist, vol. 215, no.* 2873, 6–9.
36. Pullman, B. (1998). The Atom in the History of Human Thought. New York: Oxford University Press, 31.
37. Pines, S. (1997). Studies in Islamic atomism. Jerusalem: The Magnes Press, The Hebrew University.
38. Mishra, U. (2007). Conception Of Matter: According To Nyaya-Vaisesika. Bank Road: Allahabad.
39. Setia, D. (2007). *Islam & Science 5,* 23–52.
40. Laudan, L. (1984). Science and Values. Berkeley: University of California Press.
41. Biram, A. (1902). *Kitabu'l masai'l*. etc. ed (Berlin).; pp. 36
42. Ibid; pp. 36-43.
43. Ibid. p. 47.
44. Adler, M. J. (1952). "The Great ideas: A Syntopicon of Great Books of the Western World" vol. 1 & 2. Encyclopædia Britannica, Chicago.
45. Setia, A. (2004). *Islam & Science 2* (2), 161–180.
46. Setia, A. (2007). *Islam & Science 5*, 23–52, L. Lauran, Science and Values. Berkeley: University of California Press, 1984.
47. Al-Attas, S. M. N. (2001). Prolegomena to the Metaphysics of Islam: An Exposition of the Fundamental Elements of the Worldview of Islam. Kuala Lumpur: International Institute of Islamic Thought and Civilisation (ISTAC).
48. Adler, M. J. (1952). "The Great ideas: *A Syntopicon of Great Books of the Western World" vol. 1 & 2.* Encyclopædia Britannica, Chicago.
49. Setia, A. (2004). *Islam & Science 2* (2), 161–180.
50. Al-Attas, S. M. N. (1994). Islam and the Philosophy of Science. Kuala Lumpur: International Institute of Islamic Thought and Civilization (ISTAC).
51. Mlodinow, L., & Hawking, S. (2010). The Grand Design. New York: The Random House Publishing Group.
52. Zilsel, E. (1942). *The Philosophical Review 51*, 245–279.
53. Setia, A. (2004). *Islam & Science 2* (2), 161–180.
54. Ismail, Z. (2008). *Islam & Science 6* (1), 31-53.
55. Kitchener, R. F. (1998). Introduction: The World View of Contemporary Physcis: Does it Need a New Metaphysics, in The World View of Contemporary Physics, edited by R. F. Kitchener, Albany: State University of New York Press, 3–24.
56. Pullman, B. (1998). The Atom in the History of Human Thought. New York: Oxford University Press, 31.

57. Huff, T. E. (2003). The Rise of Early Modern Science: Islam, China and the West, 2nd ed. Cambridge: Cambridge University Press, 000000.
58. Al-Attas, S. M. N. (1994). Islam and the Philosophy of Science. Kuala Lumpur: International Institute of Islamic Thought and Civilization (ISTAC).
59. Zilsel, E. (1942). *The Philosophical Review 51*, 245–279.
60. Newton, I. (1721). Opticks: or, a Treatise of the Reflections, Refractions, Inflections, and Colours of Light. London.
61. Newton, I. (1803). The Mathematical Principles of Natural Philosophy, vol. 2. London: Daniel Adee.
62. Kitchener, R. F. (1982). "Introduction: The World View of Contemporary Physcis: Does it Need a New Metaphysics," in The World View of Contemporary Physics, edited by R. F. Kitchener, Albany: State University of New York Press, pp. 3–24.
63. Zarkasyi, H. F. (2010). Al-Ghazālī's Concept of Causality: with reference to his interpretations of reality and knowledge. Kuala Lumpur: IIUM Press.
64. Maimonides, M. (1986). The guide of the perplexed, translated by S. Pines, and L. Strauss, Chicago: University of Chicago Press, 1963. S. M. N. Al-Attas, A Commentary on the hujjat al-Siddīq of Nūr al-Dīn al-Rānīrī. Kuala Lumpur: Ministry of Culture.
65. MacDonald, D. B. (1927). *The History of Science Society* (9), 326–344. S. M. N. Al-Attas, Islam and the Philosophy of Science. Kuala Lumpur: International Institute of Islamic Thought and Civilization (ISTAC).
66. Al-Attas, S. M. N. (1999). The Degrees of Existence. Kuala Lumpur: International Institute of Islamic Thought and Civilization (ISTAC), 1996, Osman Bakar, The history and philosophy of Islamic science. Cambridge: Islamic Texts Society.
67. Al-Attas, S. M. N. (1988). The Oldest Known Malay Manuscript: A 16th Century Malay Translation of the "Aqā"id al-Nasafi. Kuala Lumpur: Department of Publications University of Malaya.
68. Fakhry, M. (1928). A History of Islamic Philosophy. New York: Columbia University Press, 1970, A. Q. al-Baghdādī, Uṣ ūl al-Dīn. Istanbul.
69. Setia, A. (2004). *Islam & Science 2* (2), 161–180.
70. Setia, A. (2006). *Islam & Science, 4* (2), 113–140.