

# Time in Islamic *Kalam*

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## Abstract

Time is basically connected with change of state. Natural time units are taken from the periods of motion of astronomical objects like the Sun and Moon. It was realized by the ancients that time is very much connected to motion. In fact, time was considered to be a measure of motion.

In Islamic *Kalam* time was regarded as being always related to space, space and time were considered to be relative measures. Both space and time were considered to be discrete. Some Muslim theologians and *Mutakallimun* have detailed these aspects of time to such an extent that one can figure-out a whole theory of space and time. Their views concerning the relationship between space and time are in good agreement, conceptually, with contemporary philosophical conception of relativistic time.

In this short paper I examine the ideas of two leading Islamic thinkers about time, Ibn Hazm Al-Zahiri and Al-Ghazali. Both thinkers, who may be considered good representatives of *Kalam*, refuted the notion of absolute space and absolute time, always considering space and time to be inter-related. Al-Ghazali talked specifically about the “time-dimension” and considered it to be on equal footing with spatial dimensions. In fact many of the properties of time in Islamic *Kalam* agree conceptually with the description of time in relativity theory. Furthermore, Islamic *Kalam* assumes that time (like space) came into being with the creation of the universe, and therefore they consider the question: ‘what was God doing before the creation of the universe?’ meaningless. Most of the *Mutakallimun* considered time (and space) to be discrete, being composed of finite, non-divisible moments called *Ana*. In accordance with Islamic creed, *Mutakallimun* considered God to be outside space and time.

## Introduction

In Arabic “*Kalam*” means speech (or a collection of words). However, it also means “dialogue” and this is the meaning which was intended for Islamic *Kalam*. In its philosophical content, “*Kalam*” is a collection of concepts, assumptions, principles and problems that tries to explain the relationship between God and the physical world in accordance with the basics of Islamic creed.

*Kalam* was classified into *Jaleel al-Kalam* and *Dakik al-Kalam*. The former is the part dealing with problems related to the Divine attributes, the resurrection of the dead, and questions related to the Divine knowledge, will and power. On the other hand, *Dakik al-Kalam* deals with problems of natural philosophy, most prominent of which is the question of the temporality or eternity of the world, and the question of causality. This led to discussions of the concepts of space, time, motion and many other aspects of the physical world.

Using Ian Barbour’s terminology<sup>1</sup>, *Jaleel al-Kalam* would be called “natural theology”, whereas *Dakik al-Kalam* is the “theology of nature”.

Despite the fact that the subject of *Kalam* has been largely ignored, I feel that *Dakik al-Kalam* has much to offer of philosophical and scientific interest, particularly to contemporary philosophy of physics.<sup>2</sup> Indeed, the “Kalam cosmological Argument” devised by William Craig<sup>3</sup> is just one contemporary example in a whole field of ideas, concepts and arguments that can be utilized by the modern philosophy of science. However, the subject is in such a state now that it cannot lend itself to an effective role without being purified, reformulated and harmonized with modern philosophy. A great deal of painstaking work needs to be done in order to qualify *Dakik al-Kalam* for a contemporary role. Much of the contemporary debate about the existence of God and the philosophical implications of a universe that has a beginning in time<sup>4</sup> was the subject matter of hot discussions among *Mutakallimun* during the 8<sup>th</sup>-11<sup>th</sup> century. Sometimes one can spot similarities between the old arguments of *Mutakallimun* and contemporary arguments advanced by opponents and proponents of God's existence.

The aim of this limited study is to expose some of the original thoughts of Muslims, namely the *Mutakallimun*, about the notion of time in the hope that it may provoke more detailed and fully accounted studies.

## **The two main schools of *Kalam***

*Mutakallimun* formed two main schools, the *Mu'tazilites* who were the first to be formed, and the *Ash'arites*. The main pioneers of the *Mu'tazilites* were Wasil Ibn Atta' (d. 748 A.D), Amr ibn Ubaed (d. 762 A.D), Abul-Huthail Al-Allaf (d. 841 A.D), Ibrahim Al-Nazzam (d. 835 A.D), and Al-Jahiz (d. 868 A.D). Later generations of *Mu'tazilites* include Abu Al-Hussein Al-Khayyat (d. 912 A.D) and Abu Al-Kassim Al-Balkhi (sometimes called Al-Kabi) (d. 931 A.D), Abu Ali Al-Jeba'ie (d. 915 A.D) and his Son Abu Hashim Al-Jeba'ie (d. 933 A.D). Some of the original works of these prominent *Mu'tazilites* were preserved through the monographs written by their students and followers like Abu Rashid Al-Naysaburi (d. 1024 A.D) and Abdul-Jabbar Al-Hamadani (d. 1024 A.D) who wrote an extensive monograph about *Mu'tazilites* that preserved much of their original thought, and his student Ahmed ibn Mattaweyh (d. 1060 A.D) who wrote a book preserving a good deal of the opinions of early *Mu'tazilites* on the subjects of *Dakik al-Kalam*.

The *Ash'arites* school was formed by Abu Al-Hasan Al-Ash'ari (d. 935 A.D) who broke away from the *Mu'tazilites* and formed a new school of thought within the trends of *Kalam*. Beside Al-Ash'ari the most prominent contributors to *Ash'arites Kalam* was Abu Bakr Al-Baqillani (d. 1012 A.D), and later Abu Al-Ma'ali Al-Juayni (d. 1085 A.D) who wrote some excellent monographs on *Dakik al-Kalam* and *Jaleel al-Kalam*. In later times the *Ash'arites Kalam* was reformulated by Azud Aldeen Al-Eji (d. 1355 A.D) whom can be considered the last of the classical *Mutakallimun*.

Ibn Hazm Al-Zahiri (988-1063 A.D) was one of the Islamic thinkers who summarized some of the most fundamental opinions and views of *Dakik al-Kalam* in the first volume of his treatise "*Alfisal fi Al-Milal wa Al-Ahwa' wa Al-Nihal*"<sup>5</sup> in which he reviewed the different Islamic factions and religious groups. Abu Hamid Al-Ghazali (d. 1111 A.D) was one of the prominent Islamic thinkers who disputed the views of philosophers in his famous book "*Tahafut al-Falasifa*", meaning "*The incoherence of the Philosophers*"<sup>6</sup>. In which he discussed at length the propositions of philosophers and countered them mostly with the views of *Mutakallimun*. In this paper I will quote chiefly from these two thinkers.

## **Resources of *Kalam***

The resources of *Kalam* are quite different from those of classical natural philosophy, including the philosophy of the Greeks. *Mutakallimun* considered the Qur'an to be the prime source for their knowledge of the world, and

accordingly they sought to achieve an understanding of the world based on the stipulations of the Qur'an. Richard Walzer summarized this by saying that "Mutakallimun followed a methodology that is distinct from that of the philosophers in that they take the truth of Islam as their starting point"<sup>7</sup>. This is the main reason why we find that *Kalam* concepts are different in meaning and implication from their counterpart in the Greek and Indian philosophies.

The approach of *Mutakallimun* to understanding the world can be presented as follows:

God → Reason → The World

This is just opposite to the approach of the Greek philosophers, which can be presented by the sequence

The World → Reason → God

Effectively, the same difference applies to Muslim philosophers as opposed to *Mutakallimun*, except that the Muslim philosophers adopted a more compromising approach. William Craig recognized this point clearly by saying that: "The main difference between a *Mutakallim* (practitioner of *Kalam*) and a *Failasuf* (philosopher) lies in the methodological approach to the object of their study: while the practitioner of *Kalam* takes the truth of Islam as his starting-point, the man of philosophy, though he may take pleasure in the rediscovery of Qur'anic doctrines, does not make them his starting-point, but follows a 'method of research independent of dogma, without, however, rejecting the dogma or ignoring it in its sources'<sup>8</sup>. Obviously this does not rule-out the possibility that some *Mutakallimun*, especially those appearing at later times, i.e., during the twelfth century and after, were influenced one way or another by Greek or Indian philosophy and methodology. Original studies, however, show that the Greek influence in *Kalam* is minor and only speculative<sup>9</sup>.

As to the methodology that was followed by *Mutakallimun* one finds that they used rational argumentation in defense of their propositions and reasoning. None of the *Mutakallimun* were concerned with any sort of mathematical proof, although most of them used the geometric and physical realization of the world as one main argument in presenting their views.

### **The main principles of Dakik al-Kalam**

Despite the differing views expressed by *Mutakallimun* belonging to different schools, we find that they all subscribed to certain common basic

principles which they proposed in order to understand nature. These principles are<sup>10</sup>:

### 1. **The Creation of the world:**

According to *Mutakallimun* the world is not eternal but was created some finite time in the past<sup>11</sup>. Space and time had no meaning and never existed before the creation of the world<sup>12</sup>. Despite the fact that some of the *Mutakallimun* believed that creation took place out of a pre-existing form of matter, the dominant view of *Mutakallimun* in this respect is that creation took place *ex-nihilo* i.e., out of nothing<sup>13</sup>.

### 2. **Discreteness of natural structures:**

*Mutakallimun* assumed that all entities in the world are composed of a finite number of a fundamental component called *Jawhar* (substance)<sup>14</sup> which is a non-divisible entity that has no parts. The *Jawhar* is rather an abstract entity that does not acquire its physical properties unless occupied by a character called 'Aradh (i.e., accident)<sup>15</sup>. These accidents are ever-changing characters. This was expressed by saying that no accident can remain two successive instants. Discreteness applies not only to material bodies but to space, time, motion, energy (heat) and all other properties of matter.

### 3. **Continuous creation and ever changing world:**

*Mutakallimun* assumed that the world has to be re-created every moment<sup>16</sup>. They accommodated this idea by proposing that the world is in a state of continuous creation, i.e., that once it is created it is immediately annihilated and so forth. For some reason or another, *Mutakallimun* associated this action of re-creation with 'Aradh rather than with the *Jawhar*. But once we know that the *Jawhar* cannot stand without 'Aradh, we realize that the process of re-creation is for both. By such a process God stands as the sustainer of the world.

### 4. **Indeterminism of the world:**

*Mutakallimun* considered the laws of nature that we recognize to be contingent and undetermined<sup>17</sup>. Consequently they considered events taking place in nature to be probabilistic rather than deterministic. This resulted in rejecting the existence of natural absolute causality<sup>18</sup>. *Mutakallimun* also rejected the Greek four basic elements<sup>19</sup>.

### 5. **Space and time:**

*Mutakallimun* had the understanding that space has no meaning on its own. Without having a body we cannot realize the existence of space. So too with time, which cannot be realized without the

existence of motion which, in turn, needs a body to be affected. This is the main point that will be investigated in this paper.

The fact that different schools of *Kalam* presented different details of these general principles has sometimes given an undue appearance of contradiction. However the main trend of their works fell on the opposite side to the views of Islamic philosophers like Avicenna, Farabi, Razi and Averroes. On the other hand, it should be pointed out that some of Al-Kindi's propositions concerning space and time do agree with those of *Mutakallimun*, especially those of Ibn Hazm and Al-Ghazali<sup>20</sup>. I will not take this point any further in this paper since I will be limiting its scope to an examination and discussion of Ibn Hazm and Al-Ghazali.

### **The definition of time:**

First let us briefly discuss the definitions of time according to *Mutakallimun*. Al-Ash'ari quoting Abul-Huthail saying that "*time is the duration between one action and another*"<sup>21</sup>, while Al-Jurjani (d. 1413) in his short dictionary of *Kalam* and philosophical terms defines time as "*a known renewable that is used to specify another which is unknown*"<sup>22</sup>. This may be explained by saying that time is always defined to mean "timing" so that it is always connected with an event. This meaning was pointed to by Al-Ash'ari when he said: "*some [Mutakallimun] considered time to be the timing of a thing; if you say I will come when Zaid comes then you have timed your coming with that of Zaid*"<sup>23</sup>. Obviously this kind of definition is very condensed and would be more readily understood in the original Arabic. However, according to Ibn Hazm, time is defined to be "*the duration within which a particle would exist motionless or in motion, and if it (the time) is separated from the body, then the body will cease to exist and the time will cease to exist too*"<sup>24</sup>. In this definition time is directly connected with motion and the existence of a body that is the subject of the motion. This is why Ibn Hazm repeatedly referred to this definition of time throughout his discussion of the creation of the world.

### **The main aspects of Time in *Kalam***

The problem of time was discussed in Islamic *Kalam* within the context of the subject of the creation of the universe. I can specify the main aspects of time in Islamic *Kalam* by the following:

### **Space-time integrity:**

In Arabic the term *space* means: the surface that confines a body from all or part of its sides. They used this term to describe the volume occupied by the body. *Mutakallimun* considered space and time always to be co-existing, and that neither space nor time can exist independently. On the other hand, both space and time were considered to be a property of the physical world that would not exist in the absence of bodies. Ibn Hazm says, "*Time is the duration through which an object stays at rest or in motion, and if the object is to be deprived of this [rest or motion] then that object will cease to exist and time will cease to exist too. Since the object and the time both do exist, therefore they both co-exist*"<sup>25</sup>.

Bodies themselves would not exist without motion; rest itself was considered by some of the *Mutakallimun* to be a kind of simultaneous motion in two opposite directions. Al-Ash'ari, who is famous for his collection of the *Kalam* heritage, says that he read a book of Al-Nazzam in which he says, "*I cannot understand rest except that the body has moved therein two instants*"<sup>26</sup>. This I understand to be successive movements in two opposite directions.

### **The relativity of time:**

Space and time were both considered to be dependent on the relative position of the observer, forward and backward, "above" and "below" are all considered to be spatial assignments that depend on the reference. Likewise "before" and "after" were considered to be relative. Al-Ghazali expressing his views on this point said "*All this is due to the inability of the estimative [faculty] to comprehend an existence that has a beginning except by supposing a (before) for it. This (before) from which the estimation does not detach itself, is believed to be a thing realized and existing, namely, time. This is similar to the inability of the estimation to suppose the finitude of body overhead, for example, except in terms of a surface that has an above, thereby imagining that beyond the world there is no place, either filled or void. Thus, if it is said that there is no "above" above the surface of the world and no distance more distant than it, the estimation holds back from acquiescing to it, just as if it is said that before the world's existence there is no (before) which is realized in existence, [and the estimation] shies away from accepting it*"<sup>27</sup>.

*Mutakallimun* rejected the notion of absolute space and absolute time. When discussing the notion of absolute space and absolute time according to the understanding of the philosophers, Ibn Hazm said, "*And their time and space is not the space that we know, nor it is the time that we know, because the space that we know is the one that surrounds the localized [body] from all or some of its sides ....., and the time that we know is the duration through*

*which an object would stay at rest or in motion or the duration of the existence of the accident in a body, or in general we would say the duration of an orbit....., and they say that absolute time and absolute space are something else other than what we have defined by space and time and those are independent"*<sup>28</sup>.

Ibn Hazm rejected the independence of absolute space and absolute time that was adopted by philosophers. Beside his basic objection to the notion of absoluteness, he says "*And they say that this [absolute] space and absolute time are independent of each other, so we ask if they are as such what then separated them apart? Then if they claim that something separated them apart, they have to admit some composition to them of their genus which would have separated them"*<sup>29</sup>.

Al-Ghazali treated space and time on an equal footing in respect of being both relative in extension, and being observer dependent, he said: "*Similarly, it will be said that just as spatial extension<sup>30</sup> is a concomitant of body; temporal extension<sup>31</sup> is a concomitant of motion. And just as the proof for the finitude of the dimensions of the body prohibits affirming a spatial dimension beyond it, the proof for the finitude of motion at both ends prohibits affirming a temporal extension before it, even though the estimation clings to its imagining it and its supposing it, not desisting from [this]. There is no difference between temporal extension that in relation [to us] divides verbally into (before) and (after) and spatial extension that in relation [to us] divides into (above) and (below). If, then, it is legitimate to affirm an "above" that has no above, it is legitimate to affirm a (before) that has no real before, except an estimative imaginary [one] as with the (above)"<sup>32</sup>.*

### **Time finiteness and discreteness:**

Discreteness was one main principle, among several others, that *Mutakallimun* proposed as being a basic feature of the physical world. The discrete structure was applied to everything in nature. Specifically time was thought to be composed of tiny units, each of which was called "Ana". *Mutakallimun*, believing that the age of the universe was finite, assumed that the number of instants is denumerable. Ibn Hazm says: "*Any object in the world and every accident in an object and every time are all finite and have a beginning. We see this sensibly and objectively because the finiteness of an object is obvious through its size and through the time of its existence. The finiteness of time happens though what comes next to the past, and the exhaustion of every time [period] after its existence, as NOW is the limit of it,*

*and it is this [now] which separates the two times; the past and the future and it is as such that one time ends and another would start"*<sup>33</sup>. He also says: "*And every period of time is composed of finite instants that have beginnings"*<sup>34</sup>.

While other *Mutakallimun* contributed to the concept of discrete time<sup>35</sup>, it seems that Al-Ghazali did not have much to say on this point, perhaps because overall he had little interest in the principle of discreteness.

Today physical time is considered to be continuous; however, the known laws of physics are valid only to a limit defined by the so-called Planck time of about  $10^{-43}$  seconds. Moreover, unifying quantum theory with general relativity may require some sort of time quantization.

### **The concept of Motion:**

From their conception of space and time *Mutakallimun* formulated their understanding of motion as being discrete, and that the trajectory of motion is composed of successive "stationary points"<sup>36</sup> سَكَنَات. Accordingly they say that a body is seen moving faster than another only because the number of "stationary points" along its trajectory is small compared to that along the trajectory of the other<sup>37</sup>. However, the Mu'tazilite Al-Nazzam believed that motion on the microscopic level takes place in discrete jumps called "tafra". It appears to me that Al-Nazzam was driven to this conclusion because although he believed in a non-discrete space, he believed in discrete time, so he had to explain motion by assuming that the particle is covering space through jumps or leaps<sup>38</sup>. Max Jammer considered this understanding of al-Nazzam to be the oldest realization of a quantum motion, he says: "*In fact Al-Nazzam's notion of leap, his designation of an analyzable inter-phenomenon, may be regarded as an early forerunner of Bohr's conception of quantum jumps*"<sup>39</sup>.

### **What can be outside the universe?**

Starting from their original concept that space, time and matter do exist simultaneously, are inter-dependent and would not exist without the existence of matter, *Mutakallimun* stressed that there will be no outside to the world. Al-Ghazali discussed this point at length in his book *Tahafut al falasifa* while trying to refute the philosopher's views in respect to their claim that the world is eternal. After somewhat lengthy argumentation, Al-Ghazali says, "*It is thus established that beyond the world there is neither void nor filled space, even though the estimation does not acquiesce to accepting [this]*"<sup>40</sup>. In fact this point was already raised by Ibn Hazm while discussing the notion of absolute space<sup>41</sup>.

### **Time and God before the creation of the universe:**

Because space, time and motion do not exist without the matter that is given its existence in the physical universe, *Mutakallimun* did not see any meaning in the idea of space and time before the creation of the universe.

As for the presence of God before the creation of the universe, they assumed that God exists outside the effect of space and time. This, in fact, is an essential part of the basic Islamic creed. God is a meaning rather than being a physical entity, so it would be logical not to assign any physical existence to him. This is why believing in God in Islamic faith is actually a matter of "surrender" or "submission" rather than a rational problem that can be analyzed, proved or disproved by reasoning. And although *Mutakallimun* discussed the existence of God in much detail they considered the rational approach to be a sort of guide to believers rather than a path to solid proof. In my opinion no one can prove or disprove the existence of God, but everyone is eligible to believe in God.

Al-Ghazali was one prominent thinker who discussed the question of the existence of time before the creation of the universe. He first discussed the question of the meaning of "before" and "after" to show that these two terms are relative and observer-dependent, similar to the terms "above" and "below". Al-Ghazali further discussed the possibility for the universe to have been created smaller or larger and he concludes that there is nothing against this possibility<sup>42</sup>; consequently he asked whether such an outside is void or full? His answer was that it cannot be void or full; otherwise it would be part of our universe. Therefore he concluded that there should be no outside to the universe. Analogously he argued that there is no time before the creation of the universe. Al-Ghazali said: "*When one means by outside the world something other than its surface, then one should say there is no exterior to the world*"<sup>43</sup>.

### **Summary:**

The notion of time in Islamic Kalam can be summarized thus:

1. Time is the measurable duration between events. It has no meaning without events and without the existence of the universe.
2. Time is inter-connected with space.
3. Time is discrete, being composed of individual tiny instances.
4. Time is observer-dependent like space.
5. Absolute time and absolute space do not exist.

Substantiated studies of this subject are needed in order to establish broader and more precisely focused views on this subject.

## Notes and References

- <sup>1</sup> Ian Barbour - Ian G. Barbour, *Religion and Science*, (London: SCM Press, 1998), p100.
- <sup>2</sup> M. B. Altaie, *Dakik al-Kalam: The Islamic Approach to the Philosophy of Nature*, a talk given at the Institute of Arabic and Islamic Studies, University of Exeter, January 2005. Also see: A. Dhanani, *The Physical Theory of Kalam: Atoms, Space, and time in Basrian Mu'tazili Cosmology*, (Leiden: Brill, 1994), A. Dhanani, *Problems in Eleventh Century Kalam Physics*, a paper delivered at the Conference on Science and Islam, the Royal Institute of Inter-Faith Studies, Amman-Jordan, August 2001.
- <sup>3</sup> W. L. Craig, *The Kalam Cosmological Argument*, (London and Basingstoke: The Macmillan Press Ltd. 1979).
- <sup>4</sup> See for example: Quentin Smith, *Quantum Cosmology's implications of Atheism*, Analysis 57.4, 1997, pp.295-304 and the references therein.
- <sup>5</sup> Ibn Hazm, *Alfisal fi Al-Milal wa Al-Ahwa' wa Al-Nihal*, Arabic text edited by
- <sup>6</sup> Al-Ghazali, *The Incoherence of the Philosophers*, English translation by Michael Marmura, (Brigham Young University Press, Utah 2000).
- <sup>7</sup> Richard Walzer, 'Early Islamic Philosophers', in *The Cambridge History of Late Greek and Early Medieval Philosophy*, ed. A. H. Armstrong (Cambridge University Press, 1970), p. 648.
- <sup>8</sup> W. L. Craig, *The Kalam Cosmological Argument*, p. 17 and references therein.
- <sup>9</sup> S. Pines, *Beitrag zur Islamischen Atomenlebre*, (Berlin:1939 ), Arabic translation by M. Aburida, (Cairo: 1946), p 120. It is notable that Wolfson, for example, failed to trace any Greek or Indian origin for Islamic atomism despite the fact that the concept of Atomism was already present with the Greek and Indians before Kalam, so he had no choice but to resort to some speculative and unsound assumption that Muslims may have picked up their ideas "from spurious doxographies, either translated from the Greek or originally composed Arabic" *ibid*, p. 474.
- <sup>10</sup> M.B. Altaie, *The Scientific value of Dakik al-Kalam*, The Journal of Islamic Thought and Scientific Creativity, 4, 1994, pp. 7-18.
- <sup>11</sup> The best available account of this principle was given by Al-Ghazali (d.505 A.H/1111 A.D) in his celebrated book *Tahafut al-Falasifa, (The Incoherence of the Philosophers)*, translated by Michael Marmura, (Brigham Young University Press, Utah 2000).
- <sup>12</sup> William Craig re-devised this principle in a more modern context; see his book "*The Kalam Cosmological Argument*", *loc.cit.* p. 63.
- <sup>13</sup> H.M. Al-Alousi, the problem of creation in Islamic thought, (Baghdad: 1968); also, *A Dialogue Between Philosophers and Mutakallimun*, (Beirut: Arab Foundation for Studies, 2<sup>nd</sup> ed., 1980) p. 59. Also, see H. Wolfson, *The Philosophy of the Kalam*, (Harvard University Press, 1976), p. 359-372.
- <sup>14</sup> The term "Jawhar" and "al-Jawhar" are unanimous, however the term "al-Jawhar al-fard" is the term given to the non-divisible entity out of which all things of the world are composed, see S. Pines, *Beitrag zur Islamischen Atomenlebre*, (Berlin:1939 ) for a detailed account on this terminology. It is also of importance to point that the term substances (as originally defined within the Greek philosophy) do not accurately correspond to the Islamic atom. There are some basic differences between the Greek atom and the Islamic atom (see Wolfson pp.471-472)
- <sup>15</sup> It is sometimes claimed that the *Jawhar* is a magnitudeless entity (see, Wolfson p.472) but in fact this identification is not unanimous since, although Mu'tazilites have considered the *Jawhar* to be magnitudeless, Ash'arites consider it to have some magnitude, see Al-Juwayni, *Al-Shamil Fi Usul Addeen*, (Cairo: 1969), p. 159.
- <sup>16</sup> The best account for this principle is given in the book of Abu al-Ma'ali Al-Juwayni, *Al-Shamil Fi Usul Addeen*", (in Arabic), p. 159. Also see: Wolfson, pp. 392-409.
- <sup>17</sup> This view echoes with what the philosophy of quantum theory stipulates according to the interpretation of the Copenhagen school, see Max Jammer, *The Philosophy of Quantum Theory*, (Wiley, New York, 1974).
- <sup>18</sup> However, this does not mean that *Mutakallimun* rejected causal relation or the existence of cause and effect, rather they believed in such relations but only to the extent that it would reflect our own logic rather than having to play the role of full control of nature by itself. This is perhaps one of the most misunderstood problems of *Kalam*.
- <sup>19</sup> See, for example, Al-Baqillani, *Kitab Tamheed Al-Awael*, (in Arabic) Ed. Imad Aldeen Hayder, (Beirut: 1987).
- <sup>20</sup> H. Al-Alousi, *Time in Ancient Religious and Philosophical Thought*, (Beirut: 1980), p144.

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- <sup>21</sup> Al-Ash'ary, *Kitab Makalat al-Islamiyin wa-Ikhtilaf al-Musallin*, ed. Helmut Ritter, (Constantinople: 1929-1930), p 443.
- <sup>22</sup> Al-Jurjani, *Kitab Al-Ta'reefat*, ed. G. Flugel, (Leipzig: 1845), p.19
- <sup>23</sup> Al-Ash'ary, *Makalat*, p 443.
- <sup>24</sup> Ibn Hazm, *Fisal*, p.61.
- <sup>25</sup> Ibn Hazm, *Fisal*, p. 61.
- <sup>26</sup> Ash'ari, *Makalat*, p. 318.
- <sup>27</sup> Al-Ghazali, *Incoherence*, pp. 32-33.
- <sup>28</sup> Ibn Hazm, *Fisal*, p. 72.
- <sup>29</sup> Ibn Hazm, *Fisal*, p. 75.
- <sup>30</sup> In the original Arabic text it is called "spatial dimension" *بُعد مكاني*.
- <sup>31</sup> In the original Arabic text it is called "time dimension" *بُعد زمني*.
- <sup>32</sup> Al-Ghazali, *Incoherence*, p.31
- <sup>33</sup> Ibn Hazm, *Fisal*, p. 57.
- <sup>34</sup> Ibn Hazm, *Fisal*, p. 57.
- <sup>35</sup> See; Ibn Matawayh, "*Altathkira Fi al-Jawaher wa al-A'radh*", (Cairo: 1973).
- <sup>36</sup> The different views of *Mutakallimun* of this concept of motion is presented in more details in the book of Al-Ash'ari (see *Makalat*, pp. 21-25 )
- <sup>37</sup> M. Maimonides, "*The Guide of the Perplexed*", Arabic translation by Husein Atay (Cairo: 1969) p.202.
- <sup>38</sup> This idea of Al-Nazzam and the motivations behind it need to be studied in much more details. Unfortunately we have no original documents of Al-Nazzam and whatever we know about him is drawn from books of his followers or critiques.
- <sup>39</sup> Max Jammer, *The Philosophy of Quantum Theory*, (New York: John Wiley, 1976), p. 259.
- <sup>40</sup> Al-Ghazali, *Incoherence*, p.33
- <sup>41</sup> See Ibn Hazm, *Fisal*, vol1, pp.73-75.
- <sup>42</sup> M.B. Altaie, *The Size of the Universe between Al-Ghazali and Averroes*, to be published in *Abhath Al-Yarmouk*, 2005.
- <sup>43</sup> Al-Ghazali, *Incoherence*, p. 35.