

# *Daqīq al-Kalām*

## The Islamic Approach to Natural Philosophy

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*“Probably no chapter in the history of the cosmological argument is as significant – or as universally ignored – as that of the Arabic theologians and philosophers. Although we find in them the origin and development of two of the most important versions of the cosmological argument, namely the argument from temporality and the argument from contingency, the contribution of these Islamic thinkers is virtually ignored in western anthologies and books on the subject”.*

William Lane Craig (1979)

In Arabic “*Kalām*” means speech (or a collection of words). However it also means “dialogue” and this is the meaning which was intended for Islamic *Kalām*. In its philosophical content, “*Kalām*” 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.

Classically *Kalām* was considered to form the foundation of jurisprudence, or “*Fiqh*”, which constitute the base for Islamic “*Shari’a*”. *Kalām* was classified into *Jaleel al- Kalām* and *Daqīq al- Kalām*. The former is the part dealing with problems related to the Divine attributes, the resurrection of the dead, and the questions related to the Divine knowledge, will and power. These subjects lead to the question of Man’s Free Will held by one school of *Kalām*, and the counter proposal of self-acquisition of actions that was suggested by another school.

On the other hand, *Daqīq al- Kalām* deals with problems of natural philosophy, most prominent of which is the question of the creation or the Eternity of the World and the question of Causality. This leads to discussing the concepts of space, time, motion and many of other aspects of the physical world.

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

The dependence of Islamic jurisprudence on *Kalām* arguments was quite clear through the contributions of post- *Kalām* Islamic clerics who tried to lay down new foundations for jurisprudence. One prominent example was Ibn Hazm A-Zahiri who summarized some of the most fundamental opinions and views of Daqīq *al- Kalām* in the first volume of his treatise “*Alfisal fi Al-Milal wa Al-Ahwa’ wa Al-Nihal*”.

Despite the fact that the subject of *Kalām* was largely ignored, I feel that Daqīq *al- Kalām* has much to offer to the subjects of natural philosophy and the contemporary philosophy of physics on the conceptual level, and therefore is worth studying. Indeed, the “*Kalām* cosmological Argument” devised by William Craig<sup>2</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 state now that it cannot lend itself to an effective role without being purified, reformulated and harmonized with modern philosophy. This requires much work to be done and a painstaking effort, in order to qualify Daqīq *al- Kalām* for a contemporary role.

My program of study aims at exposing those views of *Kalām* that have a sound value in present day natural philosophy. Therefore, it heavily relies on two factors: understanding the original terms and phrases as written in original Arabic, and secondly extract their scientific and philosophical implications without falling into projecting self-ideas on the original text. This second requirement can be safe guarded by requesting self-consistency within the analysis of the text.

No way in one-hour lecture that I can provide the audience with a fully substantiated account of the contributions of the *Mutakallimūn*. However, during such a limited time I will try to summarize their main contributions to natural philosophy which was covered under Daqīq *al- Kalām*, and I will skim over some vital problems where I feel some genuine research works is needed to be done in order to see a possible use of *Kalām* in contemporary philosophy of science.

## **Reasons for the rise of *Kalām***

One can say that there are two basic reasons for the establishment of the trends of *Kalām*, the first was internal; when different views in respect to the fate of the Sinner was expressed, Muslim theologians had different opinions. The second reason was caused by some natural “mutation” and, what I call, “back-reaction” of Muslims to the new ideas and thoughts they faced when they came into contact with the new nations and civilizations they conquered during the early days of Islam. This contact created a “Dialogue between Civilizations” rather than a “Clash of Civilizations”. It is quite unfortunate and disappointing that humanity now and thirteen centuries after that great experience comes to the state of no choice other than the Clash of Civilizations according to the American strategist Samuel Huntington.

## **The two main schools of *Kalām***

*Mutakallimūn* formed two main schools, the *Mu’tazilites* who was the first to be formed, and the *Ash’arites*. The Elders of the *Mu’tazilites* were Wasil Ibn Atta’ (d. 131 A.H/748 A.D), Amr ibn Ubaed (d. 145 A.H/762A.D), Abul Huthail Al-Allaf (d. 227/841A.D) Ibrahim Al-Nazzam (d.221A.H/835A.D), and Al-Jahiz (d.255A.H/ 868A.D). Most of the original contributions of the leaders of *Kalām* was lost, some of their main ideas and arguments were preserved through the writings of their students or opponents. At a later period some prominent leaders of *Mu’tazilites* appeared who

contributed preserved valuable monographs and critiques. Most prominent of these was Abu Al-Hussein Al-Khayyat (d.~300 A.H/912 A.D) and Abu Al-Kassim Al-Balkhi (sometimes called Al-Kabi) (d.319 A.H/931 A.D), Abu Ali Al-Jeba'ie (d. 303 A.H/915 A.D) and his Son Abu Hashim Al-Jeba'ie (d. 321 A.H/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. 415 A.H/1024 A.D) and Abdul-Jabbar Al-Hamadani (d. 415A.H/1024 A.D) who wrote an extensive monograph about Mu'tazilites that preserved much of their original thoughts and his student Ahmed ibn Mattaweyh (d. 450A.H/ 1060A.D) who wrote a book preserving a good deal of the opinions of early Mu'tazilites on the subjects of *Daqīq al- Kalām*.

The Ash'arites school were formed by Abu Al-Hasan Al Ash'ari (d.324 A.H=935 A.D) who broke away from the Mu'tazilites and formed a new school of thought within the trends of *Kalām*. Beside Al-Ash'ari the most prominent contributors to Ash'arites *Kalām* was Abu Bakr Al-Baqillani (d. 403 A.H/ 1012 A.D), and later Abu Al-Ma'ali Al-Juayni (d. 478 A.H/1085 A.D) who wrote some excellent monographs on *Daqīq al- Kalām* and *Jaleel al- Kalām*. However one can say that the most efficient utilization of the *Kalām* was made by Al-Ghazali (d. 505 A.H/1111 A.D) whose contributions are the most mature ones among Ash'arites.

At late times the Ash'arites *Kalām* was reformulated by Azud Aldeen Al-Eji (d. 756 A.H/1355 A.D) who is considered the last classical *Mutakallim*.

*Daqīq al- Kalām* investigated the same basic concepts that are the subjects of present-day physics, like space, time, matter, force, speed, heat, colors, smells (gases) and the like, so it is quite legitimate to revisit *Daqīq al- Kalām* seeking common understanding, not necessarily with physics but may be with the scientific philosophy of the concept. This trend is supported by the fact that the resources of *Kalām* are quite different from those of the classical natural philosophy including the philosophy of the Greeks. *Mutakallimūn* considered the Qur'an as the prime source for their knowledge about the world, and accordingly they intended to set-up to understand the world according to the stipulations of the Qur'an. This is the main reason why we find that *Kalām* concepts are different in meaning and implications from their counter part in the Greek and Indian philosophy. For example: the Qur'an stipulates that the world was created by God some finite time in the past, accordingly *Mutakallimūn* projected this demand into a whole theory of creation of the world and generated their own understanding of substances (*Jawaher*) and the accidents (*A'rath*)<sup>3</sup>. On the other hand, for God to be free in designing the world according to his own unpredictable will, and for performing full control over the world, nature had to be thought of as being composed of unstable and ever changing events. This requirement generated the concept of ever changing accidents. Accordingly this leads to consider the laws of nature as being undetermined, and therefore lead to, unfortunately, the widely misunderstood concept of causality.

It should be clear that in no way I would claim that the philosophy of the *Kalām* forms an integrated body, or that it can be found with one individual *Mutakallim*, or that it forms a complete modern philosophy of nature. Rather, I will try to uncover aspects of those thoughts of *Mutakallimūn*, which might serve as a possible candidate for integration with the contemporary philosophy of natural sciences, in an endeavor to anticipate a kind of a philosophical feed back to the theory of nature. For example, the

idea of “discrete time” that has been part of the general principle of discreteness of nature according to the *Mutakallimūn* can be utilized in constructing an “all discrete” theory of nature, that may eliminate the present fundamental theoretical problems related to the unification of natural physical forces.

## The sources and methodology of *Kalām*

*Mutakallimūn* considered the Qur’an their main source for deducing knowledge about the world. Although they did not explicitly refer much to the Qur’anic verses, but it was clear that their main principles were deduced from the Qur’an. This means that they followed a logical sequence of deduction that start with the Devine revelations, that have to be interpreted rationally, and then would understand nature accordingly. Richard Walzer summarized this by saying that: ”*Mutakallimūn* followed a methodology that is distinct from that of the philosophers in that they take the truth of Islam as their starting point”.<sup>4</sup>

The approach of *Mutakallimūn* to understand 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 *Mutakallimūn* but only to note for the compromising approach<sup>5</sup> followed by Muslim philosophers.

## The main principles of *Daḥiq al-Kalām*

Despite the different views expressed by *Mutakallimūn* belonging to different schools, we find that they all subscribed to some common basic principles that they have adopted to understand nature, these principles are:

### 1. The Creation of the world<sup>6</sup>:

According to *Mutakallimūn* the world is not eternal but was created some finite time in the past. Space and time had no meaning and never existed before the creation of the world<sup>7</sup>. Despite the fact that some of the *Mutakallimūn* believes that creation took place out of a pre-existing form of matter, the dominant view of *Mutakallimūn* in this respect is that creation took place *ex-nihilo* i.e., out of nothing<sup>8</sup>.

### 2. Discreteness of natural structures:

All entities in the world are composed of a finite number of a fundamental component called *Jawhar* جوهر (substance)<sup>9</sup> that is non-divisible and has no parts. The *Jawhar* is rather an abstract entity that does not acquire its physical properties unless occupied by a character called ‘*Aradh* عرض (i.e., accident)<sup>10</sup>. These accidents are ever-changing characters. This was expressed by saying that no accident can stay two successive times العرض لا يبقى زمانين أو آئين. 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:

Because God is The absolutely able creator of the world and because He is live and ever acting فيوم , therefore the world has to be re-created every moment and another<sup>11</sup>. Mutakallimūn 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. For some reason or another Mutakallimūn associated this action of re-creation with ‘Aradh rather with the Jawhar. But once we know that the Jawhar cannot stand on itself we realize that the process of re-creation is for both. By such a process God stand as the sustainer of the world.

### 4. Indeterminism of the world:

Since God has the absolute free will, and since He is the personal creator and the sustainer of the world, He is then at liberty to take any action He wishes in respect to the state of the world or its control. Consequently laws of nature that we recognize are actually contingent and undetermined<sup>12</sup>. This resulted in rejecting the existence of natural causality<sup>13</sup>. Mutakallimūn also rejected the Greek four basic elements<sup>14</sup>.

### 5. Integrity of space and time:

*Mutakallimūn* had the understanding that space has no meaning on its own. Without having a body we cannot realize the existence of a space. So is the time, which cannot be realized without the existence of motion which needs a body to be affected. This connection of space and time is deeply rooted in Arabic<sup>15</sup>. Therefore, neither absolute space nor absolute time does exist<sup>16</sup>. This understanding formulated their understanding of motion as being discrete and that the trajectory of motion is composed of neighboring “rest-points”<sup>17</sup> بسكنات. Accordingly they say that a body is seen moving faster than another only because the number of rest-points along its trajectory is small compared to those along the trajectory of the other. However, the Mu’tazilite al-Nazzam believed that motion on the microscopic level takes place in discrete jumps called “tafra” طفرة. Max Jammer considered this understanding of al-Nazzam as being 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>18</sup>.

It is a fact that different schools of *Kalām* presented different details of these general principles, rather looking contradictory sometimes. However the main trend of their works fell in the opposite side to the views of Islamic philosophers like Avicenna, Farabi, Razis and Averroes.

## Proposed Research Problems in Daqīq al- *Kalām*

At present there are several problems that would easily lend itself for detailed analysis and study, that will uncover those aspects of Daqīq *al- Kalām* which may be utilized in the context of modern philosophy of nature; some of these are the followings:

1. **Discreteness of Time:** According to the proposition of *Mutakallimūn*, time is to be discrete. The name given to the smallest non-divisible element of time is *Ana*. This notion of discrete time need to be investigated in order to achieve two-folded aim: the first is historical, that may uncover the relation between the notion of discrete time and the concept of motion. In this respect the relation with Al-Nazzam concept of *tafra* has to be discussed too<sup>19</sup>. The second aim is the investigation of a possible utilization of this notion in contemporary physics, specifically in “quantum gravity”<sup>20</sup>.
2. **Causality:** Perhaps this is the mostly misunderstood concept in the history of *Kalām*. The diversity of the concepts involved has caused wide spread confusions. The basic flat rule in this respect lies in the fact that God has the absolute free Will and He is the sustainer of the universe He has created; Nature cannot act consistently on its own. Therefore, all acts should be ultimately attributed to God. This however does not necessarily mean that *Mutakallimūn* denies the absolute causality, but surely they deny the Natural causality in the same sense, and to the same extent, that modern quantum physics do<sup>21</sup>. However, it is known that Mu'tazilite have named four types of causal relations: *I'timad*<sup>22</sup>(dependence), *I'qtiran*<sup>23</sup> (conjugation), *Tawleed*<sup>24</sup> (generation) and *'Ada*<sup>25</sup> (custom). These concepts need to be investigated and analyze in view of the modern concept of causality in physics. For example, the Aspect experiment<sup>26</sup> poses some challenging questions to the classical notion of natural causality, appoint which needs to be investigated epistemologically.
3. **Eternity of the Universe:** Philosophers (like Avicenna) wanted to prove the world's timeless dependence upon God, but the idea of timelessness demands self-sufficiency, and Avicenna's conception of creation as being contingent in itself and necessary, with reference to its cause, only papers over a contradiction<sup>27</sup>. Al-Ghazali claims that, even on philosophical grounds, all the arguments advanced for an eternal world fail. It is perhaps ironic that Stephen Hawking and Carl Sagan would agree with Al-Al-Ghazali in claiming that a universe that has an absolute temporal beginning is what a created universe necessarily means<sup>28</sup>. They, of course, think that by denying such a singularity they have left nothing for a creator to do<sup>29</sup>. This point need to be investigated thoroughly in order to see the basis of agreements and disagreements of the two conclusions.
4. **The concept of Motion:** According to the principle of discreteness adopted by *Mutakallimūn* space and time are quantized. It will be of utmost interest to know how *Mutakallimūn* understood motion. Particularly, it is interesting to know that the concept of speed in Daqīq al- *Kalām* implies the existence of one universal speed, and that when two objects with different speeds are observed then it means the presence of more stationary instances along the trajectory of one of them compared to the other. This understanding needs to be investigated in details both mathematically and philosophically in order to see whether *Mutakallimūn* have realized the full picture of motion of particles and whether this understanding has any echo in modern physics, and whether Al-Nazzam concept of *tafra* has any connection with this understanding beside the possibility, if any, of utilizing this concept for a deeper understanding of motion.
5. **The Mu'tazilite Concept vacuum:** *Mu'tazilite* argued that absolute vacuum does not exist, instead they understood vacuum as being composed of non-localized *Jawaher*<sup>30</sup>. It is of serious importance to study all the motivations that

lead *Mu'tazilite* to adopt such a proposition. Implications of this proposition should be compared with the philosophical implications of Dirac's particle-hole theory<sup>31</sup>.

6. **The size of The Universe:** In his famous book: "*The incoherence of the philosophers*" Al-Ghazali questioned the possibility of the universe being created larger than, or smaller than its present size. He also questioned whether vacuum do exist outside the present volume of the universe such that a further enlargement of the universe would be possible therein<sup>32</sup>. Averroes (Ibn-Rushd) answered negatively to this question but he gave no proper reasoning except his reliance on what Aristotle has already proposed in this respect<sup>33</sup>. This question needs to be reconsidered in the light of the well-established fact that the universe is expanding.
7. **Maimonides discussions of Kalām principles:** The Jewish philosopher Maimonides discussed the principles set forth by *Kalām* and especially Daqīq *al-Kalām*. Some interesting aspects of these discussions need to be highlighted especially those dealing with the motives of those principles.
8. **The Kalām arguments of Thomas Aquinas:** Most Christian natural theology has stemmed in one way or other from the work of Thomas Aquinas (1225-1274). Two of his arguments for the existence of God have stimulated particular interest among those concerned with science: *the cosmological argument* (that all change must stem from a necessary, self-existent being who is the First Cause of all phenomena in the universe) and *the teleological argument* (that order and intelligibility and apparent purpose in nature imply a rational designer). There is a need to reconsider the arguments of Thomas Aquinas in respect to the question of the temporality of the universe. Detailed comparison with the approach of Al-Ghazali would be very interesting.
9. **The Craig Kalām Cosmological Argument and the Romero verification proposal:** In 1979 William Craig suggested the "*Kalām Cosmological Argument*" as a proof for the existence of a personal creator of the universe. Recently, in 2003, Gustavo Romero suggested an astronomical observation that could, in his opinion, verify the validity of the *Kalām* argument. The problem is to check the epistemological validity of the Romero proposal.
10. **Daqīq al- Kalām and contemporary philosophy of physics:** prospects of philosophical guidance to contemporary theoretical physics are to be studied e.g., the effect of discrete time on formulations of quantum Physics.

I found that Daqīq *al- Kalām* contains some valuable concepts, assumptions and results that possess sound values in modern philosophy of physics. An immediate contemporary example is the so-called "*Kalām Cosmological Argument*"<sup>34</sup>, which was devised and popularized by William Craig to stand as a kind of a proof for the existence of God. Such problems can accommodate more detailed investigations and analysis in order to be eligible for a role in modern philosophy of nature.

## Endnotes and References:

<sup>1</sup> Ian Barbour - Ian G. Barbour, *Religion and Science*, (London: SCM Press, 1998), p100.

<sup>2</sup> Craig, W. L., *The Kalām Cosmological Argument*, (London and Basingstoke: The Macmillan Press Ltd. 1979).

<sup>3</sup> This explains why the Islamic atomism had to be different from the Greek atomism, a question that has upset Harry Wolfson. See: H. A. Wolfson, *The Philosophy of The Kalām*, (Harvard University Press, 1976), p. 472-486.

<sup>4</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>5</sup> William Craig recognized this point accurately by saying that: "The main difference between a *Mutakallim* and a *Failasuf* lies in the methodological approach to the object of their study: while the practitioner of *Kalām* 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 follow a 'method of research independent of dogma, without, however, rejecting the dogma or ignoring it in its sources'. see: Craig, W. L., *The Kalām Cosmological Argument*, p. 17 and references therein.

<sup>6</sup> The best available account of this doctrine 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 Micheal Marmura, (Brigham Young University Press, Utah 2000).

<sup>7</sup> William Craig re-devised this doctrine in a more modern context; see his book "*The Kalām Cosmological argument*", *loc.cit.* p. 63.

<sup>8</sup> H.M. Al-Alousi, *A Dialogue Between Philosophers and Mutakallimūn*, (Beirut: Arab Foundation for Studies, 2<sup>nd</sup> ed., 1980) p. 59. Also, see Wolfson, *loc.cit.* p. 359-372.

<sup>9</sup> The name 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 is composed, see S. Pines, *Beitrag zur Islamischen Atomenlehre*, (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 Wilfson p.471-472)

<sup>10</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, p. 159.

<sup>11</sup> The best account for this doctrine is given in the book of Abu al-Ma'ali Al-Juwayni, "*Al-Shamil Fi Usul Addeen*", (in Arabic), p. 159.

<sup>12</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*, (Weily, New York, 1974).

<sup>13</sup> However, this does not mean that that *Mutakallimūn* 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 *Kalām*.

<sup>14</sup> See, for example, Al-Baqillani, *Kitab Tamheed Al-Awael* , (in Arabic) Ed. Imad Aldeen Hayder, (Beirut: 1987).

<sup>15</sup> The concepts of space and time in Arabic is given in many general as well as specialized dictionaries, see for example Al-Jurjani, *Al-Tareefat*, p. 19 and 61.

<sup>16</sup> The best reference for these terms is *Al-Fisal* of Ibn Hazm, where he explicitly states this point of view with many interesting details. For example he says: 'They (the philosophers) say that absolute space and absolute time is not what we have defined previously because they are not invariant', see Al-Fisal, p.75.

<sup>17</sup> The different views of *Mutakallimūn* of this concept of motion is presented in more details in the book of Al-Ash'ari (see *Makalat* p. 21-25 )

<sup>18</sup> Max Jammer, *The Philosophy of Quantum Theory*, (New York: John Wiley, 1976), p. 259.

<sup>19</sup> The notion of *Tafra* which was suggested by Al-Naddam need to be revisited because it was always claimed that Al-Naddam didn't believe in discreteness, however as it stand the notion of *tafra* suggests that Al-Naddam believed in the discreteness of space but the continuity of time.

<sup>20</sup> Presently the limit of known physics stops at the borders of the so-called Planck dimensions (length  $\sim 10^{-33}$  cm, time  $\sim 10^{-44}$  second, mass  $\sim 10^{-5}$  gm, temperature  $\sim 10^{32}$  K), beyond which there exist no understanding of the physics of nature. In order to go further into the understanding of the microscopic world we need to develop a theory which describes gravity in terms of finite discrete quanta. Such a

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theory is untenable at present because gravity would not lend itself to quantization. One possible resolution of this problem may become possible if we quantize time, (see, Gerard 't Hooft *Class. Quantum Grav.* **16**, 395-405, 1999).

<sup>21</sup> In modern quantum physics the laws of nature are probabilistic and undetermined. On the other hand the universe do not seem to be highly contingent; the fine-tuning needed to develop the universe at its very early stages suggests the existence of a so-called intelligent design, (for further details see, Polkinghorne, J, *Reason and Reality*, (London: SPCK, 1991), p77-78.

<sup>22</sup> This term is mostly used to explain causal relationships that involve forces.

<sup>23</sup> This term is mostly used by Ash'arites to describe non-causal relationships between events that take place in conjunction with one another.

<sup>24</sup> This is the type of causal relations by which the effect is produced as a direct consequence of the cause.

<sup>25</sup> Because of the denial of the natural causality, while accepting the existence of cause-effect relationships Mutakallimūn developed the notion of custom ('ada) to justify the validity of physical laws and their causal content.

<sup>26</sup> J. Baggott, *The Meaning of Quantum Theory*, (Oxford University Press: Oxford 1992) , p 142.

<sup>27</sup> L.E. Goodman, *An Introduction to Medieval Islamic Philosophy*, pp. 20-21.

<sup>28</sup> E.W. Carroll, "*God and Physics: From Hawking to Avicenna*",

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<sup>29</sup> It was thought that a singular universe (a universe crated from nothing) would justify the existence of God, however this is only naïve because the nature of physical laws and the development of nature suggest some kind of an intelligent coordinator or otherwise a new superior natural selection rule.

<sup>30</sup> See, Al-Juwayni, *Al-shamil*, p. 124.

<sup>31</sup> According to modern quantum theory vacuum is thought of being composed of wobbling virtual particles or quanta and in the Dirac's theory of the electron the vacuum is understood to be composed of negative energy states called the Dirac Sea.

<sup>32</sup> It is worth mentioning here that *Mutakallimūn* refused to assume any kind of space outside the physical world. Although they had no clue whatsoever about the structure of the whole universe as we knew it today but their global view of universe is not much different from ours; the difference is only in the details.

<sup>33</sup> As is well-known the Aristotle view of the universe stipulated that the universe is finite, but has a fixed volume and is eternal. The argument of Al-Ghazali, though theological in its content, developed a clever question in respect to the size of the universe and the meaning of the space outside it. The *Kalām* views presented by Al-Ghazali do resonate epistemologically with the presently accepted view.

<sup>34</sup> Craig, W. L., *The Kalām Cosmological Argument*, *loc. Cit.*