بسم الله الرحمن الرحيم

Daqīq al-Kalām: A Basis for an Islamic Philosophy of Science

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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 temporal regress 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 sequence of words. However it also means 'dialogue'; and this is the meaning which was intended in the case of Islamic *kalām*. In its philosophical context *kalām* denotes a collection of concepts, assumptions, principles, and problems that is used to explain the relationship between God and the physical world in accordance with the basics of the Islamic creed.

Classically, *kalām* was considered to form the foundation of jurisprudence (fiqh) which in turn constitutes the basis for the Sharīʿa, which comprises the Islamic religious rules of life. The reason for this was that the Sharīʿa constitutes a deductive system of rules and instructions which needs a logical foundation in order to be fully justified and established. *Kalām* was further classified into *jalīl 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 which relate to the divine knowledge, will, and power. These subjects lead on to the question of human free will, as held by one school of *kalām*, and the counter-proposal of self-acquisition (*kasb*) of actions that was suggested by another school.

By contrast, *daqīq al-kalām* deals with problems of natural philosophy, most prominent among which is the question

of the creation of the world, its structure, temporal development, and the meaning of causality. This entails discussions of the concepts of space, time, motion, force, and many other aspects of the physical world. Using Ian Barbour's terminology one might say that *jalīl al-kalām* could be called 'natural theology' whereas *daqīq al-kalām* is the 'theology of nature.'{1}

Despite the fact that the subject of *daqīq al-kalām* has been somewhat neglected, I feel that this trend has much to offer to the fields of natural philosophy and the contemporary arguments in the debate between science and religion, and therefore is well worth studying. It will be shown that *daqīq al-kalām* can provide the basis for a contemporary philosophy of science which resolves many of the philosophical questions raised by modern physics. Many of the arguments of *daqīq al-kalām* are still living and have sound value in contemporary science and the philosophy of modern science. The '*kalām* cosmological argument' which was re-devised by William Craig{2} is just one contemporary example in a whole field of ideas, concepts, and arguments that could be utilized by modern philosophers of science. However, the subject is in such a state now that it cannot lend itself to an effective role unless it is first purified, reformulated and harmonized to fit the categories of modern philosophy. Much work and painstaking effort must be expended before *daqīq al-kalām* is fit for a contemporary role.

For the sake of acquainting the reader with the necessary background in *kalām* I am going to outline those views that have a sound value in present-day natural philosophy. These will include my own re-arrangement and designation of the basic doctrines and principles of the *kalām*. I will try to summarize their main contributions to natural philosophy which were historically covered under *daqīq al-kalām*, after which I will move briefly through some vital problems where I feel some genuine research work needs to be done in order to identify the possible scope for deploying *kalām* in the contemporary science-religion dialogue.

REASONS FOR THE RISE OF *KALĀM*

Historically, one can say that two basic motivations drove the emergence of *kalām*. The first was internal: different opinions expressed by Muslim theologians on the fate of sinners initiated an argument that proceeded to develop into a whole tradition of thought. For example some theologians suggested that a Muslim sinner is a non-believer and should be considered *kāfir* (one who negates Islamic belief). Other theologians suggested that he should be considered only 'corrupt' (*fāsiq*), a technical middle position which lay between the status of *kāfir* and believer. The second reason for *kalām*'s emergence was the reaction of the Muslims to the new ideas and thoughts they faced when they came into contact with different nations and civilizations, particularly the classical Mediterranean and the Indic. This contact, at a time when Muslims were the dominating power in the world, created a 'dialogue between civilizations' rather than a 'clash of civilizations'. It is unfortunate and disappointing that humanity in our time, thirteen centuries after that great experience, now feels that it exists only in a state of clash between civilizations, as articulated by the American strategist Samuel Huntington.

THE TWO MAIN SCHOOLS OF *KALĀM*

The *mutakallimūn* (the doctors of *kalām*) formed two main schools: the Muʿtazilites, who were the first to be formed, and the Ashʿarites. Prominent leaders of the Muʿtazilite school included Wāṣil ibn ʿAṭā' (d. 748), ʿAmr ibn ʿUbayd (d. 761), Abu'l-Hudhayl al-ʿAllāf (d. 840), Ibrłhīm al-Naẓẓām(d. 835), and al-Jāḥiẓ (d. 868). Most of the original contributions of the leaders of *kalām* have been lost, but some of their

main ideas and arguments were preserved through the writings of their students or opponents. Valuable monographs and critiques have, however, been preserved from some prominent leaders of Muʿtazilism who worked in a later period. Most prominent among these were Abu'l-Husayn al-Khayyāṭ (d.912) and Abu'l-Qāsim al-Balkhī (sometimes called al-Kaʿbī) (d. 931), Abū ʿAlī al-Jubbā'ī (d. 915) and his son Abū Hāshim al-Jubbā'ī (d. 933). Some of the original works of these prominent Muʿtazilites were preserved through the monographs written by their students and followers such as Abū Rashīd al-Naysābūrī (d. 1024) and ʿAbd al-Jabbār al-Hamadhnī (d. 1024) (who wrote an extensive survey of the Muʿtazilite system that preserved much of their original thought), and his student Aḥmad ibn Mattawayh (d. 1059), who wrote a book preserving a good deal of the opinions of the early Muʿtazilites in the subject areas of *daqīq al-kalām*.

The Ashʿarite school was formed by Abu'l-Hasan al-Ashʿarī (d. 935) who broke away from the Muʿtazilites and formed a new school of thought within the parameters of *kalām*. Beside al-Ashʿarī the most prominent contributors to the school which bore his name were Abū Bakr al-Bāqillānī (d. 1012), and later Abu'l-Maʿālī al-Juwaynī (d. 1085) who wrote some excellent monographs on both *daqīq al-kalām* and *jalīl al-kalām*. However one can say that the most efficient utilization of the *kalām* was made by al-Ghazālī (d. 1111), whose contributions represented the most mature writings produced among the Ashʿarites. In later times the Ashʿarite *kalām* was reformulated by ʿAḍ ud al-Dīn al-Ījī (d. 1355), who is considered the last classical *mutakallim*.

Daqīq al-kalām investigated some of the basic concepts that are the subjects of contemporary physics, such as space, time, matter, force, speed, heat, colour, smells (gases), and the like. So it is quite legitimate to revisit this discipline seeking a common understanding, not necessarily with physics as such but perhaps with the scientific philosophy which surrounds the concepts. This policy is supported by the fact that the resources of *kalām* are quite different from those of classical natural philosophy, including the philosophy of the Greeks. *Mutakallimūn* considered the Qur'ān to be the prime source for their knowledge about the world, and accordingly they intended to found their discipline in such a way as to understand the world according to the stipulations of the Qur'ān. This is the main reason why we find that some concepts of *kalām* are different in their meanings and implications from their apparent counterparts in either Greek or Indian philosophy. For example: the Qur'ān stipulates that the world was created by God at some finite time in the past; accordingly the *mutakallimūn* projected this demand into a whole theory of creation of the world and generated their own understanding of substances (*jawāhir*) and accidents (*aʿrāḍ*){3} as part of a general principle of discreteness in order to serve the notion of creation. On the other hand, for God to be free in designing the world according to His own unpredictable will, and in order that He exert full control over the world, the world had to be thought of as being composed of a series of unstable and ever-changing events. This requirement generated the concept of ever-changing accidents which was expressed by the principle of continued re-creation. Accordingly, this led theologians to consider the results of the action of the laws of nature (fire burning cotton, for instance) as being undetermined, so that the *mutakallimūn* were able to develop a new concept of causality.

In no way do I wish to claim here that *kalām* forms an integrated body of thought, or that it can be found complete with one individual *mutakallim*, or that it forms an entire and satisfactory modern philosophy of nature. Rather, I will try to uncover aspects of

those ideas of the *mutakallimūn* which might serve as possible candidates for integration within contemporary philosophies of natural science, in an endeavour to anticipate a kind of philosophical feedback to the theory of nature. For example, the principle of continual re-creation can be utilized to understand better the state of indeterminacy of measurement in the physical world. Also, the notion of 'discrete time' which was proposed by the *mutakallimūn* as part of the general principle of discreteness (atomism) in nature can be utilized in constructing an 'all-discrete' theory of nature that might contribute to eliminating the current fundamental theoretical problems related to the unification of natural physical forces. On the other hand some questions that have been considered already by *jalīl al-kalām* do echo with primary issues in the contemporary debates in science and religion that are taking place in the West. Questions concerning the knowledge of God, His action in the physical world, His control of the future and the degree of freedom enjoyed by the natural world and humans were some of the main issues that were debated by the *mutakallimūn*.

SOURCES AND METHODOLOGY OF *KALĀM*

The *mutakallimūn* considered the Qur'ān to be their main source for deducing knowledge about the world. Although they did not explicitly refer much to the Qur'ānic verses, it was clear that their main principles were deduced from the Qur'ān. Hence they followed a logical sequence of deduction which started with the divine revelation, which had to be interpreted rationally, and then tried to understand nature accordingly. Richard Walzer summarized this by saying that the '*Mutakallimūn* follow a methodology that is distinct from that of the philosophers in that they take the truth of Islam as their starting point.'{4} William Craig has taken the same view, saying that

> *the main difference between a mutakallim [practitioner of kalām] and a failasūf ['philosopher'] 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'ānic 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.'*{5}

The main approach of the *mutakallimūn* in understanding the world can be presented as follows:

God ł Reason ł The World

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

The World ł Reason ł God

Effectively the same difference applies to Muslim philosophers as opposed to *mutakallimūn*, despite the concordist approach which was typically followed by Muslim philosophers who tried hard to reconcile Greek philosophy with Islam.

PHILOSOPHY AND *KALĀM*

This reconciliatory approach was started by al-Kindī (d. 868 A.D) and was further developed by al-Fārābī (d. 950) and Avicenna (Ibn Sīnā, d. 1036), who adopted a mainly neoplatonic approach. This method of the early Muslim philosophers in recognising divine action in the world was refuted by al-Ghazālī in his classic *The Incoherence of the Philosophers (Tahāfut al-Falāsifa)*.{6} Averroes (Ibn Rushd, d.1198) later championed the defense of the doctrines of Aristotle, trying to refute the arguments of al-Ghazālī in his *Incoherence of the Incoherence (Tahāfut al-Tahāfut)*.{7} However in his Faṣl al-Maqāl (Decisive Treatise), Averroes strove valiantly

to show that Islam can accommodate the views of the Greek philosophy through certain reinterpretations of the verses of the Qur'ān.{8} Yet this defense ultimately proved unsuccessful, since the arguments presented by al-Ghazālī were already strong enough and very effective in persuading the elite of the inadequacy of philosophy. The fact that at the time of al-Ghazālī *kalām* was still under siege and frequently out of favour with many religious scholars and jurists, caused one branch of Islamic thought (the Hanbalite) to be directed toward a more fundamentalist approach that was later able to breed thinkers like Ibn Taymiyya (d.1328). The birth of such trends that minimized the role of rational approaches in understanding God and the world did not assist the growth of reason-based theology or science in the Islamic world.

Some of the *mutakallimūn* who lived during the eleventh century and later, especially those whose allegiance was still to the Muʿtazilites, borrowed some of the philosophical arguments in their endeavours to support the proofs for the existence of God and to coherently theorize His attributes. This approach was not an unmitigated success, for it could seem inconsistent with the basic *kalām* thesis which assumes that revelation is the prime source of knowledge which enables us to understand the world.

THE MAIN PRINCIPLES OF DAQĪQ AL-KALĀM

Even though the *mutakallimūn* expounded diverse views according to their school affiliation, one finds that in general they subscribed to certain common basic principles that they adopted in order to understand nature. I have identified the following five principles.{9}

1. **The creation of the world**.{10} According to the *mutakallimūn* the world is not eternal but was created at some finite point in past time. Space and time had neither meaning nor existence before the creation of the world.{11} Despite the fact that some of the *mutakallimūn* believed that creation took place out of a pre-existing form of matter, the dominant view of *kalām* in this respect was that creation took place ex nihilo, that is to say, out of nothing.{12} Accordingly they considered every constituent of the world to be temporal.

2. **Discreteness of natural structures**. The *mutakallimūn* believed that all entities in the world are composed of a finite number of fundamental components called *jawhar* ('substance'){13} that is indivisible and has no parts. The *jawhar* was thought to be an abstract entity that acquires its physical properties and value when occupied by a character called ʿarḍ ('accident').{14} These accidents are ever-changing qualities. Discreteness applies not only to material bodies but to space, time, motion, energy (heat), and all other properties of matter.{15}

   Some authors have tried in vain to relate the Islamic concept of the atom with equivalents among the Greeks or Hindus. {16} However, because the Islamic atom is magnitudeless and because the number of atoms in the world is finite, it was found that it is unlikely that the Muslims took this idea from other nations; the Islamic atom possesses genuinely different properties.{17}

3. **Continual re-creation of an ever-changing world**. Because God is the absolutely able creator of the world and because He is living and ever-acting to sustain the universe, the world has to be re-created in every moment.{18} This re-creation occurs with the accidents and not with the substances, but since the substances cannot be realized without being attached to some accidents,

therefore, the re-creation of the accidents effectively governs the substances too. By such a process God stands to be the total sustainer of the world. This principle is very important for two reasons: firstly, it establishes an indeterminate world; and secondly, it finds a sound physical echo in contemporary quantum physics. In respect of the second it is astonishing to realise that this understanding explains why in the quantum world we do not find fixed values for the properties of the systems; instead we always have an average which is expressed by the so-called expectation values. So this principle can provide yet another explanation for the fact that our physical measurements detect only average possible values.

4. **Indeterminacy of the world**. Since God possesses absolute free will, and since He is the personal creator and the sustainer of the world, He is at liberty to take any action He wishes in respect to the state of the world or its control. Consequently the laws of nature that we recognize have to be probabilistic rather than deterministic, so that physical values are to be contingent and undetermined. {19} For these theological reasons the *mutakallimūn* deduced the indeterminacy of the world. This resulted in rejecting the existence of natural causality{20} because nature, according to *kalām*, cannot possess any sort of will. The *mutakallimūn* also rejected the Greek four basic elements{21} and the existence of any kind of self-acting property inherent in those elements. This became a very central argument in *kalām* for the proof of the need for God; if nature is blind no productive development would be expected.

5. **Integrity of space and time**. The *mutakallimūn* had the understanding that space has no meaning on its own. Without there being a body we cannot conceive of the existence of a space. So also with time, which cannot be realized without the existence of motion which in turn needs a body to be affected.{22} This connection of space and time is deeply rooted in the Arabic language itself. {23} Therefore neither absolute space nor absolute time in fact exists.{24} This understanding drove their understanding of motion as being discrete, so that the trajectory of motion is composed of neighboring 'rest-points.'{25} 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 Muʿtazilite al-Naẓẓām believed that motion on the microscopic level takes place in discrete jumps, called ṭafra. Max Jammer considered this understanding of al-Naẓẓām as being the oldest realization of the principle of quantum motion: 'In fact, al-Naẓẓām'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.{26}

The current status of the philosophy of science

The emergence of relativity theory and quantum theory at the dawn of the last century subjected contemporary philosophy to a kind of shock and awe. In consequence, some radically new concepts emerged with which the philosophies of the eighteenth and nineteenth centuries were entirely unfamiliar. The most prominent concepts were the integrity of the spacetime proposed by relativity theory and the concept of uncertainty which was required by quantum physics. The latter concept meant that it would be impossible to predict any natural

development with complete certainty; a concept that jeopardized the Laplacian doctrine of the determinism of the natural world which had become one of the main pillars of classical natural philosophy. In fact so strong was the shock that philosophers had to pause for some time before reaching for a new paradigm. Some philosophers continued to deal with the topic of natural philosophy using the very same paradigm of the classical philosophy of science. However any inspection of the status quo of contemporary science makes it clear that no viable philosophical framework for modern science can be acknowledged other than empiricism. The basic reason for this is that the European classical enlightenment philosophies could not deal with the conceptual development of modern physics in the twentieth century. In fact the western philosophical heritage is essentially incompatible with the theoretical developments of relativity theory and quantum physics. This is because western philosophies were based on the fundamental doctrines and dialectical methodology of the Greeks, which comprised a philosophical system which had at its core some fundamental principles which incline to a solidified view of nature without God. For this reason I conjecture that the modern Western philosophies of science, with their roots still in Athens, are unable to structure a consistent framework; instead modern philosophers of the twentieth century like that of Karl Popper ended by simply denying the need for a framework. One might conclude that in general the Western mind has never acknowledged philosophically the development of the abstract concepts of quantum physics; most philosophers of science, including Popper himself, specifically critiqued the Copenhagen School's interpretation of quantum measurements. On the other hand some new theories were developed claiming a hidden determinism underlying truth in the apparently indeterministic world. These theories, which were called Hidden Variables Theories, are still struggling to defy the natural reality of indeterminism. In any case the achievements of quantum physics are well established now, and quantum theory has proved to be a consistent theory despite a possibility that it might be incomplete.

More recently a more appropriate concept of 'natural realism' was developed to reform the philosophical propositions of empiricism and to shape a more consistent and viable philosophy of modern science.

We need to understand the true implications of twentieth-century science as much as we need to understand its philosophical implications. Concepts proposed by quantum theory and the mathematical structure of quantum mechanics are still in need of deeper understanding and interpretation. The meaning of an 'operator' in quantum mechanics is obscure, just as is the meaning of the unpredictability of measurements. The role played by the mathematical entities called 'imaginary quantities' in physics, although being directly un-measurable entities, is something worth studying too on the level of philosophical concepts, in order to understand key dimensions of its practical naturalistic meaning.{27} In theoretical physics most of us play the game of generating equations that sometimes do not have clear explanations. An example of this would be string theory. In general relativity and curved spacetime physics we are not ready yet to understand the full meaning and implications of a space-like universe. For this reason many of the black hole physicists were taken by surprise immediately after the recent declaration by Stephen Hawking that information is not completely lost when a particle falls into a black hole.{28} In cosmology and despite the eminence of the big bang theory, we are still far from deciding whether the universe did have a start in time or whether it had

an infinite extension in the past. The point of singularity that contains all matter and energy that exists in our universe stands not only as an epistemological challenge but as an ontological dilemma too. In general, while science is firm and strong on the practical side of the story, it is still far from reaching a resolution on the theoretical side. That is why we should not speculate overmuch. Instead we should maintain some fixed basic principles and doctrines, some sort of an epistemic paradigm, while finding our way through the issue of the relationship between science and religion.

Some issues of contemporary importance

In this section I will discuss some currently hot issues in the science and religion debate, adopting the arguments of *kalām* in the background of my suggestions. The aim here is to explore some ideas on how to deal with these issues and to suggest what Islamic *kalām* might have to say about them.

Laws of physics, laws of nature and the divine action

Most of us talk about the laws that we discover in physics and call them 'the laws of nature'. In fact this turns out to be a subtle point, implying some sort of a belief that we may or may not accept. To admit the existence of 'natural laws' may implicitly mean to say that nature exhibits itself according to a reliable set of rules which control its behaviour. However, this may also mean that the laws of nature consist of a set of intrinsic properties that make nature behave spontaneously independently of anything beyond it. Ancient philosophers assumed such intrinsic properties and today most scientists mean to say the same. In the past this led to the kind of reductionism which was implicit already in the Aristotelian doctrines, which assumed that God was just a prime mover. In due course it led to the God-of-the-gaps, and also to conceding a role for God only if a beginning in time for the universe was realized. But as soon as Stephen Hawking deduced a way to avoid the temporal singularity in the history of the universe he immediately questioned the role of such a creator. In fact the Hawking question is inevitable for anyone who sees no role for God except as a prime mover; the non-existence of a beginning, therefore, will eliminate the role of such a prime mover.

On the other hand some physicists, like Steven Weinberg, who are sceptical of any divine interaction with the world, wish to see God either always acting with miracles, or otherwise abiding by their understanding of the world.{29} In a moment of despair during a debate with John Polkinghorne, Weinberg said: 'And indeed at any moment we may get evidence of a supernatural supervisor of the universe. I mean suddenly in this auditorium a flaming sword may come and strike me for my impiety, and then we will know the answer.' A miraculous universe is more likely to be chaotic, and a chaotic universe will stand in less need of God, although such a need cannot be fully eliminated. Should the universe have been running miraculously the task of assuming the absence of an organizing and controlling global force would have been easier. At this point it seems to me that the argument of Weinberg is self-defeating; a fiery sword will suddenly appear in the auditorium to hit Steven Weinberg if and only if the world is completely working miraculously at random.

Glimpses of the divine action

Understanding divine action in the world will shape our understanding of the divine attributes and capabilities, and consequently will shape our understanding of God. So it is a matter of the utmost importance to play the game cautiously, taking into consideration our limited intellectual capabilities and our renewable scientific knowledge.

Quantum theory provided us with a new realization of the world through new concepts and principles that seemed to transform our conception of nature into something more abstract. Particles have been seen to have wave properties, which has weakened locality and produced the result that the physical measurements of some parameters is undetermined. The Heisenberg uncertainty principle and the notion of virtual particles that was construed from it do allow for invisible and directly immeasurable virtual worlds and creatures surrounding us. The notion of the vacuum is, accordingly, different from the customary notion of nothingness.

The so-called 'causal joint' in the divine action is sought rigorously in the quantum description of the world. At this point we should remember that quantum description of the world, even on the macroscopic level, is physically more accurate than the classical description. So, indeterminism and probabilistic measurements underlie the reality of our physical world. On the other hand, quantum descriptions of the physical world demand the presence of 'operators' that would effect the action of measurement or any move of the system. Though such operators are always understood to be mathematical entities within the structure of quantum theory, we also know that physical observables are the corresponding expectation values of those operators.

A full description of the world on the smallest scale would require the quantizing of spacetime, a step which would reformulate the whole structure of both quantum theory and general relativity. Some basic concepts might have to be altered accordingly, which is why we should be careful in drawing final and stiff conclusions in modelling God, since God should be independent of all this. That is to say, any comprehension of divinity and the divine action should be independent of the details of scientific theories; we should only take evidence from science inasmuch as it would guide us in comprehending divinity on a rational scale. But it should always be remembered that comprehending divinity is more a matter of faith than a mathematical exercise; no-one can prove or disprove the existence of God by mathematical means; and since God is not a physical entity no one will be able to prove or disprove His existence through physical discoveries.

Daqīq al-kalām offers an original solution to the question of quantum indeterminacy. This has been devised through the principle of re-creation. By this principle we can offer better interpretations of the problem of quantum measurements.{30} It also offers us some glimpses of the divine action in nature; as re-creation allows for the probabilistic nature of physical measurements it becomes justifiable to question the force which governs chance and probability. In this respect it would be important to remember that very low-probability events have mysteriously occurred and are occuring now, such as those which have made intelligent life in this universe possible. One famous example is the generation of carbon through fusing three helium nuclei with a very rare and low probability of occurrence.{31} However at this point we focus our scrutiny further as this topic may turn out to belong to *jalīl al-kalām*.

The world's intelligibility

The universe seems to be following a logical trend of causality and lawfulness. This fact may lead to the belief that nature is driving itself with no need for an external agent. Yet it may lead us also to believe that the universe possesses a sort of cosmic mind that is driving it from within: such a mind is the global cosmic order. This was the type of God that Spinoza conceived and in which Einstein believed. However it remains an uneasy task to realize how such cosmic order would compile itself into a sort of global

cosmic consciousness from within the cosmos itself. Hence there remains the challenge of understanding why this intelligible world is organized in such a way as to behave lawfully. It seems that the lawfulness of the world is a strong indication of the existence of a purpose and some final destiny.

One may rightly suggest that the objects of the world do have some intrinsic nature; and yet there can be no clear reason why this nature should constitute a stand-alone property, when we take into consideration the fact that quantum physics has demonstrated the fluctuating character of all the physical quantities. Here the principle of continual re-creation proposed by *kalām* comes into play. Fluctuations are caused by continual re-creation, justifying at the same time the divine intervention which drives the world through its constantly re-created properties.

The divine intervention need not be miraculous at all, since such a set of miraculous interventions would, as I mentioned above, render the world unintelligible. The Qur'ān has stressed this fact in several verses. For example we read: 'He created the heavens and the earth truthfully'. Here the word 'truthfully' (*bi'l-ḥaqq*) does not accurately describe the Arabic original of the verse. In fact the original word intends the sense that God has created the world justly to be ordered and to be recognized through reason. This is why we see in some translations phrases such as 'with truth', or 'truthfully'. In another translation of the verse we read that 'He created the Heavens and the Earth for a genuine purpose.' (16:03){32}

It is not feasible to rule out the role of some strict laws that govern the behavior of the world; and yet one can appreciate that the operation of such laws is sustained by some supernatural agency that necessarily exists in order to operate these laws. The necessity that such an agency be supernatural is imposed by the fact that such an agency should not form part of our physical world, since if it were to be part of our physical world then it would have to abide by the laws of the world, and consequently would not be able to play the role of a controlling agency. So in the Islamic view, laws of nature are the laws for nature sustained by God in accordance with His *sunna*, His 'way' with creation. The law is the rule and the breach is an allowed unpredictable exception. This is indeed in conformity with the stipulations of quantum mechanics.

One final point is due. The laws of physics are, in fact, our realizations of how the world will act; in no way do these laws necessarily express the true and actual divine algorithms. These laws are our algorithms for the world. Therefore I would say that we are far from conceiving how the 'mind of God' works; we are far from being able to 'catch God at work.'{33}

The multiverse proposal

During the second half of the last century some physicists turned their attention to the accuracy with which the values of universal constants (like the mass of the electron, the Planck constant, the gravitational constant, and the charge of the electron) have been set. They discussed the sensitivity of the structure and property of our universe to these values. They found that a life-accommodating universe is surely very sensitive to small variation in the values of these universal constants. This principle acquired the name of 'fine-tuning'.

In order to explain the fine tuning which is observed in the construction of the world and the due precision by which nature is seen to be operated, some physicists have proposed that our world is actually not the only universe existing but is only one

state out of an infinite number of worlds that are simultaneously actual. They called these 'parallel universes'. It is possible that all such worlds may be lifeless, with the exception of our own. Consequently, the proponents of this multiverse hypothesis see nothing astonishing in the fine-tuning of our world since it would be a matter of well-expected chance for a fine-tuned world like ours to exist. The multiverse hypothesis gained publicity through an article by Max Tegmark published in Scientific American.{34} However, much of the claim that this multiverse is a reality remains unsubstantiated, and there is no rigorous scientific proof of the existence of such states. The primary source for these speculations is the theory of chaotic inflation proposed by Andrei Linde. The other alleged source is the Everett interpretation of quantum mechanics which allows for many other worlds to exist in which all other possible values of a physical measurement do exist. However, it is important to know that the Everett many-worlds interpretation applies to quantum (microscopic) systems, not to classical (macroscopic) systems. Further, this is a complicated theoretical problem that cannot be verified either way by direct experiments.

There are some basic scientific objections to the possibility of having all other universes really existing at the same time. The most important of these objections may be the 'orthogonality' condition. By this condition quantum systems belonging to the same Hermitian operator with different eigenvalues (different values for the same observable) have to be orthogonal. This implies that no two quantum systems of this sort can exist simultaneously. Such a condition is necessary in quantum mechanics in order to guarantee the repeatability of physical measurements. In any case, for our universe, which is a very low probability event, to be realized, the question still remains as to who has decided that this possible universe should exist rather than another, or rather than nothing at all. One might argue that here on the planet Earth life has developed, whereas there are many other planets that cannot accommodate life. The very existence of the many lifeless planets is suggestive of the possibility of the existence of many lifeless universes. However, a counter-argument will say that the non-existence of life on other planets is actually caused by the fact that the conditions for life to exist are very subtle and sensitive. Having all other planets abiding by the same laws of physics would cause the planet on which life existed to be distinctive. But should different planets obey different laws of physics we could not then quietly justify the non-existence of life on those planets. Similarly, a multiverse theory should require all other hypothetical universes to abide by the same laws that our universe abides by, otherwise we would be unable to understand why life should not exist in them. However, no strong scientific argument exists that can confirm that the other hypothetical universes do follow the same laws of physics as ours; on the contrary the multiverse hypothesis suggests that the laws of physics may not be the same in other universes, and indeed this is the argument which is frequently used to justify the accurate selection of a set of laws that have made life possible on Earth in our universe.

One other good question which challenges the multiverse hypothesis is that which was raised long ago by Einstein, and which asks whether 'God had any choice when creating this universe.'{35} Some physicists find that the answer to this question could be yes in the light of the multiverse hypothesis. {36} The Qur'ān does suggest that God had and always has the choice; however such a possibility does not necessarily imply that God has such universes ready under his gloves.

I would say that a multiverse may exist only under a fully chaotic miraculous order.

God has not only created this world justly and for a purpose, but has set some built-in mechanisms to safeguard that the world remains comprehensible.

In summary, I would say that *daqīq al-kalām* can provide a strong basis for developing a consistent and viable philosophy which acknowledges modern science. Beside this, if properly restructured and utilised, daqīq al- *kalām* can pave the way for a profound reformation in Islamic thought as well as in other intellectual systems active in the modern world. Islamic *kalām* has the potential to restructure our understanding of nature, reality, the world's relation to God, human destiny and the purpose of living.

{ENDNOTES}

{1} Ian G. Barbour, *Religion and Science* (London: SCM Press, 1998), p.100.

{2} W.L. Craig, *The Kalām Cosmological Argument* (London and Basingstoke: The Macmillan Press Ltd. 1979).

{3} This explains why the Islamic atomism had to be different from the Greek atomism, a question that upset Harry Wolfson. See H. A. Wolfson, *The Philosophy of The Kalām* (Cambridge MA: Harvard University Press, 1976), pp. 472-486.

{4} Richard Walzer, 'Early Islamic Philosophers', in A. H. Armstrong (ed.), *The Cambridge History of Late Greek and Early Medieval Philosophy*, (Cambridge: Cambridge University Press, 1970), p. 648.

{5} Craig, p. 17 and references therein.

{6} Abū Hāmid al-Ghazālī, *Tahāfut al-Falāsifa, (The Incoherence of the Philosophers)*, translated by Michael Marmura (Provo, Utah: Brigham Young University Press, 2000).

{7} Averroes, *Tahafut al-Tahafut, (The Incoherence of the Incoherence)*, translated from Arabic with introduction and notes by Simon Van den Bergh (London: E.J.W. Gibb Memorial, 1930).

{8} Ibn Rushd, *Faṣl al-maqāl*, published and translated as: Averröes, *The Philosophy and Theology of Averroes*, trans. Mohammed Jamil-al-Rahman (Baroda: A. G. Widgery, 1921).

{9} M.B. Altaie, 'The scientific value of *Daqłq al-Kalām', Islamic Thought and Scientific Creativity*, Vol. 4, No. 2 (1994), pp.7-18.

{10} The best available account of this doctrine was given by al-Ghazālī in his celebrated *Tahāfut al-Falāsifa (The Incoherence of the Philosophers)* cited above, n.6.

{11} William Craig re-devised this doctrine in a more modern context; see his book *The Kalām Cosmological Argument*, p. 63.

{12} *Husām Muḥyi al-Dīn al-Alūsī, Hiwār bayn al-falāsifa wa'l- mutakallimłn* (Beirut: al-Mu'assasat al-ᶜArabiyya, 2nd ed., 1980), p. 59. See also Wolfson, pp. 359-372.

{13} So for the word *jawhar*, 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, *Beiträge zur islamischen Atomenlehre* (Berlin: Gräfenheinichen, gedruckt bei A. Hein gmbh, 1936) for a detailed account of this terminology. It is also important to point out that the term substance (as originally defined within Greek philosophy) does not accurately correspond to the Islamic atom. There are some basic differences between the Greek and the Islamic atom (see Wolfson, pp.471-472).

{14} 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 Muᶜtazilites considered the *jawhar* to be magnitudeless, Ashᶜarites consider

it to have some magnitude; see Abu'l-Maʿālī al-Juwaynī, *al-Shāmil fī uṣūl al-dīn Alexandria: al-Maʿārif*, 1969), p.159.

{15} M.B. Altaie, 'Atomism according to *Mutakallimln', Études Orientales* 23/24 (2005), pp. 49-90.

{16} Wolfson, p.466.

{17} Pines, op. cit.

{18} The best account of this doctrine is given in Juwaynī, p. 159.

{19} This view resonates with what the philosophy of quantum theory stipulates according to the interpretation of the Copenhagen school; see Max Jammer, *The Philosophy of Quantum Theory* (New York: Wiley, 1974).

{20} However this does not mean that the *mutakallimūn* rejected causal relations or the existence of cause and effect; rather they believed in such relations but only to the extent that this 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*.

{21} See, for example, Abū Bakr al-Bāqillānī, *Kitāb Tamhīd al-awā'il*, ed. ʿImād al-Dīn Haydar (Beirut: Maktabat al-Turāth al-ʿArabī, 1987).

{22} M.B. Altaie, 'Time in Islamic *Kalām*', a paper delivered at the conference on Einstein, God and Time, Oxford University, Sept. 11-13, 2005.

{23} The concept of space and time in Arabic is given in many general as well as specialized dictionaries, see for example ʿAlī al-Jurjānī, *al-Taʿrīfāt* (Beirut: Dār al-Fikr, 1978), pp. 19 and 61.

{24} The best reference for these terms is in 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 are not what we have defined previously because they are not invariant', see Abū Muḥammad Ibn Hazm, *al-Fisal fi'l-milal wa'l-ahwā' wa'l-niḥal* (Cairo: al-Ṣubayḥ, 1928), p.75.

{25} The different *kalām* views on this concept of motion are presented in more detail by Abu'l-Hasan al-Ashʿarī, *Maqālāt al-Islāmiyyīn wa'khtilāf al-muṣallīn*, ed. H. Ritter (Istanbul: Devlet Matbaası, 1929-30), pp. 21-25.

{26} Jammer, p. 259.

{27} Hawking and Hartle have already propounded the view that the universe could have been in a state of an infinitely-extending imaginary time before the Big Bang.

{28} Stephen Hawking, GR17 conference, Ireland, public lecture.

{29} The Weinberg-Polkinghorne debate during the conference on Science and Spirituality: Questions, sponsored by The John Templeton Foundation, Granada, Spain, 2002.

{30} M.B. Altaie, 'Re-creation: a possible interpretation of quantum indeterminism', in M. Fuller (ed.), *Matter and meaning: is matter sacred or profane?* (Cambridge Scholar Publishing, 2010), pp. 21-36.

{31} P.C.W. Davies, *The Accidental Universe* (Cambridge: Cambridge University Press, 1982).

{32} Clay Chip Smith, 'The Parallel Qur'ān', online at: http://www.clay.smith.name.

{33} This is in reference to Einstein's reported words on his deathbed.

{34} Max Tegmark, 'Parallel Universes', *Scientific American*, May 2003.

{35} A. Einstein, quoted in www.humboldt1.com/ṭgralsto/einstein/quotes.html.

{36} P.C.W. Davies, 'Multiverse

Cosmological Models', *Modern Physics* Lett.A vol. 19 no.10 (2004), pp.727-744.