ULUM

Dini Tetkikler Dergisi
Journal of Religious Inquiries
مجلة الدراسات الدينية

علوم

www.dergipark.gov.tr/ulum

Did Physics [Cosmology] Render God Unnecessary? A Critical Assessment of *The Grand Design* *

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ABSTRACT

In this study, we will consider the claim, defended by world-renowned cosmologist Stephen Hawking and science writer Leonard Mlodinow in their book *The Grand Design*, that science is able to explain the universe as a whole and that therefore there is no need to appeal to a supernatural being in order to account for the coming into existence of the universe out of nothing and its fine-tuned order. In this regard, we will first analyze the extent to which M-theory is scientific. For M-theory is mainly mentioned by Hawking and Mlodinow as the theory that explains scientifically the generation of the universe out of nothing and why the universe is the way it is. In the second part, the conception of science that Hawking and Mlodinow adopt on the basis of the model dependent realism will be analyzed. Moreover, we will call attention to some problems that are rooted in the increased gap between theory and experiment in contemporary physics. In the last part of the article, we will analyze the subject matter from Islamic viewpoint in a theological

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* **This article is the translation of a previosly published article in Turkish:** Bulğen, Mehmet. "Fizik Tanrı'yı Gereksiz mi Kıldı? The Grand Design (Büyük Tasarım) Kitabı Üzerinden Bir Değerlendirme". *Marmara Üniversitesi İlahiyat Fakültesi Dergisi=Journal of Marmara University Theology Faculty* 41 (2011/2): 143-166.
The abstract of the article has been modified according to the requirements of *ULUM* journal.

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Article Types Translated Article
Received 14 November 2018
Accepted 28 December 2018
Published 31 December 2018
Cite as Bulğen, Mehmet. "Did Physics [Cosmology] Render God Unnecessary? A Critical Assessment of The Grand Design". *ULUM* 1/2 (December 2018): 201-224, https://doi.org/10.5281/zenodo.3354337

manner, and hereby we will attempt to answer the question 'what is an ideal relationship between science and religion in Islamic thought'? The general aim of the article is to demonstrate that M-theory, which is believed to be able to explain the generation of the universe, does not possess the scientific criteria for testability and that the claim that "physics renders God unnecessary" has no value other than being a speculative statement.

KEYWORDS

Kalām, God, Science, Physics, Cosmology, Theology, M-Theory

Fizik Tanrı'yı Gereksiz mi Kıldı? *Büyük Tasarım* Kitabı Üzerinden Bir Değerlendirme

ÖZ

Bu çalışmada ünlü kozmolog Stephen Hawking ile bilim yazarı Leonard Mlodinow'un *Büyük Tasarım* (*The Grand Design*) kitabında dile getirdikleri bilimin evreni tüm unsurları ile açıklayabildiği bu nedenle evrenin var oluşunu ve hassas düzenini açıklamak için doğa üstü bir varlığa ihtiyaç duymadığı iddiası değerlendirilecektir. Bu bağlamda ilk olarak evrenin yoktan var oluşunu ve hali hazırdaki durumunu bilimsel açıklamasında temel aldıkları M-Kuramı'nın ne derece bilimsel olduğu incelenecektir. İkinci kısımda Hawking ve Mlodinow'un bilim anlayışının esas aldığı Modele Dayalı Gerçeklik anlayışı değerlendirilecektir. Ayrıca bu bölümde günümüz fiziğinde teori ve deney arasında oluşan açığın meydana getirdiği problemler üzerinde durulacaktır. Makalenin son kısmında ise konunun İslâm dini ekseninde teolojik bir değerlendirmesi yapılacak ve İslâm dini açısından ideal bir din bilim ilişkisinin nasıl olması gerektiği sorusu cevaplandırılmaya çalışılacaktır. Makalenin genel amacı ise evrenin yoktan var oluşunu açıklayabildiği iddia edilen M-Kuram'ının başta test edilebilirlik olmak üzere bilimsellik kriterlerini karşılamadığı, bu nedenle "Fizik Tanrı'yı Gereksiz Kıldı" iddiasının spekülatif bir iddia olmaktan öte bir değeri olmadığını ortaya koymaktır.

ANAHTAR KELİMELER

Kelâm, Tanrı, Bilim, Fizik, Kozmoloji, M-Kuramı

INTRODUCTION

Traditionally, it has been argued that asking the question "how?" is of interest to science, and asking "why?" is of interest to philosophy.[1] The renowned cosmologist Stephen Hawking, who retired from Isaac Newton's (1643-1727) chair at Cambridge University, last year (2011) and theoretical physicist Leonard Mlodinow of the California Institute of Technology (Caltech), oppose the classical conception of science at the very first lines of their book, *The Grand Design*, co-authored, they argue:

[1] For a detailed comparison between science and philosophy see Alex Rosenberg, *Philosophy of Science; A Contemporary Introduction,* Second Edition (London: Routledge, 2005), 4; Fernand Renoirte, *Cosmology: Elements of A Critique of the Science and of Cosmology,* trans. James F. Coffey (New York: Joseph F. Wagner Inc, 1950), v-xi.

"To understand the universe at the deepest level, we need to know not only *how* the universe behaves, but *why*.

Why is there something rather than nothing?

Why do we exist?

Why this particular set of laws and not some other?"[2]

The language composed by Hawking and Mlodinow is not a new usage, nor does it mean a paradigm shift because this language was already formed as a result of a paradigm change that happened before: when cosmology became a science!

Cosmology is a controversial area. Many still do not accept that there can be such a "science"[3] because, as we said at the beginning, science is a classically descriptive activity, which asks the question "how?" and tries to portray the existing reality; however, cosmology asks not only the question "how?", but also "why?", which makes it necessary to grasp the universe from its very basic to most general aspects.[4] Again, classically, science is reductionist and nature is examined by dividing it into as many branches and parts as possible whereas cosmology is holistic; physical reality is conceptualized as a "whole", not as fragments.[5] Classically, science is based on observations and experiments; however, it is not possible to observe the entire universe, the subject matter of cosmology, or to experiment under laboratory conditions.[6]

2 Stephen Hawking-Leonard Mlodinow, *The Grand Design* (Germany: Bantam Press, 2010), 9-10.

3 Helge Kragh, "The Controversial Universe: A Historical Perspective on the Scientific Status of Cosmology", *Physics and Philosophy* 8 (2007): 1 ff.

4 Gordon Kane, *Supersymmetry: Unveiling the Ultimate Laws of Nature* (New York: Basic Books, 2000), xvi. also see Ernan McMullin, "Is Philosophy Relevant to Cosmology", *Modern Cosmology & Philosophy,* ed. John Leslie (New York: Prometheus Books, 1998), 35-6.

5 John Charlton Polkinghorne, "Reductionism", *Interdisciplinary Encyclopedia of Religion and Science,* accessed: 25 October 2010 http://www.disf.org/en/Voci/104.asp. Also see. Leo Albert Foley, *Cosmology: Philosophical and Scientific* (Milwaukee: The Bruce Publishing Company, 1962), 10.

6 On the scientific value of today's cosmology see. Michael J. Disney, "Modern Cosmology: Science or Folktale?", *American Scientist* 95/1 (2007): 383; Hannes Alfvén, "Cosmology: Myth or Science?", *Journal of Astrophysics and Astronomy* 5 (1984): 79-98. Also see Marc Lachièze-Rey, *Cosmology: A First Course* (Cambridge: Cambridge Univ. Press 1995), 2; Milton K. Munitz, *Space, Time and Creation: Philosophical Aspects of Scientific Cosmology* (Illinois: The Free Press, 1957), 3.

Until the middle of the past century, "cosmology" is usually accepted as a field of metaphysics;[7] the philosophy itself was even described as "grasping the universe as a whole".[8] However, experimental investigations starting with the development of atomic physics since the late 19th century enabled scholars to study the core of a substance, not just its atoms, even into its core constituents, and to encounter extraordinary small distances and vast amounts of energy. On the other hand, observations in the field of astronomy enabled us to see beyond the Solar System and the Milky Way Galaxy; even to examine the early times of the ages and the first moments of the universe in an ever-growing scale by breaking all kinds of active optical systems. Theories and models such as Relativity, Quantum and Big Bang, which were simultaneously developed with large quantities of experimental and observational data obtained from research in the field of nuclear physics and astrophysics, not only built a scientific framework, but also made it possible to achieve the standard models for substance and the universe itself, too.[9] Thus, a "scientific cosmology" that examines the universe as if it were a single object, as a whole from the smallest particle to the widest scale, was born.[10]

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7 Herman Bondi, "Astronomy and Cosmology", *What is Science,* ed. James R. Newman (New York: Simon and Schuster, 1955), 84; R. CLI, "Cosmology" *The Oxford Companion to Philosophy,* New Edition Ted Honderich (Oxford: Oxford University Press 2005), 180; Foley, *Cosmology: Philosophical and Scientific*, 10; Even 1966, when the famous astronomer Edward R. Harrison (1919-2007) was admitted to the University of Massachusetts, he was given a booklet of what the university is or is not. It is written in this booklet that two lessons can not be found in the curriculum: witchcraft and cosmology. See Dick Teresi, *Lost Discoveries: The Ancient Roots of Modern Science from the Babylonians to the Maya* (New York: Simon & Schuster, 2002), 158.

8 Ernsts Von Aster, *İlk Çağ ve Orta Çağ Felsefe Tarihi = The History of Ancient and Mediavel Philosophy* (Istanbul: Im Publications, 2000), 3; also see. James Jeans, *Physics and Philosophy* (Whitefish: Kessinger Publishing, 2003), 81. [For instance, David Hume (1711-1776) claimed that an attempt to explain the creation of the entire universe could not be a matter of empirical knowledge. Since we can not go out of the universe and observe it or create an experience of its creation, we can not say anything about the whole universe itself with the events we perceive in our own limited world. In the same vein, Immanuel Kant (1724 -1804) argued that the questions such as "is the universe finite or infinite in terms of space and time?" or "is it composed of all indivisible atoms or not?" are antinomies and cannot be resolved by rationally. Immanuel Kant, *Critique of Pure Reason*, trans. Werner S. Pluhar (Indianapolis: Hackett Publishing, 1996), 454-496; The most stanch advocates of the idea that investigating the ultimate nature of matter or the boundaries of physical reality was not the work of science, were the positivists. Auguste Comte (1798-1857) in his famous book, *Positive Philosophy* (1844), maintained that the structure of celestial bodies is an example of the knowledge that will remain hidden forever. As we never go to stars, there is no knowledge of their chemical and mineralogical composition. Accepting cosmology as a branch of philosophy led to the exclusion of it from the curriculum of the "positive sciences". The phrase "Don't let me hear anyone use the word 'Universe' in my Department!" which is attributed to the famous physicist Ernest Rutherford (1871-1937), gives an idea of the extent to which cosmology was negatively perceived at that time. also see Paul Davies, *Cosmic Jackpot: Why Our Universe Is Just Right for Life* (Boston: Houghton Mifflin Harcourt, 2007), 18.]

9 Maurizio Gasperini, *The Universe Before the Big Bang: Cosmology and String Theory* (Berlin: Springer 2008), 1.

10 With regard to the process of cosmology becoming a science, see Stephen G. Brush, "How Cosmology Became a Science", *Scientific American* (August, 1992): 62; John F. Hawley - Katherine A. Holcomb, *Foundations of Modern Cosmology* (Oxford: Oxford University Press, 2005), 4-6, 25; Matts Roos, *Introduction to Cosmology* (England: John Wiley &Sons, 2003), 1; William R. Stoeger, "What is 'the Universe' which Cosmology Studies?" *Fifty Years in Science and Religion: Ian G. Barbour and His Legacy,* ed. Robert J. Russell (Aldershot: Ashgate Publishing, 2004), 127.

However, cosmology did not only become science, but it also changed the meaning of science because the common understanding of science was based on conceptual frameworks such as determinism, reductionism, realism and methodological positivism defined in the Newtonian sense. However, the scientific cosmology coming up with theories such as Relativity and Quantum challenged the firm, reductionist, determinist and positivist essentials of modern science.[11] Instead, many entirely new conceptual frameworks such as *relativity, uncertainty, probability, chaos, complexity, emergence, irreducibility, irreversibility, entanglement, non-locality, superposition* and *action at a distance* emerged.[12] The understanding of deterministic science that claims the whole future can be calculated when the starting conditions are known, left its place to a new relatively speculative understanding of science in which the role of the observer increases, particles can be found in several places and shapes at the same time, communicating faster than the speed of light with each other. An understanding, in which uncertainty is regarded as the ontological and epistemological features of nature, discontinuity substitutes for continuity, and space and time become not absolute, but relative, and defined by probabilities rather than certainty.

How can it be both a "science" and "speculative"? If the evidence found in the field is indirect, if the developed models and theories have never been able to be falsified or verified, and if they are contradictory with each other on the other hand, if a team regards metaphysical axioms before setting the work, and if scientists are approaching problems with the models prescribed by the conceptual system and culture they live in, welcome to "speculative cosmology"!

Before starting to discuss the topic through *The Grand Design*, we need to clarify that famous controversial claim of the book even before the book appears: "Now science can explain the universe by itself; philosophy is dead, theology is unnecessary!"

We need to remember that the science mentioned here is not science in the classical sense, it is "speculative cosmology" as mentioned above. Therefore, as soon as the book takes its place on the shelves, many critics called the claim that "philosophy is dead, theology is unnecessary" as Hawking's joke[13] in that claiming "Philosophy is dead" while associating physics to metaphysics; and "Theology is no longer necessary." while constantly mentioning God could only mean that Hawking is joking.

However, this joke does not discredit Hawking. At least, he will not be accused of being small-minded at any time of his life. Despite his incurable illness (ALS), since the age of 21, he always dealt with big questions; he could walk around the horizons of the universe with his mind although his body was attached to a wheelchair. Today, Hawking had one of the world's most prestigious academic titles (Lucasian Mathematics Professor) until his retirement due to reaching the age-limit last year, as well as being a natural

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[11] Because now there was no way to explain natural phenomena such as radioactivity, photoelectric, black body radiation, intrinsic heat, atomic structure, and high velocities at large distances with classical physics approaches. Salvator Cannavo, *Quantum Theory: A Philosopher's Overview* (New York: SUNY Press, 2010), 2; also see Ian G. Barbour, *Religion and Science* (San Francisco: Harper & Row, 1997), 166.

[12] Harold Curtis, *Following the Cloud: A Vision of the Convergence of Science and the Church* (s.l.: BookSurge Pub. 2006), 135.

[13] For instance, see Michael Moorcock's review in *Los Angeles Times* http://articles.latimes.com/2010/sep/05/entertainment/la-ca-stephen-hawking-20100905; also see Christopher Norris, "Hawking Contra Philosophy", accessed: 10 September 2011, http://www.philosophynow.org/issue82/Hawking_contra_Philosophy.

member of the British Royal Society of Science and the American National Academy of Sciences. In the past, reputation of people those who had this title such as Isaac Newton (1642-1727), Paul Dirac (1902-1984) necessitates Hawking to be respected, too.

What makes Hawking a worldwide phenomenon is no doubt the books he wrote, not his title. *A Brief History of Time* (1988), now a classic, is the world's most popular cosmology book. The book, which leads many people to know science, has been translated into nearly 40 languages other than English and sold more than 20 million. After a while he came out with, *The Grand Design* (2010) and also managed to hit the bestseller lists both in the UK and the United States.[14]

Although the reason why Hawking sells so much is regarded as the ability to describe complex scientific issues in a clear way that everyone can understand, we think that the main factor behind his success is that he can transform cosmology into answering the questions related to man's search for meaning. Essentially, cosmology is a science that has the potential to respond to the existential questions of man. The answers to questions such as where the universe comes from, where it goes, whether it needs a creator or not, which principles and laws govern its operation and how the material is formed, to some extent, are the answers to ultimate human questions and the future of humanity as well; because human beings live in this universe and share the same destiny with the universe, which they are a part of.[15] In this respect, it is not a coincidence that the Big Bang Theory, particle experiments conducted in laboratories like CERN or a new book of Hawking arouse curiosity not only in physicists and astronomers, but in theologians, philosophers and ordinary people alike.[16]

While searching for answers to such questions in his books, Hawking is not satisfied with the narrow boundaries of science. So, he gives examples from mythology, makes references to the words of the clergy, conveys opinions of philosophers, and does not hesitate to use metaphysical implications when needed. However, such a style sometimes makes it difficult to discern between physics and philosophy in his books. Therefore, one who is not an expert may mistake some speculative expressions in his books as scientific facts. For example, there was the word "God" in nearly 50 times in *The Brief History of Time* (1988), so Henry F. Schaefer from the Nobel prize committee claimed that it was not a cosmology book, but a theological

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[14] Nate Freeman, "Hawking's Book Shoots to Top of Amazon Sales After He Denies God's Existence", accessed: 06 September 2011, http://www.observer.com/2010/culture/hawkings-book-shoots-top-amazon-sales-after-he-denies-gods-existence.

[15] For example, Marcus Aurelius Antoninus (121-180), the famous Roman Emperor and a Stoa philosopher, described this relation of meaning between the universe (Macro Cosmos) and man (Micro Cosmos) as follows: "He who does not know what the world is, does not know where he is. And he who does not know for what purpose the world exists, does not know who he is, nor what the world is. But he who has failed in any one of these things could not even say for what purpose he exists himself." See George Long, *Thoughts of Marcus Aurelius Antoninus,* accessed: 16 November 2010, http://www.gutenberg.org/ files/15877/15877-h/15877-h.htm#viii._52.

[16] This can be an answer to the question of how Hawking can discuss speculative and metaphysical questions like "Where do we come from? Where are we going? Why do we exist? Is there a God?" in his books. As another example also see Joseph Silk, *On the Shores of the Unknown: A Short History of the Universe* (Cambridge: Cambridge University Press, 2005), 2-4.

one.[17] Some science writers such as Timothy Ferris went even further and declared him a God-mongerer.[18] Hawking nonetheless increased the number: he used the word "God" more than 60 times in *the Grand Design*.

When he is asked why he has mentioned God so often in his books, Hawking says that it is difficult to explain the existence of the universe without talking about God. His works are at the boundary line between science and religion, but he himself tries to stay on the side of science.[19] Therefore, Hawking was known for using positive language when talking about God, contrary to what militant atheists like Richard Dawkins did. For example, in his book titled *The Brief History of Time*, Hawking said that, "If we discover a complete theory... it would be the ultimate triumph of human reason for then we should know the mind of God. "[20]

However, Hawking is forced to leave this intertwined style of religion-philosophy and science as the dominant claim of "Science alone can explain the universe!" clearly shows, that it will lead to a considerable decrease in the sales figures of his books.[21] Moreover, although he notes that they do not have the intention of rejecting God in writing *The Grand Design*,[22] it is very clear that the expression "the beginning and the end of the universe can be explained only staying within the boundaries of science without resorting to supernatural power or a God" has atheistic implications.[23] Although it has been scientifically criticized by senior scholars including Roger Penrose,[24] Joseph Silk,[25] Craig Callender,[26] Paul Davies,[27] Peter Woit,[28]

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17 Henry Firitz Schaefer III, "The Big Bang, Stephen Hawking and God", *Science and Christianity: Conflict or Coherence?* ed. Henry Firitz Schaefer (USA: The Apollos Trust, 2008), 57.

18 James E. White, "Unfortunate Godmongering", accessed: 14 September 2011, http://www.christianity.com/blogs/jwhite/11638165/print.

19 Schaefer, *The Big Bang, Stephen Hawking and God*, 59.

20 Stephen Hawking, *A Brief History of Time* (New York: Bantam Press, 1988), 191.

21 Hawking, in an interview on his book *A Brief History of Time*, said that he had long thought put the "God's Mind" expression which is the very debated in the book. He also said that the book could not reach such successful sales figures if he did not put that expression.

22 See Hawking's interview on Larry King Live CNN, accessed: 09 October 2010 http://www.youtube.com/watch?v=9AdKEHzmqxA.

23 Dwight Garner, "Many Kinds of Universes, and None Require God", *The New York Times*, accessed: 14 September 2011, http://www.nytimes.com/2010/09/08/books/08book.html.

24 Roger Penrose, "*The Grand Design* (review)", *Financial Times* (04 September 2010), http://www.ft.com/cms/s/2/bdf3ae28-b6e9-11df-b3dd-00144feabdc0.html#axzz1CSIgPlwa.

25 Joseph Silk, "One Theory to Rule Them All", *Science* 330 (6001): 179-180.

26 Craig Callender, "Stephen Hawking Says There's No Theory of Everything", *New Scientist* 207 (2777) (September 2010): 50

27 Paul Davies, "Stephen Hawking's Big Bang Gaps", *The Guardian,* accessed: 04 September 2010, http://www.guardian.co.uk /commentisfree/belief/2010/sep/04/stephen-hawking-big-bang-gap,

28 Peter Woit, "Hawking Gives Up", accessed: 14 September 2011, http://www.math.columbia.edu/~woit/wordpress/?p=3141.

Marcelo Glesier,[29] John Horgan[30] and Baroness Greenfield[31], the fact that there are not many backing up the book except for the famous atheist, Richard Dawkins, confirms our evaluation. According to Dawkins, in the 19th century, Darwin excluded God from biology, but physics was undecided, but it was badly hit by this book of Hawking's.[32]

Unlike Dawkins's claim, however, we do not think that the general approach of the book, will satisfy the atheists just as the theists. Yet, Hawking accepts it is not so absurd to show God in reply to questions such as "Why is there something but nothing?", "Why are not the laws of nature different?", "How can our universe have such appropriate living conditions?", because there is not a definite answer to these kinds of questions in the scientific framework until now.[33] In fact, Hawking accepts the "premises" of cosmological evidences widely used today to prove the existence of God such as "intelligent design", "anthropic principle", "first cause" and "fine tuning", and explains them almost in a way that even makes the theists jealous. However, in the classical atheist approach, the premises of such kind of cosmological evidences are contradicted and rejected from the very beginning. For example, in this context, the Big Bang Theory, which is regarded as the beginning of the world, has not been accepted for many years by atheist circles, just as the rejection of the evolution theory in theistic circles. Some atheist cosmologists like Fred Hoyle have developed an alternative universe model (Steady State).[34]

At this point we must immediately remind that Hawking and Mlodinow accept the premises of cosmological arguments, and according to them, science can now respond to questions like "how can the universe create itself from nothing?", "why does it have such sensitive living conditions within its own scope?" So, it is no longer necessary to involve a supernatural being or God to explain such phenomena.

Undoubtedly, such a discourse will run some risks in itself. Revealing that the theory (M-theory), which is said to be capable of responding to these phenomena scientifically, is not scientific or highly

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29 Marcelo Glesier, "Hawking and God: An Intimate Relationship", accessed: 10 September 2011, http://www.npr.org/blogs/13.7/2010/09/08/129736414/hawking-and-god-an-intimate-relationship.

30 John Horgan, "Cosmic Clowning: Stephen Hawking's "new" theory of everything is the same old CRAP", *Scientific American*, accessed: 13 September 2010, https://blogs.scientificamerican.com/cross-check/cosmic-clowning-stephen-hawkings-new-theory-of-everything-is-the-same-old-crap/.

31 Baroness Susan Greenfield, a prominent UK scientist, was asked to comment on Hawking's Hawking and Mlodinov's ideas about God. Was she worried by scientists making claims about other areas of life? "Yes, I am," she replied. "Of course, they can make whatever comments they like but when they assume, rather in a Taliban-like way, that they have all the answers then I do feel uncomfortable. I think that doesn't necessarily do science a service." see Alister McGrath, "Stephen Hawking, God and the Role of Science", *ABC Religion and Ethics* (14 Sep 2010), http://www.abc.net.au/religion/articles/2010/09/14/3011163.htm

32 "Science and Religion: Another Ungodly Squabble" (5 September 2010). http://www.economist.com/blogs/babbage/2010/09/science_and_religion

33 *The Grand Design*, 172.

34 Hoyle's acceptance of the idea of infinite time led him to defense Steady State Theory a long period of time although most of his colleagues did abandon this theory. see John Polkinghorne, "Cosmology: Scientific Cosmologies" *Encyclopedia of Religion,* ed. Lindsay Jones (Detroit: Thomson Gale 2005): 3/2032; also see Ian G. Barbour, *When Science Meets Religion* (San Francisco: HarperOne, 2000), 42.

speculative will nullify the premises of the above cosmological arguments, and in this case "God" will likely continue to be a stronger argument.

Since we have already made a detailed review,[35] we will not negotiate the parts of the book again, but instead we will try to evaluate the book based on its main idea.

To sum up, according to Hawking and Mlodinow, humanity from Ptolemy (100-160) to Copernicus (1473-1543), from Newton to Einstein (1879-1955) and to the present quantum theories, has always tried to understand the physical reality via "models". Considering that they are constantly being replaced, will this series of models always continue to change like this, or will they reach an endpoint? It is such a point that will be the ultimate theory of the universe, and it will contain all the forces of nature and predict all the observations we can make. And again, according to Hawking, the models of the universe produced until now have always had to be associated with God in some way. Plato regarded that the universe was created by God, and Aristotle regarded God as the first mover. God was regarded as the founder of the order of the universe by Newton and as the creator of the continuity by Descartes. Today, the Big Bang Theory, which attributes a beginning to the universe is interpreted as indicating God. Can't a model or theory that can explain and answer all the questions about the universe without resorting to God at all and staying within the limits of science itself be developed?

"We do not yet have a definitive answer to this question, but we now have a candidate for the ultimate theory of everything, if indeed one exists, called M-theory (Membrane Theory)[36]. M-theory is the only model that has all the properties we think the final theory ought to have, and it is the theory upon which much of our later discussion is based... We will describe how M-theory may offer answers to the question of creation. According to M-theory, ours is not the only universe. Instead, M-theory predicts that a great many universes were created out of nothing. Their creation does not require the intervention of some supernatural being or god. Rather, these multiple universes arise naturally from physical law. They are a prediction of science."[37]

As seen, Hawking and Mlodinow attribute all their claims to the success of M-theory. For this reason, getting to know this theory a little better will allow us to question better the validity of the claims.

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[35] Mehmet Bulğen, "The Grand Design (Büyük Tasarım): a book review", *Marmara Üniversitesi İlahiyat Fakültesi Dergisi* 39 (2010/2): 171-182.

[36] The meaning of "M" in M-theory is controversial. Edward Witten, a professor of theoretical physicist who first introduced the theory at the University of California, did not explain the meaning of M. He said, "As soon as we understand the theory better, we will understand what "M" is", he said. He even wanted to add a mystery to the theory, stating that it could mean "Magic", Mystery. But for many, the meaning of "M" in M-Theory is "membrane". Because, on the 10^{-35} meter scale, M-theory, bases on the entities that are membranes, not "strings" as opposed to String Theory. For a detailed discussion of string, super string and their current form, M-theory, see, Michael J. Duff, "The Theory Formerly Known as Strings", *Scientific American* (February 1998): 64.

[37] *The Grand Design*, 8.

1. M-THEORY: IS IT SCIENCE OR PHILOSOPHY?

Today's scientific cosmology is based on two basic components: Quantum Mechanics, the General Theory of Relativity.[38] The former explains the universe on a micro scale, and the latter on a macro scale. Although both the Relativity Theory and the Quantum Mechanics are successful in their own fields, these theories are not compatible with each other.[39] Removing the incompatibility arising from the discreteness of Quantum theory and the continuum of General Relativity is one of the most important research areas of today's cosmologists.[40]

On the other side, it is generally accepted that the universe began to exist with a huge explosion/expansion 13.7 billion years ago but the Big Bang Theory cannot explain what led to the expansion. This theory starts to explain the expansion moment from 10^{-43}th seconds, and when one tries to go beyond it, a situation called "singularity" arises, and after that the General Relativity lose its validity, or it cannot elucidate it further.[41]

"String Theory" was put forward towards the end of the 1960s in order to develop a non-conflicting physics theory by bringing together incompatible physics theories, and to overcome the obstacles in situations such as the Big Bang and the Black Hole, too. In this theory, instead of the particles of the Standard Model whose basic components are non-dimensional "points", one dimensional "strings" provide a basis for it. On the other hand, 6 additional space dimensions, which are folded as circle have been added on the known 3 space and 1-time dimension. Accordingly, vibrations at different frequencies of strings that resemble violent wires constitute protons and electrons, which form atoms, and an additional six space dimensions make an infinite number of multiverses possible.[42]

M-theory which Hawking shows as a candidate for the theory of everything is the product of the struggle to unite five different String Theories and Super Gravity Theory. It is different from the String Theory, as well as on the same scale as the basic unit (10^{-35} meters, i.e. Planck Distance), because M-theory is based on two-dimensional membranes instead of one-dimensional strings, and it adds a space dimension to the ten dimensions in String Theory. Although the theory seems to be mathematically successful, no experimental clue has been obtained about the existence of these additional strings/membranes or the additional spatial dimensions to the three dimensions we already know.[43]

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38 Spencer Scoular, *First Philosophy: The Theory of Everything* (Florida: Universal Publishers, 2007), 349.

39 Serge Brunier, *Majestic Universe* (Cambridge: Cambridge University Press 1999), 175.

40 William R. Stoeger, "String Theory", *Encyclopedia of Science and Religion,* ed. Wentzel Van Huyssteen (New York: Macmillan Reference USA, 2003), 844.

41 Christopher Ray, *Time, Space and Philosophy* (London: Routledge 1991), 199.

42 Gordon Kane, *Supersymmetry*, 131; Laura Ruetsche, "String Theory", *Encyclopedia of Philosophy,* 2nd edition, ed. Donald M. Borchert (Detroit: Macmillan Reference USA, 2006), 9: 267; Larry Gilman, "String Theory", *The Gale Encyclopedia of Science,* Third Edition, ed. K. Lee Lerner (New York: Macmillan Reference USA, 2004), 6: 3868; Katrin Becker, *String Theory and M-Theory* (Cambridge: Cambridge University Press, 2007), 2; Barton Zwiebach, *A First Course in String Theory* (Cambridge: Cambridge University Press 2004), 3; Michael Green, "A Brief Description of String Theory", *The Future of Theoretical Physics and Cosmology,* ed. G.W. Gibbons (Cambridge: Cambridge University Press, 2003), 473.

43 Larry Gilman, "String Theory", 3869.

To clarify the idea of not being tested experimentally, with the present experimental conditions, it has been found that an atom normally consists of a nucleus and the electrons whirling around it, and this nucleus is composed of protons and neutrons, which consist of smaller particles called 'quarks'. However, the question of whether these particles are composed of smaller particles as well and what their building blocks are cannot be answered with the present technological advancements.

For example, in the world's most advanced particle accelerators, 1 trillion electric volts of energy can be produced by colliding subatomic particles. This level is one quadrillion time lower than the energy level required for the membranes of M-Theory to be tested experimentally, while it is sufficient to examine subatomic physics like protons in quantum mechanics. This is because the size of the membranes of M-theory and the additional seven space dimensions are on the smallest possible scale, that is, the Planck Scale, which is such a small distance, 10^{-35} meters, that if we make a comparison over the size of the protons (10^{-15} meters) that are subject to collision at CERN today, the size of a proton compared to the size of the Sun is equivalent to that of a membrane of M-Theory compared to the large size of the proton. It is also stated that a particle accelerator in a galaxy size, namely 1000 light years (about 46.357.579.315.645.920.000 km) long will be needed to empirically demonstrate that such membranes or strings exist with the present technological possibilities. However, when we think that the Great Hadron Collider (LHC), the largest particle accelerator in the world, has a 27 km circumference, it will be understood how impossible it is. Therefore, many scholars who criticize the String Theory, as we will also discuss below, think that it is a "philosophy" that cannot be verified and falsified by experiment, rather than being a part of science.

One of the first scientists to come to mind about critics of the String / Super-String / M-Theory is undoubtedly Nobel Prize winner physicist, Sheldon Lee Glashow. According to Glashow, the String Theory may have achieved some mathematical success. However, physics is not "Mathematical Platonism"; it has to rely on observations and experiments. If physics is regarded as mathematics only, then all the achievements that have been made since the 17th Century Science Revolution will be ruined, and such a paradigm shift will take physics to the Middle Ages. Glashow, who defends that String Theory cannot be tested in the future as it cannot be tested today, goes so far as to call it "the tumor of physics" and asserts that it must be removed from the curriculum before it is too late.[44]

Science writer Jim Holt says the following about String Theory, which has been nominated for "The Theory of Everything" in his article in *The New Yorker*:

"It is the worst of times in physics. For more than a generation, physicists have been chasing a will-o'-the-wisp called string theory. The beginning of this chase marked the end of what had been three-quarters of a century of progress. Dozens of string-theory conferences have been held, hundreds of new PhD.s have been minted, and thousands of papers have been written. Yet, for all this activity, not a single new testable prediction has been made, not a single theoretical puzzle has been solved. In fact, there is no theory so far—just a set of hunches and calculations suggesting that a theory might exist. And, even if it

[44] For an interview with Sheldon Lee Glashow on String Theory, see "Viewpoints on String Theory: Sheldon Glashow", accessed: 05 September 2011. http://www.pbs.org/wgbh/nova/elegant/view-glashow.html

does, this theory will come in such a bewildering number of versions that it will be of no practical use: **A Theory of Nothing**."[45]

John C. Baez from The Departments of Mathematics and Physics at the University of California also makes statements similar to Jim Holt:

"For the last few decades, astrophysicists have been making amazing discoveries in fundamental physics: dark matter, dark energy, neutrino oscillations, maybe even cosmic inflation in the very early universe! Soon the Large Hadron Collider will smash particles against each other hard enough to see the Higgs boson - or not. With luck, it may even see brand new particles. But about all this, string theory has had little to say."[46]

Peter Woit from Columbia University says that String Theory has a very good relationship with the public because ideas like infinite universes, eternal lives, dimensional dimensions are interesting to humans; however, this situation leads to the exaggeration of the true value of the theory and the exploitation of people's emotions by some physicists and popular media. According to Peter Woit, the public should no longer be deceived for the sake of being sold and watched, and it should be explained that a theory that cannot be verified and falsified cannot be science in popular science magazines. On the other hand, department heads and senior theoreticians in universities should be warned, theses about String Theory should not be given in postgraduate and doctoral studies, and the energy of young and curious minds should not be wasted. Research funds should not be used for these kinds of theories, but rather for their true purpose, and conferences for the sake of this theory should not be organized any longer. According to Peter Woit, physics would have been far more advanced than its present position if the cost, effort, time spent, and energy consumed on String Theory over the last 30 years were used for the Standard Model.[47]

The Trouble with Physics (2006), written by the theoretical physicist Lee Smolin, to criticize String Theory, is regarded as a breaking point. Smolin claims in his book that the physics which is the basis for of all the sciences is now deviated. According to him, the human understanding on the laws of nature has increased rapidly in the last two centuries, but today there is not much more known about the laws of nature than in the 1970s. Why has humanity suddenly been stuck for almost forty years? why is physics in "depression"? One of the most important sources of the problem, according to Smolin, is that "String Theory", which physicists created for gathering their ambitious enthusiasm and all the forces of nature as a single theory (Theory of Everything). This theory unfortunately succeeded in attracting the interest of society and captivating the hearts of physicists with its exotic new particles, and parallel universes. However, according to Smolin, there is a huge shortage in this theory: as any part of it cannot be tested until

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[45] Jim Holt, "Unstrung: In string theory, beauty is truth, truth beauty. Is that really all we need to know?, *The New Yorker*, accessed: 8 September 2011, http://www.newyorker.com/archive/2006/10/02/061002crat_atlarge?currentPage=2

[46] John C. Baez, "This Week's Finds in Mathematical Physics", accessed: 05 September 2011, http://math.ucr.edu/home/baez/week246.html.

[47] Peter Woit, "String Theory: An Evaluation", accessed: 10 September 2011, http://arxiv.org/PS_cache/physics/pdf/0102/0102051v1.pdf; also see Peter Woit, *Not Even Wrong: The Failure of String Theory and the Continuing Challenge to Unify the Laws of Physics* (New York: Basic Books, 2006).

now, there is no hope that it will be testable in the future, so this theory, which comes with infinite number of versions, does not carry the scientific criteria. Nevertheless, since it takes the lion's share in funding, it is able to attract the best minds to itself. Therefore, young physicists who go to other areas are punished, so this theory decreases the value of physics as a whole. According to Smolin, if "verifiability" or "falsifiability" principles are to be regarded as the criteria, theories in String Theory certainly do not meet the criteria of being scientific, and thus it is in the scope of "metaphysics". Smolin also, parallel to scientists like Glashow and Peter Woit, wants the theory to be removed from the curriculum and cut the research grants.[48]

2. HAWKING'S UNDERSTANDING OF SCIENCE AND SOME METHODOLOGICAL PROBLEMS OF TODAY'S PHYSICS

The basic criticism over String Theory or M-Theory, as can be seen from the clear expressions of the physicists we have quoted above, is that it cannot meet the basic criterias for scientific knowledge.[49] Indeed, it can be considered as an indicator of the regard that M-Theorists such as Stephen Hawking and Edward Witten could not receive the Nobel Prize despite their popularity. The Swedish Royal Academy, which awards this prize, strictly requires that the discovery that is rewarded be verified empirically and the evidences should be testable.

We nevertheless do not think that while they claim "science can explain the universe alone", Hawking and Mlodinow are not aware of the speculative character of M-theory, which their thesis is based on. In many parts of the book, they see no harm in citing that most of their ideas are rejected by scientists.[50] So, we need to consider why Hawking and Mlodinow have ignored the criteria, such as being testable or verifiable and falsifiable, which are required for scientific knowledge, or rather, what they understand by science.

First of all, we need to point out that the testability condition of today's physics theories is a difference in approach. According to Hawking, a physical theory is simply a mathematical model, and it is pointless to question whether it matches external reality or not.[51] In fact, as he stated with the understanding of "model-depended realism," the best theory according to him is the theory that "constructs its own reality".[52] Therefore, Hawking is close to the idealist wing, which attributes everything to mind and derives everything from it, and does not accept the existence of an objective reality outside the mind.

However, it would also be erroneous to reduce the distinction between the experiment and the theory of today's physics to the historical controversy between idealism and realism. We must also be aware of the discussions on the nature of science by the thinkers and schools of though like the Vienna School, Karl

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48 Lee Smolin, *The Trouble with Physics: The Rise of String Theory, The Fall of a Science, and What Comes Next* (New York: Mariner Books, 2007), xv-xxii.

49 Peter Woit, "Is String Theory Testable?" accessed: 10 September 2011, http://www.math.columbia.edu/~woit/testable.pdf. Also see. John Horgan, "Cosmic Clowning: Stephen Hawking's "new" theory of everything is the same old CRAP", 13 September 2010, https://blogs.scientificamerican.com/cross-check/cosmic-clowning-stephen-hawkings-new-theory-of-everything-is-the-same-old-crap/

50 Hawking – Mlodinow, *The Grand Design*, 7.

51 Stephen Hawking - Roger Penrose, *The Nature of Space and Time* (Princeton: Princeton University Press, 2010), 4.

52 Hawking – Mlodinow, *The Grand Design*, 173.

Popper, Jürgen Habermas, Thomas Kuhn and Paul Feyerabend. For example, Thomas Kuhn thinks that science is neither a cumulative validation of accumulation as logical positivists suggest, nor is it a human activity that approaches the truth by sorting out mistakes as Karl Popper defends. According to Kuhn, no scientific theory is absolute, but contains a number of limitations that will cause it to lose favor one day. The underlying reason for this is that scientific theories regarding physical reality are determined based on broader conceptual paradigms. The formation of these paradigms that guide scientific activity is holistic, that is, with many factors coming together. In addition to the historical and socio-cultural environment in which the scientific study is conducted, many factors that cannot be controlled like the researchers' personal attitudes and beliefs influence the formation of conceptual paradigm.[53]

As seen, Kuhn makes science a socio-cultural phenomenon. It is also revealed by the fact that we often encounter the paradigm concept, he actually developed for natural sciences, in the field of social sciences.

In addition to these speculations about the nature of science, we must also remark that the today's physics faces very important methodological problems in practice. Whereas physics has been traditionally accepted as a science based on the combination of "theory and experiment",[54] when the level of the research on the most fundamental and outmost limits of the universe is considered, it can be defended that such research threatens the sustainability of the theory-experiment cooperation.[55] One of the primary reasons for this is that it requires extremely expensive and sophisticated conditions to test particle physics and astrophysical theories. For example, the Large Hadron Collider (LHC), which is considered to be today's most advanced particle accelerator, is reported to have a machine cost of 10 billion USD, which is such a huge budget that it is impossible for a university but even for an ordinary state to meet. Although it is possible for many countries to build joint research laboratories, such as the European Nuclear Research Center (CERN) or the International Space Station (ISS). That is not all; experiment facilities can be created as a result of very large technological infrastructure, knowledge accumulation, institutional organization, and complicated processes that do not accept any fault and cannot be compensated. For example, the so-called "God Particle" (Higgs Boson) of the Standard Model, which is often the subject of today's media, has been theorized by Peter Higgs at Edinburgh University in the 60's. At least half a century has passed since it was tested by Atlas and CMS tests in CERN last year, and it is stated that the results of the experiment can be taken as a result of data analysis that will last for about 10 years, or even a definite result cannot be obtained.[56] In this case, even common-sense scientists lose control and now claim that physics should be

[53] Alexander Bird, "Thomas Kuhn", *The Stanford Encyclopedia of Philosophy* Fall 2011 ed. Edward N. Zalta, URL = http://plato.stanford.edu/archives/fall2011/entries/thomas-kuhn/; also see. Thomas Kuhn, *Structure of Scientific Revolutions,* 3rd edition (Chicago: University of Chicago Press, 1996).

[54] Barry Loewer, "Philosophy of Physics", *Encyclopedia of Philosophy* 2nd ed. Donald M. Borchert (Detroit: Macmillan Reference, 2006), 7: 473-478.

[55] We can explain the relation between experiment and theory in physics with the example of "the scissor". Just as a scissor must be opened and closed in order to be able to continue its functioning, it is necessary to occasionally open and close between experiment and theory in order to be able to achieve progress in physics. As in quantum physics, sometimes theories do not exactly match observations and a new theory is developed that explains new observations. But nowadays the gap between theory and experiment is so open that nobody knows how these two faces can intersect again.

[56] Geoff Brumfiel, "Higgs Hunt Enters Endgame", *Nature* 479 (24 November 2011): 456-57.

avoided from restricting obstacles, and these works should be done with greater emphasis on mathematics.[57] However, the principle of "relying on experiments and observations", which is regarded as the most basic condition of scientific knowledge, is damaged then, and as a result, the line separating science and philosophy from each other disappears to some extent.

Undoubtedly, it would be useful to give details about why just mathematics cannot be accepted as a single criterion for understanding nature. Although mathematical modeling of nature is very important for the development of scientific knowledge, mathematics or unaided reason without experiment and observation is not considered essential to describe physical reality.[58] Indeed, it is because most of the great physical theories create their own mathematical axioms themselves. For example, from Ancient Greece to the 19th century, the linear space vision of Euclidean geometry, based on continuity in the mathematical modeling of nature, was considered as the basis for nearly two thousand years. However, mathematicians such as Riemann (1826-1866) and Gauss (1777-1855), especially Lobachevsky (1793-1850) and Bolyai (1802-1860), have shown that Euclidean geometry is not absolute and that other types of geometries could be developed, with different axioms.[59] In fact, Einstein's relativity theory is based on Riemann geometry, which is curved space geometry instead of Euclidean geometry based on lineer spaces. Today, geometric axioms (such as discontinuity and discreteness) on which the String Theory and therefore M-Theory are based differ from both Euclidean geometry and Riemannian geometry.[60] Therefore, mathematical splendor is not sufficient for the theory to fully describe physical reality.[61]

Another methodological problem faced by modern physics is on the measurement issue and seems to be a more insuperable obstacle because Werner Heisenberg's "Uncertainty Principle" predicts that the position and momentum of a particle cannot be measured with the same certainty, even when appropriate testing conditions are met and experiments are carried out.[62] Accordingly, the smaller uncertainty in the

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[57] J. D. Bernal, *A History of Classical Physics: From Antiquity to the Quantum* (New York: Barnes & Noble Books, 1972), 302; also see J. D. Bernal, *Modern Çağ Öncesi Fizik,* Turkish trans. Deniz Yurtören (Ankara: TÜBİTAK Publications, 1995), 334.

[58] Barry Gower, *Scientific Method: A Historical and Philosophical Introduction* (London: Routledge, 2012), 67; Peter Kosso, *A Summary of Scientific Method* (New York: Springer Science & Business Media, 2011), 7.

[59] For example, Lobachevsky accepts that, contrary to Euclidean's fifth axiom, he can draw more than one parallel from a given point to a given straight line, or that the sum of the angles of a triangle is less than 180 degrees. The Riemannian geometry differs from both the parabolic geometry of Euclid and the hyperbolic geometry of Lobachevsky, its elliptical geometry has no parallel lines, and the sum of the angles of a triangle is greater than the sum of two perpendicular angles. George Sarton, "Euclid and His Time", *Ancient Science and Modern Civilization* (New York: Harper & Brothers, 1959), 27-28; Alexander Hellemans – Bryan Bunch, *The Timetables of Science: A Chronology of the Most Important People and Events in the History of Science* (USA: Simon & Schuster,1988), 272-73.

[60] Brian Greene, *The Elegant Universe: Superstrings, Hidden Dimensions and The Quest for The Ultimate Theory* (New York: Vintage Books, 2000), 231; George Johnson, "How Is the Universe Built? Grain by Grain", accessed: 07 September 2011, https://archive.nytimes.com/www.nytimes.com/library/national/science/120799sci-planck-length.html

[61] For an overall assessment of the relationship between experiment / observation and mathematics / logic in cosmology bk. Hannes Alfvén, "Cosmology: Myth or Science?", *Journal of Astrophysics and Astronomy* 5 (1984): 79-98,

[62] George Greenstein - Arthur G. Zajonc, *The Quantum Challenge: Modern Research on the Foundations of Quantum Mechanics* (Jones & Bartlett Learning, 2005), 45

position of the particle (the more precise its position measured) is, the greater uncertainty of its momentum is; on the contrary, the uncertainty of its position increases as the uncertainty of its momentum decreases. This implies that statistical or probabilistic values are valid in natural sciences, as in social sciences, instead of "certainty". However, perhaps more important than all these is the acceptance of quantum mechanics as a postulate that "measuring or observing an object will change its state". According to this, there is no possibility of measuring the position and momentum of a particle in its natural state without affecting it. If the activity of measurement and observation makes the object different from what it actually is, in this case the question arises, "Is the thing that which is demonstrated by the measurements and observations really nature itself or is it just the form that which is influenced by the observer?". Thus, the principle of "describing physical reality as it really is", which is perhaps one of the most important existential purposes of physics, becomes controversial.

The role of the observer in quantum physics is not only this, but it gives ground for making many interpretations contrary to common sense and daily life. Hawking and Mlodinow take advantage of quantum physics' anti-realist interpretations, while founding the claim in *The Grand Design* that "science alone can now explain the universe". For example, "Sum Over History" theory developed by Richard Feynman, the American Nobel Prize winner physicist who theorized "Double Slit" experiment, are among them. If we remember briefly the experiment and the theory, according to the classical physics, while the objects are in motion, they follow only one orbit, one track between the initial and final target positions. However, the "interference pattern" in the Double Slit Experiment implies that a particle at the atomic scale can pass through two or more slits at the same time. This theory was formulated by Richard Feynman as the particle progressing from one point to another in space-time as possible. Accordingly, the probability of a particle going from A to B is found by gathering the waves for each possible way from A and B. So, there is a possibility that an A particle going to point B will come to Jupiter, which is not on its road, and even pass the entire universe. So according to Feynman's theory, the particle has "sum over histories" before reaching the goal. On the other hand, observation of the observer in the Double Slit Experiment brings the particle into a single position from the "superposition". Thus, the observer has determined that the route of particle followed, that is, its past.

Hawking and Mlodinow have arrived at the following conclusions from this experiment and theory: If quantum physics is dominant at the very basis of matter, the universe as a whole must have multiple pasts or alternative histories, just as in Feynman's theory of sum over histories. In other words, just like a particle, the universe should have lived through all alternative pasts until it comes to its present position, which means that there is an infinite number of universes. Some of these universes may resemble our universe, some may not; some have appropriate living conditions, some do not. And in some of them, Elvis Presley dies at a young age, but he does not die in some. In some, Napoleon loses the Battle of Waterloo, in some, he wins. In each universe, there are different laws and situations in which all possibilities are experienced. So, the answer to the question, "How does our universe have such delicate life conditions?" is not God, but the "Sum Over History Theory", because there is a possibility that in the infinite number of universes there is a universe with suitable living conditions similar to ours. Again, the result is that just as our observation of particles affects the past of the particle in the Double Slit Experiment, our observation of the universe at this moment determines the past of the universe.

"The usual assumption in cosmology is that the universe has a single definite history. One can use the laws of physics to calculate how this history develops with time. We call this the "bottom-up" approach to cosmology... Instead, one should trace the histories from the top down, backward from the present time. Some histories will be more probable than others, and the sum will normally be dominated by a single history that starts with the creation of the universe and culminates in the state under consideration. But there will be different histories for different possible states of the universe at the present time. This leads to a radically different view of cosmology, and the relation between cause and effect. The histories that contribute to the Feynman sum don't have an independent existence, but depend on what is being measured. We create history by our observation, rather than history creating us."[63]

Hawking and Mlodinow want us to believe that we have been to Mars at the same time during our trip from Istanbul to Ankara. If so, Hawking and Mlodinow did not write *The Grand Design* book, but we created the book with our observations during the introduction of the book by having an impact on the past (top-down approach)! However, we must admit that we find it much more surprising that Hawking and Mlodinow continually try to benefit from Feynman's Sum Over History Theory while trying to support M-Theory, and they claim that the unified theory that Einstein was seeking is this theory. It is known that Feynman himself, as long as he lived, strongly opposed the String Theory and labeled it as madness, deviation, and the wrong path.[64] It is known that Einstein opposed the interpretation of Quantum Physics with an objective indeterminist or anti-realist point of view, and struggled with these ideas throughout his life. He argued that the problem arises from our lack of knowledge, not because nature is in fact like this, and that a theory corresponding with common sense will absolutely be revealed in the future.

In our opinion, however, the main criticism to M-Theory is its claim to be the "ultimate theory" that contradicts the overall progress of science. In fact, a claim such as "The Theory of Everything" means that there is no longer something to investigate, physics comes to an end and science is over. Essentially, this fact brings to mind a familiar claim. Towards the end of the 19th century, the leading scientists of the time, the mathematical physicist Lord Kelvin (1824-1907), claimed that physics came to the last decimal place of its life. According to him, all the basic problems have been solved, except for some insignificant details on heat and light theory, and that in the following decade, these would probably be resolved as well.[65] However, a decade later the discovery of radioactivity, the theory of relativity, and quantum mechanics transformed physics totally, and caused scientists to change their perception of the universe.

3. AN EVALUATION WITH REGARD TO ISLAMIC VIEWPOINT

Undoubtedly, the basic principle of the Islamic religion is "monotheism" (*tawḥīd*). This principle, which emphasizes that nothing but *Allah* can be deity, divides existent beings into God and everything other than God (*mā siwa Allāh*). On this ontological distinction, God represents the eternal, perpetual, immutable, necessary, sacred and incomprehensible side of reality; however, the universe stands for the side which is finite, limited, contingent, discontinuous, profane, comprehensible, mutable and diverse. Therefore, the

[63] Hawking – Mlodinow, *The Grand Design*, 139-140.

[64] Jim Holt, "Unstrung: In String Theory, Beauty Is Truth, Truth Beauty", accessed: 8 September 2011, http://www.newyorker.com/archive/2006/10/02/061002crat_atlarge

[65] Peter E. Hodgson, *Theology and Modern Physics* (Burlington: Ashgate Rub., 2005), 1.

principle of *tawḥīd* or monotheism stipulates the condition that the universe can be comprehended as a whole, and subject to research and examination by cleaning the universe from divine attributes such as sacredness, transcendence, eternity, and infinity.

So, according to Islam, does "human being" have the competence to do this, and to comprehend the universe from the very basic to the most general, that is to say, to make a "scientific cosmology"?

Even if the *Qurʾān* emphasizes that man cannot grasp *Allah* in many verses,[66] it approaches the universe differently. *The Qur'an* states that Allah taught all the names of things to prophet *Adam*,[67] and as a "steward of *Allah* on earth", the human being is required to establish sovereignty over nature and other beings,[68] and to examine heaven and earth using the senses and the mind, using this knowledge as evidence for the existence of *Allah*.[69] Indeed, the fact that all beings except for *Allah* are expressed in terms of "The Universe" (*ʿĀlam*) in the sense of "pointing to the creator's existence" (with which man is explicitly directed to cosmological arguments about knowing *Allah*), implies that man can comprehend the universe because human beings must be able to grasp the universe as a "whole", so that they can develop reasoning and reflection. Hence, according to Islam, mankind has no right to direct his incapability of not being able to see or comprehend Allah to the nature and the phenomena in the world: in other words, to render the universe metaphysical.

After presenting this perspective, if we evaluate the expression "Now, science can explain the existence of the universe alone, God is unnecessary!", it is true that it holds the claim of abstracting nature from signs and symbols so much that one cannot make religious associations. However, while we state that M-Theory, which is used to support this claim is a highly speculative theory, that is, it does not have the basic criteria required for being scientific, as the "*tawḥīd*" principle notes above, we need to avoid approaches which imply that human beings cannot comprehend the universe, know the very nature the of things, scientific research on the substance and the limits of reality will fail, and that therefore, cosmology is in the field of metaphysics, not science. Although it seems to be useful for religion in the short run to make the universe incomprehensible by man, it will cause cosmological proofs to fall into contradiction in themselves as it will open the way to deification of the universe over the long term. An unknown (God) cannot be explained with another unknown (the universe); the human cannot grasp the universe, so s/he cannot develop reasoning and reflection of God through it.

Therefore, instead of declaring the universe incomprehensible and trying to reach God through the points that science cannot explain (god of the gaps), as theologinas we must encourage science to further research on the universe, and we must consider these progresses as a service to the "*tawḥīd*" principle and distancing from "pantheism" and "polytheism or henontheism" (*shirk*). When we approach the matter in this way, even cosmology becomes a "science", and will be regarded as a service to *tawḥīd* and departure from *shirk*, because the fact that the universe can be explored and understood as a whole is the greatest proof that it is not God.

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66 al-Anʿām 6/103, al-Aʿrāf 7/143, al-Baqara 2/55, al-Nisāʾ 4/1.

67 al-Baqara 2/31.

68 al-Baqara 2/30; al-Anʿām 6/165; Fāṭir 35/39.

69 al-Dhāriyāt 51/20-21.

From such a religio-scientific perspective, since religion does not try to reach God through the points that science cannot explain, the possibility of conflict with science will also be minimized. However, reaching God through the unknowns in the universe -the unsolved points by science- will cause conflict between science and religion each time science makes progress in explaining little known issues. Even if science uses methodological naturalism and reveals that the whole universe is the result of a law of nature, it will not be able to harm religion because today science can reveal how the rain falls, and from which stages babies pass through the mother's womb and are born. However, this does not prevent a believer from regarding rainfall as the mercy and the birth of the baby as the work of a unique miracle of God. So, why is the birth of the universe based on natural laws -for example, The Law of Gravity- contrary to religion?

CONCLUSION

Today, cosmology is a science, but it is true that this science faces many deficiencies and crises in comprehending the universe as a whole. However, this does not mean that they cannot be overcome and no progress can be recorded in this field. If we know much more about the universe today than a decade ago, there is no reason not to feel optimistic about the future. If science fails to understand the universe, it will never be due to the inadequacy of the human capacity or incomprehensibility of the universe; perhaps failure, as J.D. Bernal states, will be due to the fact that the social organization necessary for science is not established.[70] Therefore, instead of the way of reaching God through the points where science is helpless to explain, theologians have to put forward a conception of God from the knowledge of the universe.

On the other hand, the religion - science relation can be evaluated restrainedly, first of all, by having knowledge about both of them. When examined closely it is seen that although science seems to follow a certain methodology based on the rational evaluation of experiments and observations, it also includes speculative aspects. On the other hand, although religion is supposed to be totally speculative, it has certain methodologies when based on a just and wise belief of God. Accordingly, it should be well questioned why modern science emerged in the west, where monotheistic religions were dominant, not in a geographical region where Indian religions such as Hinduism and Buddhism were dominant. In response to the Eastern religions which make God and nature identical, and so have supreme, holy, mysterious, frightening, incomprehensible natural conceptions, the fact that the monotheistic religions separate the universe and God with clear lines, and the whole world is given to the control of a just and wise God with an "unchanging custom" enabled the development of a conception of nature free from independent semi-god spirits and supernatural powers, thus an infrastructure was established in which natural sciences could have the opportunity to improve. The liberation of nature from mythical narratives, spiritual elements and divinization by monotheistic religions constituted one of the most important stages in the development of science.[71] Therefore, although they are portrayed as if they were clashing, "science" and "monotheistic religions" are actually children of the same family and the same worldview. For this reason, just as science has contributed to religion in its purification from superstitions, religion can also help to purify science from superstitions, contrary to common sense, and anti-realist approaches. In this scope, it can be seen that Einstein's quantum physics responds to the objective indeterminist interpretation with that statement,

[70] J. D. Bernal, *Tarihte Bilim=Science in History*, trans. Tonguç Ok (Istanbul: Evrensel, 2008), 484.

[71] Ismail R. Faruqi, "Islam and The Theory of Nature", *Islamic Quarterly* 26/1 (1984): 16-24.

"God does not play dice", as a call to religion as a relief for the deviation from the traditional understanding of science.

Religion does not only encourage science to use common sense, with its red lines it may also enable scientists to ask the right questions and turn to the right channels in terms of the ultimate goal. It should not be forgotten that the astronomer George Lemaitre (1894-1966), one of the great theoreticians of the Big Bang Theory, which is considered one of the greatest discoveries of the past century and regarded as a starting point for the physical world in accordance with religion, is also a priest at the same time. In fact, String Theory, which is argued to foreshadow infinite universes contrary to religion for about 40 years, led physics to a stalemate, and caused a loss of time, and should be looked at from this point of view.

On the other hand, regarding science only as a technique means to underestimate it. On the contrary, with its worldview, science provides important clues about not only the functioning of the universe but also the place of the human being in the universe, the purpose of life, and moral duties and responsibilities. In addition, it provides scientists who deal with it with features such as neutrality, honesty, diligence, inquisitive spirit, passion of truth and humility. For example, according to Epicurus, physics reveals that nature is not governed by capricious gods, but by its systematic rules, so it frees man from unnecessary fears and obligations caused by these gods, and opens the way for a happy and free life. According to the classical period Islamic theologians (the practitioners of the science of *kalām*, *mutakallimūn*), physics does not only purify nature from the divine elements, but reveals that nature in constant change and transformation is in need of a God out of itself, so it makes the human being ready to duties that God will guide through His prophets.

In fact, the debate is the same today, as well. Today, in the West, Hawking and Mlodinow claim in *The Grand Design* that physics makes God unnecessary by revealing that the universe is a self-sufficient whole without needing the intervention of a supernatural being from the beginning to the end; which means that the human being must follow the path of his own mind, not a religion based on God. On the contrary, according to Antony Flew, who left atheism in the light of the picture of the universe set forth by modern science, science reveals that there exists an omnipotent, omniscience and omnipresent being, which is transcendent.[72]

As a result, for us, God and the universe represent both sides of reality. Science examines the side of the universe in the form of change, transformation and multiplicity, while theology focuses on the side of God, who is eternal, unique and immutable. However, this does not mean that the fields are completely separate and independent from each other. The history of thought has shown that both sides cannot be put forward with great consistency unless they are associated and reconciled. Many philosophers and scientists from Plato to Aristotle, Newton to Einstein felt the need to somehow associate their systems with God in order to construct a coherent model of the universe. Theologians, on the other hand, were able to proof a concept of God only after the association with the universe, as can be understood from the cosmological evidences commonly used in defense of God's faith. It is therefore difficult for a person to speak about God

[72] Antony Flew, *There is God: How The World's Most Notorious Atheist Changed His Mind* (New York: Harpercollins 2007), 90-91, 155

without revealing an opinion about the universe. In that case, we as theologians must also be busy with the universe as much as we are engaged with God.

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