



## THE PERSPECTIVE OF THE QUR'AN ON THE RELATIVITY OF SPACE AND TIME IN PHYSICS

Juniah\*<sup>1</sup>, and Rindi Juniarti<sup>2</sup>

<sup>1,2</sup> Physics Education Study Program, Universitas Islam Negeri Raden Fatah Palembang, South Sumatera, Indonesia

E-mail: [1juniahhh13@gmail.com](mailto:1juniahhh13@gmail.com)

(\*) Corrensponding Author

### Abstract

*This study examines the concept of the relativity of space and time in the Quran from Einstein's theory of relativity. The study focusses on the concept of relative time long before modern scientific discoveries, highlighting the harmonious relationship between scientific findings and religious perspectives. This research employs a qualitative descriptive method to analyse literature and finds that time is relative, influenced by the observer's frame of reference, in line with the principles of relativity. According to relativity theory, time can change from one inertial system to another. This means that time is not something absolute, but rather relative to the observer who is making the observation. Relative motion influences the relativity of time.*

**Keywords:** Al-Qur'an, Relativistic, Space and Time.

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## INTRODUCTION

The Quran is a book of faith and a way of life aimed at realising and creating righteous individuals and a community based on the guidance of belief in Allah, the day of judgement, and the pillars of faith. Human life is inseparable from the role of knowledge, which is continually evolving and influencing human thought patterns. Physics is a field of knowledge that has continuously evolved and undergone revolutions from the 17th to the 20th century to reflect and absorb God's creations. The human intellect is what distinguishes us from other beings. The Qur'an is considered a miracle whose truth can be scientifically proven. This examines special relativity from the perspectives of science and the Qur'an. People believe that they have discovered the theory of relativity, even though the Quran first explained it. Therefore, many scientific thinkers have begun to conquer and acknowledge the truth of the Quran. According to El Syam and Ahmad (2024), all knowledge comes from the Creator, the Almighty, and is taught to humanity through the Qur'an. Everything from cosmology, astronomy, medicine, mathematics, and so on, all the way to physics, is derived from the Quran. The Quran teaches humanity that the universe was created by God for mankind's benefit. God created the clouds that stretch across the sky, the rain that falls from them, the stars that shine in the blue sky, the moon, and the sun for the benefit of those who think.

Physics is the science that thoroughly studies God's verses scattered throughout the universe. Scholars often refer to it as the cosmic verse. So, when we study physics, we are actually reading Allah's verses. Even in Islamic science, physics is known as Ath-thabi'ah, one of its meanings being "trace" or "sign." (Adi, dkk. 2022). Thus, in Islam's

view, physics has a meaning that is very close to the Creator of the universe. The terms "knowledge," "nature," and "deeds" have a clear connection in the Arabic language. Physics is a main branch of science, alongside chemistry, biology, and other exact sciences (Fitri, dkk. 2023).

The study of the relationship between religion and science is a topic that captures the attention of scientists, researchers, and philosophers. One intriguing area in this context is the relationship between modern scientific concepts and ancient religious texts, including the Qur'an, the holy book of Islam. In recent contexts, significant efforts have been made to investigate the relationship between the Qur'an and modern scientific concepts, including the field of physics. One of the most intriguing concepts in modern physics is the theory of relativity, which was first formulated by Albert Einstein in the early 20th century. This theory is divided into two main parts, namely special relativity and general relativity. The theory of special relativity, formulated in 1905, relates to the relationship between space and time, which was further developed by Einstein in 1915, discussing space and time.

According to Sri (2015), the presentation of classical physics provides a solid foundation for studying modern physics is provided in the presentation of classical physics. The discussion in classical physics includes mechanics, electromagnetism, heat, and sound. Classical physics is founded on sensation phenomena. The distinction between classical and modern physics lies in optics and waves. Meanwhile, modern physics explores concepts that our five senses cannot perceive, such as atoms and black holes, as well as the relativity of time and speed. This revolution in knowledge, particularly in physics and science-technology, reached its zenith in the recently concluded 20th century. Modern physics is the development of physics that began in the 20th century with the discovery of Einstein's theory of relativity. Time relativity is a scientifically proven fact that has been expressed through Einstein's "Special Theory of Relativity," published in 1905.

## **METHODS**

This research uses a qualitative descriptive method. This method is employed to clearly and comprehensively describe the issues being discussed. The theoretical data collection uses literature review techniques by gathering information through reading various literature relevant to the research. The data collected for analysis is then presented in the results and discussion so that conclusions can be drawn. Qualitative methods are used to obtain natural conditions, with the researcher positioned as a critical instrument. Data collection techniques employ triangulation, and the analysis is inductive. The data is presented descriptively to observe the characteristics of the variables focused on in the research (Hiebl, 2023).

## **RESULTS AND DISCUSSION**

The Quran states that time is significant, and it is mentioned repeatedly in the Quran to indicate that time is crucial for humanity. Day and night occur because the Earth and the Moon orbit the Sun, which creates time on Earth due to God's omnipotence, intended for humanity by His will. In other words, day and night are subdued by God to serve a life purpose. The functions found in the creation of day and night for humanity represent the functional values of time as a creation of God that is not in vain. Most

people, including scientists, agree that time is "absolute," meaning it is unlimited and unconditional. That assumption was initially justified because, at a fundamental level, no human being globally knows when time began and when it will end, as it is a secret of God. This is explained through His Word (the Qur'an), which states that He (Allah Swt) never created anything without a beginning and an end, except for Allah Swt Himself. In His Word, QS. Al-Hadid verse 3 mentions that it means: "Indeed, He is the First and the Last, the Manifest and the Hidden; and He is All-Knowing of all things" (QS Al-Hadid: 3) (Sri, 2015).

The concept of time contained in this verse is that only Allah knows everything, including when time exists and when it ceases (ends) because "Huwal awwalu = He is the First" (He existed before anything came to life and gives life to everything), "wal akhuru" = and the Last, who lives eternally, He exists after everything alive has been put to death by Him. It can also be realized that God exists beyond the limits of time. (dimensi ruang-waktu). There are still many concepts of time found in the Qur'an, which, when related to the role of human reason in understanding them, will lead to many different perceptions of the concept of time. Time is a unit of existence that coexists with events. According to the Great Dictionary of the Indonesian Language, time (the dimension of time) has two meanings: connotative and denotative. The connotative meaning of time refers to time as a concept, while the denotative meaning of time refers to a measurable quantity that can be counted in seconds, minutes, hours, weeks, years, etc. Time can be divided into three events. An event that signifies a situation – an event that symbolizes the past, present, and future. This event is a process of a series of occurrences experienced within the time dimension. The past is what has already passed, the present is what is being experienced, and the future is yet to be experienced.

According to Sri (2015), current scientific developments always bring new miracles. A theory initially thought to be true has the potential to be proven wrong later. Einstein's theory is no exception (Dyayadi, 2008: 1). The relativity of time is a scientifically proven development of Einstein's theory of relativity. One of the theories put forward by Einstein, "Einstein's Special Theory of Relativity," is a theory that shows the existence of a concept of speed of time, namely, "speed makes time relative." The absence of another universal reference frame also influences time as a physical variable. Suppose a frame of reference moves relative to another frame of reference that is stationary. In that case, the time experienced by a person in the moving frame of reference will be different from the time in the frame of reference that is still. However, this only applies if the motion has a speed close to light. This time difference became known as time dilation (time relativity).

The effect of speed on the time difference is quite significant at high speeds (speed close to light,  $c$ ). According to the concept of physics, if two systems move synchronously, then all the laws of mechanics are the same in both systems. That principle is called the principle of classical relativity; ideas in classical mechanics and physics outline this same principle. However, according to the particular theory of relativity, two events observed simultaneously by an observer on a train are not simultaneous/the same as an observer on the ground. The length of each object on the train is shorter for observers outside. In nature, there is a certain finite speed that cannot be exceeded, which is known as the limiting speed. This limiting speed is light  $c$ , the most incredible speed at which a signal can be transmitted. Classical physics assumes that signals can be transmitted at an infinite rate, but nature defies this notion, and it seems genuinely fantastic that such signals exist. Experiments confirm the speed of light,  $c$  as the limiting speed, so it can be interpreted that the speed of light plays a vital role in

relativity, such as the role of the concept of infinity in Classical Physics (Yusmaan Wiyatmo, 2010: 2).

The relativity of time states the main things, as seen in the following equation:

$$t_A = \frac{t_B}{\sqrt{1-v^2/c^2}}$$

Contains implications, namely:

1. The time interval between events occurring in a moving reference frame is always shorter than in a stationary reference frame.
2. Maximum speed and speed of light. This means that nothing can move faster than the speed of light.

According to the theory of relativity, time can change from one inertial system to another. This results in time not being absolute but relative to the observer making the observation. Time's relativity is influenced by relative motion. The description of relative time in the verses above illustrates that differences in movement systems carried out by one actor result in differences in the time needed to achieve a target. This means the Qur'an also clearly hints at the concept of relative speed of time by showing a system of motion in two reference frames.

The theory of relativity examines the measurement of physical quantities that depend on the observer and the event being observed. The new mechanics of relativity imply a very close relationship to time. The description of physical time states that observers moving in the same reference frame will observe a relatively short reference event. This natural law can occur in every creature living on earth, where every living creature has a relatively short time because Allah SWT has designated it as a substance that is Almighty over everything.

## CONCLUSION

Based on the research above, it can be concluded that:

1. The conclusion reached by the discoveries of modern science is that time is not what materialists think but is only a relative perception. What is most interesting is that science discovered in the 20th century was revealed to humanity in the Qur'an fourteen centuries ago. The Qur'an contains various references regarding the relativity of time. The expression uncertain time (relativity of time) uses the Qur'an's root word, yaum (day).
2. The Qur'an states that people feel time at different levels: sometimes it feels very short, and sometimes it feels very long. Humans can feel that time feels very long or short because they are in between two things: either they are experiencing pleasure, or they are experiencing misery or punishment.
3. The functional value of the relativity of time in the Al-Qur'an is a blessing and a medium for self-introspection.

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