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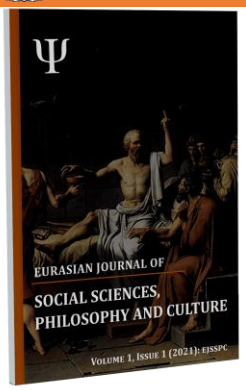

AVICENNA DEALING WITH PHYSICS ISSUES EASTERN PREDECESSORS AND CONTEMPORARIE

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ABSTRACT
The article briefly reveals some views of the famous medieval scientist-encyclopedist Abu Ali ibn Sina (Avicenna, 980-1037) on physics geometric optics. Based on the study of Natural Sciences from the physical part of the treatise "nature shavings" ("Kurozai natural"), devoted to the problems of physics. Khalifa Al-Ma'un (IX-century) "house of wisdom" ("Beth al-hikma" - "□□□□ □□□") in Baghdad about the Academy Ma'liumat.
In the Middle East, many well-known scientists turned to the problems of Physics and mathematics: Abu Nasr al-Farabi, Abu Ali ibn al-Haysam and Avitsenna himself, Abu Bakr Ar-Razi's rays do not go out of sight, Ibn Al-Haysam some issues of mechanical movement, he received a separate development in connection with the development of issues of heat and electricity, Those who consider it philosophically, the article is interdisciplinary in nature and is written at the intersection of physical and historical sciences, taking into account historical and scientific analysis.

Abu Ali Husayn ibn Abdullah ibn Hassan Ibn Ali ibn Sina (Avicenna) was born on August 16, 980 in the village of Afshana near Bukhara. His father Abdallah was originally from Balh

(now Afghanistan). He was an educated person, interested in philosophy, science and theology. During the reign of Noah ibn Mansur, Samani Abdallah moved from Balkh to Bukhara, where he served as an official in financial management. Abdallah, who served in the village of Afshana, married a girl named Sitora. It was here that Ibn Sina (Avicenna) and his brother Mahmud were born. In 986, the family moved from Afshana to Bukhara.

Sections in several encyclopedic works by Avicenna are geometric optic dedicated to the issues of: "Book of Knowledge", "Book Of Healing", "canon of Medicine" the treatise "The Viper of Nature", written in the form of a question and answer, is also his scientific correspondence. The treatise "The Viper of nature" consists of four parts, dedicated to various issues of Natural Science. mainly to matters of physics dedicated for the first time to the Russian language by the author of this work fully translated and published with brief reviews.

In addition, his treatise" the quails of nature "("Kurozai tabriet" - هضارق تايعيبط)," treatise on the causes of Thunder "("Risala Fi Asbab AR-ra'd" - هلاسر ىف بابسا دعرلا)," the measure of reason "("Meyer-Al-ukulh" - رايعم علالوق)is devoted to the issues of physics. also, his scientific correspondence with Aburayhan Beruni on the book "Physics" and "about heaven"by Aristotle.

Now we will briefly dwell on the work of some medieval eastern predecessors and contemporaries of Avicenna, who dealt with various problems of Natural Science, in particular, "natural science", that is, the issues of physics of his time.

After the establishment of the Arab Caliphate, in the ninth century in one of the largest scientific centers on its territory, namely in Baghdad, caliph Al-Ma'un (IX century) had its own academy called "House of wisdom" ("Beth al-hikma"-"تيب همكح").

The development of Science in general, and physics and mathematics in particular, at the Baghdad Scientific School began with the translation of the works of mainly ancient, as well as indium and Syrian scientists.

As a result of translation activities and in-depth analysis and extensive interpretation of the works of Greek, Indian and Syrian authors, scientists from the medieval Muslim world made a significant contribution to the further development of science, especially Natural History.

One of the most famous scientists of this period was the greatest mathematician of the peoples of Iran Khorezmi Muhammad ibn Musa al-Khorezmi (about 780-850). He was not only the greatest mathematician of his time, but also an excellent astronomer. He compiled astronomical and trigonometric tables. It should be noted that the word "algebra" comes from the name of its composition "ربجلا و هلباقملا" ("Al-Jabr and-L-Muqabala"-" filling and opposition"), which indicates methods for solving equations of the first and second order with one unknown. After Al-Khorezmi, the following scholars who worked mainly in the "House of wisdom" were mainly engaged in mathematics and astronomy: Ahmad ibn Abdullah Al-Marwazi (about 770-866), Abu-L-Abbas Ahmad ibn Muhamad al-Fergani (IX-century), Abu-L-Vafa Muhammad ibn Muhammad al-Buzjani (940 – 988).(On sin, righteousness and judgment.) about 1000), Abu Nasr Mansur ibn Ali ibn Iraq (about 960 – 1020, he was the teaching of Aburaykhan Beruni).

These scientists were mainly engaged in mathematics, trigonometry and astronomy.

In the Baghdad school and other scientific centers of the caliphate, and after its disintegration, in the Khorasan and Maverannahr scientific centers (Merva, Nishapur, Samarkand, etc.), Muslim Arabic-speaking scientists (mainly tajiki, Khorasan and the indigenous population of Maverannahr) were also engaged in various problems of "Science Science".", then physics. There is no complete list of predecessors and contemporaries of Ibn Sina here, which had a significant impact on the development of medieval physics, in particular mechanics and geometric optics: Abu Yusuv ibn Isaac ibn Sabbah Al-Kindi (WAF. approximately. (883 y.), Three sons of Moses ibn Shakira-Muhammad, Hassan and Ahmad, Brothers Banu Musa in the history of science (IX - century), Abu Taib Sind Ibn Ali (WAF. 864), Ahmad ibn al-Fadl Al-Bukhari (IX-century), Yuhanna ibn Yusuf ibn Al-Kharis (WAF. 980), Ismail ibn Ar-Razzaz Al-Jazri (IX-century), Abu-L-Hasan Sabit ibn Korra as-Sabi'al – Harrani (836-901), Abu-L-Abbas Al-Eranshahri (II half of IX-century), Abu Bakr Muhammad ibn Zakariya ibn Yahya Ar-Razi (865 – 925), Abu Nasr Muhammad ibn Muhammad Al-Farabi (II half of IX-century), Abu 865-925). Abu-Vafa Muhammad ibn Muhammad Ibn Yahya Ibn Ismail ibn Al-Abbas Al-Bozjani (940-998), Abu Sahl Vaijan ibn Rustam Al-Kuhi (10th century), Abu Ali ibn Al – Hassan ibn al-Khaysam(965-1039 (973-1048) and Abu r-Raykhan Mu-hammad ibn Ahmad Al-Beruni (973 – 1048).

In the Middle Ages, the first and most famous to deal with the problems of mechanics in the near and Middle East were the brothers Banu Musa. A special treatise on mechanics belongs to their pen. His writing, along with Greek and Syrian writings, was based on the works of the next generation of scientists in the field of physics in the medieval Muslim East.

Their disciple Sabit ibn Korra continued and developed the work of Banu Musa. Under the influence of the writing of Banu Moses and the "mechanics" of Archimedes, Sabit ibn Korra wrote his important work "The Book of leverage scales" ("book Fi-l-Karastun"), widely known in medieval Europe in Latin translation. In addition to the" book about leverage scales", we know another work by Ibn Korra-" a book about the properties of the load and its imbalance "("book Fi siffa al – weight and ichthylafiha"). This treatise by Ibn Korra, called "a separate chapter on the properties of weight and its imbalance (balance)"-(Bob gabrad Fi siffa al-weight and ichthilafiha), a well-known physicist of the 12th century and the composition of the ast-Rohman Abu-l-Fath Abd ar-Rahman Al-treasure came to us in later processing.Books of wisdom scales " - "book mizan al-hikma".

Sabit ibn Korra in his" book of hand scales " forms the Basic Law of the hand. Following the dynamic tradition, he considers an unequal hand in motion. The first sentence of his "book of hand scales" is structured like this: "if we divide any line into unequal parts, we establish a dividing point and move the entire line so that it does not return to its position, it describes two similar sectors. two circles, the half diameter of one of them - the longer part of the line, the half diameter of the other-the more Joint part of the line" [70, p.86].

It is known that for the authors of the last Hellenistic treatises on Archimedes and mechanics, the concept of the moment of force in relation to the ditch was introduced only for one special case: when the hand is in equilibrium in a horizontal plane, and its arm serves as a segment from the axis to the suspension point of the load. And for Sabit ibn Korra, the shoulder already has the shortest distance from the axis in the direction of force. [65, page 88].

Another representative of the Baghdad School, which had a great influence on the development of Natural Science in the middle Muslim East, was Abu Sahl al-Kuhi (X century). He was not only a physicist ,but also an excellent astronomer (one of the founders of the famous Baghdad Observatory) and mathematician. His pen contains a number of works in various fields of the Natural History of that time. However, not all of his treatises have survived to this day. He is the author of the treatise "dividing the sphere into planes" ("Taksim al-kura bi sutuh moustavia")," the idea that infinite movement will occur in infinite time " ("Kavl' ala Anna Fi-z-zamon al-mutanahi Haraka gair mutanahiya"), "books for logicians about sequence two movements" ("Kitab' ala-L-manticiyina fi ta-vali al-mutarain"), "definition of Kybla azimuti" ("is-tihraj samt Al-Qibla") and others.

To explain optical phenomena, Ibn Al-Khaysam attracts some issues of mechanical movement, that is, in fact, he uses the method of mechanical analogy. Thus, to explain the reflection of light, he studies the phenomenon of exposure of two bodies, taking into account the shock of a metal mirror and the jump from it. He considers three cases: 1) throwing the ball on the surface of a metal mirror spread horizontally; 2) throwing the balls from the catapult into a mirror perpendicular to the horizontal plane; 3) in the window located at an arbitrary angle to the horizon, kata shoot the ball from a distance.

Ibn Al-Khaysam studied the reflection of light not only from the plane, but also from spherical mirrors, as well as from the phenomenon of refraction of light. He found that the angles of incidence and refraction are not proportional, and rejected the opinions of some ancient predecessors (for example, Gerona) about the infinity of the speed of light, expressing the idea that light propagates at a limited speed. Ibn Al-Haysam, along with Avicenna, developed Abu Bakr Ar-Razi's doctrine that the Rays do not come out of sight, but come from stars and boiling bodies.

After this brief review, let's move on to considering Avicenna's physical views. The study of Avicenna's predecessors and contemporaries as a study of the physical ideas of medieval Muslim Eastern scholars is usually a very serious and time-consuming problem, the subject of long special research.

Avicenna's idea of time, space, and movement was reflected in his scientific correspondence with "the book of healing", "the book of salvation", "the book of knowledge", "the book of instructions and Instructions", "The Viper of nature" and his Aburayhan Beruni.

Time. Time in Avicenna's philosophical worldview is closely related to the concepts of space and movement. In the" book of salvation " he emphasizes that time is not visible, i.e.inactive does not exist. "We don't even notice the time if we don't feel the movement "[page 94, 116]. Avicenna provides the following arguments to explain that time is an objective category.

1. "Both moving bodies both start and end the movement, one of which is larger and the other can travel a smaller distance, that is, so that one moves faster and the other moves more slowly. But if you take half of this distance, then at the same speed it can be covered with another possibility. This opportunity is the amount of effort. A amount of movement it is what is usually called time.

2. The movement has the moments before and after, which are part of it. Time is simply the number and measure of the previous and subsequent minutes of movement.

3. If the bodies are variable, then they must have a previous and subsequent state. The previous and subsequent position of bodies is determined by comparison with time. In other words: the change of things is directly manifested over time. Time is therefore an important aspect-to-sequence ratio " [pp. 24, 118-119].

These statements belong to the philosophical side of Ibn Sina's doctrine of the existence of objective truth and time as a philosophical category. For us, from the point of view of Physics, his statement that movement is inseparable from time is more important. "In practice," he says, any action and change occurs at the right time, at a certain time interval."And here Avicenna's teachings about time correspond to modern physical ideas. According to Avicenna, time is an eternal and endless category. The main feature of Avicenna's doctrine of time is the recognition of the objective, material essence of time and its connection with matter and its action [Page 24, 120].

In the analysis of the problem of time, Avicenna is based on such concepts as "eternity" ("dahr" - دهر) and "superbuny" ("Sarmad" - سرمد).

It should be noted that the term "dahr" in the physical teachings of ar-Rosie is limited in the sense of absolute time (in the sense of Aristotle) along with time "time" ("goh" - ماگ). "Dahr" in the philosophical system and physical teachings of the dahrites (supporters of absolute time) is an absolute time without a beginning and an end, i.e.it is infinite and eternal, but it exists regardless of matter, its action and change. For Ibn Sina," dahr " as an eternal and absolute time does not depend on matter and its transformation, i.e. time is in any case closely related to matter and its movement.

Space. Speaking of space, Avicenna refers to the erroneous point of view of those who consider space to be abstract, non-bodily. The inconsistency of this concept from his point of view is that its authors contrast spatial length to body length, while nature and spatial and body are the same [24, p.115-116].

"Space," writes Avicenna in the Book Of Healing," is nothing more than the limit of a large volume body ("nihaya" - نهایه). It surrounds a moving body, is equal to it, is stable and filled with a moving body. A moving body separates from space and moves in it with movement. It cannot have two bodies at the same time. From here, the existence and essence of space becomes clear" [Page 24, 116].

It is known that Avicenna denied the existence of emptiness. About this he writes: "...supporters of emptiness argue that the world is in the void, and there is emptiness in the world. This idea is close to imagination and far from Crazy. The reason for the thought of the existence of emptiness is the presence of air that is not visible to the eye. And people thought that there was nothing, and thought that the space was empty, and therefore imagined that there could be a space [Page 32, 171]. In this sense, it follows Aristotle, who defines space as a set of "places". "Place" is defined as the limit of the material environment that surrounds the body.

From the point of view of Avicenna, space is neither body nor form. This is what lives in the body. It surrounds any body. The presence of a" place "determines the presence of a" filled " space.

It follows from the book of healing and the book of knowledge that Avicenna clearly expresses the difference between the concepts of form, body, volume and "place".

Having figured out what a body is, it reliably substantiates the three-dimensionality of space: "... the body is the one that finds the length, in which you will find another length that crosses the first at a right angle, as well as the third length that is perpendicular to these two lines.at the point where two straight lines intersect.

And everything that can be imagined these three lengths, as mentioned above and is called the body of matter, and it exists in the world. The real length of the first is called "long" ("the lesson" - ازارد , "Widows" - لوط), while the second is called the "width" (the complaint - ضرع the "pon" - انهپ) and the third is called "depth" (the"cm" - قمع, "sita could" - مربطس). These three (dimensions) are inherent in the body, sometimes as an opportunity, and sometimes as reality. A body is a body that (measurements) can be determined by showing or guessing them... but what they see as length, width and depth is not the shape of the body, but its occurrence" [32, p.107-108].

Avicenna following al-Farabi in his classification tries to explain the reasons for the origin of all the main disciplines of that time. In particular, he introduces the" science of skillful technique "("ilm al-Ziyal" - لیهلا ملع), that is, the practical mechanics of his time into the" branches "of Sciences, Poni-May, a set of relevant applied techniques under the" branches " of each Science. For example, it refers to the "branches" of geometry, for example, a significant part of what is usually part of the "Elm Al-ziyal", that is, the doctrine of the movement of goods moving with the help of mechanical devices, the movement of water, etc. Avicenna in its classification refers to the "science of weight", i.e.static and" tool science", i.e. the doctrine of ordinary machines, i.e. actually part of Statics. In both cases it means "ilm al-Ziyal". It is characteristic that it connects both directions to mathematics.

The classification of Avicenna Sciences is close to the classification "Aristotle". In many ways it follows al-Farabi and Abu Abdallah al-Khorezmi, but there are certainly differences between these classifications. The basics of its classification of Sciences are presented in the "book of knowledge".

It should be noted that Avicenna's methodological ideas were subsequently successfully used in the creation and improvement of various fields of science, especially natural sciences (mathematics, physics, astronomy, mechanics, etc.).

Ultimately, about the influence of the works of Ibn Sina on the work of scientists of the next generation of East and West, we can say that a comprehensive and in-depth study of the "Avicenna School" reveals the unexplored aspects of his work and creates a special difficult scientific work for Avicenna scientists.

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