

SCIENTIFIC ACTIVITIES OF ABU RAYHAN BERUNI AT  
THE KHORAZM ACADEMY OF MAMUNA

*Gularam Kamilovna Masharipova*

*Professor of the University of Alfraganus, Doctor of Philosophy (DSc).*

**Abstract.** The article describes the scientific activities of Abu Rayhan Beruni at the Khorezm Academy of Mamun. Mamun held scientific discussions with scientists in his palace. They expressed their opinions on various problems in various fields and argued. The winners of such a scientific conference were presented with valuable gifts. The scientists were headed by Abu Rayhan Beruni, the Prime Minister of Khorezmshah, patron of science Abu Mansur al-Sakhri, who did not spare his services in creating a real creative environment for scientists.

**Keywords:** Khorezm Academy of Mamun, mudarris, scientific heritage, creativity, mathematics, astronomy, geometry, disaster, understanding.

In the 9th-10th centuries, several independent states emerged on the territory of our country, and from the point of view of political and economic development, Khorezm had a greater advantage than other countries. The heyday of Gurganj falls on the 10th century. It was surrounded by strong walls of a white castle six meters high. Recently built beautiful buildings add beauty to the city. Muqaddasiy (10th century): "Gurganj is expanding day by day, there is nothing in Khorasan that could compare with the gates of the palace built by Mamun in front of the gates of Khodjaj. Mamun's son Ali built a palace in front of himself. In front of the palace there is a square, like in Bukhara," he writes [p. 15, 22]. Ali ibn Mamun built hospitals, mosques and madrassas in Gurganj. The streets of the city are clean and tidy. Cleanliness was taken seriously during this period. Laying polished stones on the roads, the excellent organization of city life led to a special order of the streets of the 9th-12th centuries. Also in the 10th century, Khorezm Shah Ali ibn Mamun carried out many works to improve Khorezm and provided direct financial support to scientists.

There were internal rules in the cities that all residents had to follow. According to a written source, their implementation was monitored by a special state official-specialist. In particular, his duties included monitoring the cleanliness of the streets [2, p.69].

Scientists of that time traveled to other countries to engage in scientific creativity and improve their knowledge. However, not all rulers liked their freethinking and truthfulness. This forced the ascetics of science to leave their homeland and seek refuge from the rulers of other countries.

Scientists, engaged in reading the rich library of Gurganch, deepened the

knowledge of their students and expanded their thinking. Representatives of the Academy made a worthy contribution to the rise of science not only in Central Asia, but also in all countries of the East and West [14, p.158]. They served to further increase its influence in Movarunnahr and Khorasan.

Abu Rayhan Beruni received an education from Abu Nasr ibn Iraq and became a mature scientist. At a young age, he had deep knowledge of mathematics, astronomy and other sciences. First of all, it is noteworthy that he knows many languages. Judging by the fact that all the works of the scientist were written in Arabic, Arabic was the generally accepted scientific language in the countries where Islam was spreading at that time, and he had a deep knowledge of the grammar of this language. His "Mineralogy", "India" and other works testify to his deep knowledge of Arabic poetry and its meanings [7, p. 24].

His works such as "Relics of Ancient Peoples", "Kanuni Masudi" and "Saidan" show that Abu Rayhan Beruni knew the Sogdian and Persian-Darian languages very well. According to "Saidan", he studied Greek from a young age. He began to study Sanskrit from Indian merchants in his youth in Khorezm [20, pp. 194-195]. The scientific, theoretical and experimental studies of the catastrophe carried out by him are of great scientific significance. They study the "positions, movements and celestial processes of celestial bodies" as follows: 1) The fiery spheroid of the Sun and stars [10, p. 114], the movement of the stars [10, 115], 2) The movement of the earth's crust [9, 183 - p.], (floating and returning) [8, p. 432], 3) The rotational motion of the Earth around its axis [8, p. 255; 16, p. 30], 4) The Earth [p. 9, 245], that the Sun and the stars have a spherical shape, 5) The movement of the Sun [p. 16, 29], 6) rainbow rain [p. 11, 6], obstacles [p. 9, 120], morning and evening dawns [p. 16, 30, 112], 7) the crown of the Sun [p. 16, 114], their rain [5, p. 235], 11) determination of the position of the stars [3, p. 59], 12) the inclination of the ecliptic to the equatorial plane [16, p. 46], 13) opinions about the zodiac [9, p. 216].

Abu Rayhan Beruni expressed ideas about determining the latitude and longitude of places in the direction of practical disaster [16, p.77], compiling calendars [17, p.44]. Abu Rayhan Beruni writes about lunar addresses in his work "Memorials of Ancient Peoples": "When I was far from the high court and deprived of the happiness of honorable service, I saw a man who was considered among the scientists of science and astrology in the city of Ray" [6, p. 399]. The "high dargah" mentioned here is, of course, the palace of Khorezmshah Abu Abdullah in Kot, and the "honorable service" is his service to the Khorezmshah. By depriving him of this, Abu Rayhan Beruni means the execution of the Khorezmshah and his departure from Khorezm. That the scientist went to Paradise after this incident is confirmed by the following sentences in the "Mineralogy": "I had a friend in Rayy from the Isfahan merchants, and sometimes I went to visit him as a guest", "But Abu Mahmud told me his measurements with his

own mouth" in the "Geodesy". . . said that an error had crept in and that he was not happy to find the greatest deviation" - this is fully confirmed by his lines. The scientist collected information for the work of Abu Rayhan Beruni "Mineralogy" all his life. In his childhood in Khorezm, and then during his stay in Iran, India and Afghanistan, he collected stories, stories and information about the properties of precious stones, the lands where they were mined, and such minerals, studied their physical and chemical properties. He describes the results of almost 60 years of research in the field of mineralogy. In the treatise, he gives an idea of the weight and volume of objects, for the first time in the history of science, he calculates the density and specific gravity of more than 50 substances with modern precision, makes special devices for measuring the specific gravity of solids and liquids and describes them [13, 292-402; 4, pp. 402-418; 1, pp. 32-63; 19, pp. 179-197]. Apart from the information of Abu Rayhan Beruni, no written information has reached us about the knowledge of the catastrophes of ancient Khorezm. According to him, the catastrophe was called "Akhtarvenik" in the language of the Khorezmians, who knew the position of the stars better than the pre-Islamic Arabs [7, p. 259]. He continued: "The scientists from Khorezm who observed the movement of the Moon and drew conclusions from this have passed away." From his words it is evident that before the Arab invasion there were many astrologers in Khorezm, whose level of development was significantly higher than that of the pre-Islamic Arabs. This is also evidenced by the information found during excavations in Koykyrylykkale. M.G. Vorobyova and M.M. Rozhanskaya stated that the monument of Koykyryan Castle was installed in such a way that it could be used to observe disasters. It is known that al-Khwarizmi's work "Surat al-arz" contains tables of latitude and longitude of settlements known to him. A similar table, but many times determined and updated, we see in "Kanuni Masudi". If we compare them, al-Khwarizmi has geographic coordinates of 539 cities, and Abu Rayhan Beruni - 603 [17, p. 304].

A comparison of the geographical coordinates in the works of Abu Rayhan Beruni and al-Khwarizmi shows that Abu Rayhan Beruni did not include many cities in Western Europe (except Spain) in his tables, but expanded his table to include cities in Iran, Iraq, the Caucasus, Khorasan, Central Asia and India. The coordinates of the cities in these areas do not correspond to each other in the books of Abu Rayhan Beruni and al-Khwarizmi, the reason for this is the 200-year difference in their lives, and Abu Rayhan Beruni had more accurate information about these cities and contributed to the accurate knowledge of their coordinates.

Abu Nasr ibn Iraq wrote several treatises on disasters, geometry and mathematics, dedicating 12 of them to Abu Rayhan Beruni. These works are as follows [12]:

1. "Kitab al-sumut" (كتاب السموت) ("Book of Azimuths").

2. “Kitab fi’illati tansif at-ta’dil’inda ashab as-Sindh” (كتاب في علة تنصيف التعديل عند أصحاب السند) (“A book on the reason for dividing an equation into two equal parts according to the Sindhi authors”).

3. “Kitab fi tashihi kitab Ibrahim ibn Sinan fi tashihi ihtilaf al-kawakib al-ulwiya” (كتاب في تصحيح كتاب ابراهيم ابن سنان في تصحيح اختلاف الكواكب العلوية) (Correction of the book of Ibrahim ibn Sinan “On the correction of differences in the movement” by the above-mentioned luminaries “the book about”).

4. “Risala fi-l-barakhin ala amal habash bi tadalah at-taqwim” (رسالة في البراهين) (“Treatise on the evidence of the nsky method of compiling a calendar table”).

5. “Risala fi tasshihi mo waka li-Abu Ja’far al-Khazin min as-sahwi fi zij as-safayihi” (رسالة في تصحيح ما وقع لأبي جعفر الخازن من السهو في زيح السفائح) (The Zij has become a circle) by Abu Ja’far Khazin, a treatise on correcting the error in

6. “Risala fi majazat dawair as-sumut fi-l-asturlab” (رسالة في مجازات دوائر السموت) (“Treatise on the points of intersection of azimuth circles in Asturlab”).

7. “Risala fi tadalah ad-dakaiq” (رسالة في جدول الدقائق) (“Treatise on the Table of Minutes”).

8. Risala fi-l-barahini "ala 'amal Muhammad ibn al-Sabbah fi imtikhhan ash-shams" treatise about (رسالة في البراهين على عمل محمد بن السباح في امتحان الشمس).

9. “Risala fi-d-daweer allati tahuddu al-saat az-zamaniya” (رسالة في الدوائر التي تحد الساعات الزمانية) (A treatise on the circles [indicating] the limits of the hours of time).

10. "Risala fi-l-burhan 'ala 'amal habash fi matali' as-samt fi zijihim" (رسالة في البرهان على عمل حبش في مطالع السمات في زيجه).

11. "Risala fi ma'rifat al-qasi al-falaqqi'ati bi-tariqin ghayra tariqin nsib'il mu'allafati" (رسالة في معرفة القسي الفلكية بطريق غير طريقة نسبة المؤلف) (A Treatise on Determining Two Arcs of a Sphere by a Method Other than the Complex Coefficient Method).

12. “Risala fi khall shubha” arada lahu fi-l-maqalaas-salasa ‘ashara min kitab” (رسالة في حل الشبهة أراد له في المقالات الثلاثة عشر من كتاب) (“The book began with “A treatise on resolving the doubt that arose in the thirteenth [chapter]”).

The spiritual heritage of Abu Rayhan Beruni, the value of his works, the scientific significance of his views are that he provides historical information about the high development of national and religious tolerance in the territory of our Motherland, located on the Great Silk Road, and in the character of our people [10, p.58]. For example, Beruni mentioned in his works that thousands of years ago in the city of Urgench there lived Jewish quarters, Christian churches, Arab, Indian, Chinese and Slavic peoples. Beruni argues that people are organized into a society to help each other, create vital needs, avoid any disasters, be partners, sympathizers, sympathizers

and live without danger. The main reason for the creation of human communities is mutual assistance, sympathy and mutual support. Alternatively, Beruni, as a humanist thinker, shows that this state and order were subsequently violated by various robberies and military actions. For example, as Beruni stated in Mineralogy: “Man’s needs are so varied that he alone cannot satisfy them. One assistant is not enough to satisfy them. The needs are varied and numerous. Only a team of several people can satisfy them. And for this, people need to build cities” [5, p. 11]. He continues his thoughts in Geodesy: “And... due to the abundance of needs (of man) and the absence (of the possibility) of self-defense, the absence of means of self-defense, the abundance of enemies, he had the opportunity to unite with his brothers in a society in which each of its (members) mutually assists each other, is engaged in work that satisfies his and others' needs” [8, p. 83]. This article provides a scientific analysis of Abu Rayhan Beruni’s views in the religious sphere. Researchers A.B. Kholikov and B.T. Erman says the following about this: “Beruni gives religion a broad meaning, based on the views of that time, and understands it as the entire complex of spiritual life, even many areas of practical human life” [23, p. .47]. According to the opinion of the leading researcher of the philosophical views of Abu Rayhan Beruni, who wrote the preface to the work “India”, A. Irisov, “probably, with their definitions they wanted to emphasize Beruni’s rationalistic tendencies in understanding religion. these are absolute rights, if they have such a meaning” [24, p. 96], he concludes.

If we take into account the opinion that in Central Asia there were many figures who combined a religious worldview and encyclopedic knowledge, then the conclusions of the above-mentioned researchers are to a certain extent justified. After all, such an encyclopedic scientist and thinker as Beruni, who tried to find a scientific and historical basis for the social events and relations that always occur in society, was probably convinced that religion, including Islam, embodies all areas of spiritual life at that time. According to Beruni, enmity, strife and bloody wars based on religious fanaticism and intolerance are decisively condemned. He emphasizes the approach to religious beliefs and teachings from the point of view of the scales of reason, calls for an objective assessment of other religions, their purpose and spiritual essence [8, p. In this regard, one of the medieval scientists proudly writes the following about Abul Abbas Iranshahri [6, p. 477]: “I do not know anyone who would tell the correct history without deviations and hypocrisy, except Abul Abbas Iranshahri.” Because this man did not support or oppose any religion in his book. Perhaps he invented his own way of writing a work on religions and called on other people who wanted to write such a work to follow the same path. He explained well the religions of the Jews and Christians, the content of the Torah and the Bible” [9, p. 27].

The scientific heritage dedicated to the work of Abu Rayhan Beruni is studied in a number of works by the author [26-37].

**Conclusion.** Since Abu Rayhan Beruni did not have the opportunity to directly determine the coordinates of cities, he received information about them from al-Khwarizmi and was within the limits of his creative influence.

The natural scientific legacy of Abu Rayhan Beruni, the problems raised by him in the field of specific sciences, play an important role in creating a general picture of the world, that is, in the formation of a philosophical worldview. In his astronomical table, Beruni put forward a heliocentric hypothesis that the center of the Universe is not the Earth, but the Sun and that all planets, including the Earth, revolve around the Sun. Alloma's scientific conclusion was scientifically confirmed 500 years later in the heliocentric system of the great astronomer Copernicus. In a conversation with Abu Ali ibn Sina, Beruni came to the conclusion that the planets in the Universe, including the Earth, have mutual attraction. His scientific assumption was scientifically substantiated by the law of universal gravitation, discovered by the English scientist Newton at the beginning of the 18th century. With his socio-political views, Abu Rayhan Beruni developed the advanced traditions of not only Central Asian, but also ancient Indian, Greek and Iranian thinkers and became known to the world as a sociologist in history.

#### **References:**

1. Akromkhodjaev O. Beruniy – one of the first researchers. - Tashkent: Nauka, 1976.
2. Alimjanov H. Study of Beruniy's activity. State education. - Tashkent, 1994. - № 1-2. - 69 p.
3. Akhmedov A. Khorezm Academy of Mamun. - Tashkent: Nauka, 2005.
4. Belenitsky A. Place of mineralogical treatise. - Moscow, 1973.
5. Beruni Abu Rayhan. Collection of information for knowledge of jewelry. - Moscow: Nauka, 1963.
6. Information about Abul Abbas Iranshahi. Western India, Volume II. - Tashkent: Nauka, 1965.
7. Abu Rayhan Beruni. Selected works. T. 1. Monuments of ancient peoples // Responsible editors I. Abdullaev, O. Faizullaev; Translation. A. Rasulov. - Tashkent: Science, 1968.
8. Beruni Abu Raikhan. Selected works. T.3. Address delimitation to determine distances (between) residential buildings. [Geodesy] // Introduction, translation. and the author of the comments A. Akhmedov. - Tashkent: Science, 1982.
9. Beruni Abu Raikhan. India. - Tashkent: Science, 1965.
10. Abu Raikhan Beruni. I understand. - T., 2005.
11. Bulgakov P.G. Life and works of Beruni. - Tashkent: Science, 1972.
12. Eremeeva A.I., Tsitsin F.A. Astronomy of history. - Moscow State University, 1976.
13. Zikrillaev F. Beruni's Works in the Field of Physics. - Tashkent: Nauka, 1973.
14. Zaki Salih. The Work Remained, Volume 1. Istanbul Printing Science. 1329. F.A. Abu Rayhan Beruni Institute of Oriental Studies of the Republic of Uzbekistan. Article 18464.

15. Lemmlein G.G. Mineralogical Sweden. - Moscow: USSR Academy of Sciences, 1992.
16. Masharipova G.K. The Influence of the Natural Science, Social, Philosophical and Spiritual Heritage of Scientists of the Khorezm Academy of Mamun on the Development of Social Thinking. Monograph. - Tashkent: Navruz Publishing House, 2019.
17. Muhammad al-Khwarizmi. Selected Works. - Tashkent: Science, 1993.
18. Romanova B. R. Pedagogical thoughts of Khorezm poets-educators of the late XIX - early XX centuries.: Author's abstract. diss... sugar ped. science - Tashkent, 1978.
19. Sadykov H.Yu. Beruni and his works in the field of astronomy and mathematical geography. - Moscow: USSR Academy of Sciences, 1953.
20. Sirazhdinov S.Kh., Matvievskaya G.P., Akhmedov A. Mathematics and astronomy and the works of Abu Raikhan Beruni. - Tashkent: Science, 1973.
21. Umarov G.Ya. Beruni, Copernicus and modern science. - Tashkent: Science, 1973.
22. Usmanov T. Beruni's place in the history of physics. - Tashkent: Science, 1977.
23. Kholidov A.B., Erman B.T. Preface to "India" by Beruni // India. T. II. - Moscow, 1963. -.47 p.
24. From the history of the peoples of Central Asia. - Tashkent, 1990.
25. Shamsi F. Abu ar-Rayhan al-Bayruni. - 1993. - P. 194-195.
26. Masharipova G.K. Important aspects of the use of modern pedagogical technologies when teaching the subject "Fundamentals of Spirituality" in academic lyceums and vocational schools. //"Cooperation in the education system: priorities and current tasks." Collection of lecture abstracts of the scientific and practical conference. - Tashkent, February 16, 2013 - pp. 171-172.
27. Masharipova G.K. The scientific heritage of the scholars of Khorazm Mamun Academy who made great inventions of the Middle Age. // Europaische Fachhochschule. European applied sciences # 9. - pp. 13-14.
28. Masharipova G.K. The effectiveness of using modern pedagogical technologies in teaching the science of spirituality // Materials of the scientific and practical conference "Innovative ideas and developments of talented youth in the conditions of modernization of equipment and technologies" - TITLI, Tashkent, 2017. - pp. 254-256.
29. Masharipova G.K. Issues of education of religious tolerance in the minds of young people. // Materials of the 7th scientific conference of the Republic on the topic "Topical issues of improving the methodology, approach and methodology of religious studies." – Tashkent, 2015, Part VII. - pp. 91-93
30. Masharipova G.K. The role of the education system in the development of the intellectual potential of youth //Republican online scientific and theoretical conference on the topic "Current issues of national progress and increasing the socio-political activity of youth". - Samarqand. April 25, 2020 - pp. 116-118.

31. Masharipova G.K. The impact of the natural-scientific heritage of Khorezm Ma'mun Academy on the development of social and philosophical thinking. Dissertation for the degree of Doctor of Philosophy. - Tashkent, 2021, 302 p.
32. Masharipova G.K. The role of national customs and traditions in the family and family relationships. // Scientific and theoretical online conference of a republican scale on the topic “Current issues of ideological education of our people in conditions of independence”. – Tashkent, May 5, 2020 - pp.276-279.
33. Masharipova G.K. Formation of a healthy lifestyle // Materials of the Republican scientific and practical seminar on the topic “A healthy lifestyle is the basis of a healthy generation”. – Tashkent, 2016. – pp. 197-200.
34. Masharipova G.K. Innovative technologies - improving the quality of education based on modularity and technologization of the educational process and the effectiveness of its implementation // On the topic “Prospects for the development of legal, economic, socio-philosophical, educational directions of innovative ideas in Uzbekistan.” in the context of globalization” online scientific and practical conference Tashkent State Pedagogical University. May 7, 2020 - pp.472-475.
35. Masharipova G.K. “Dinshunoslik” fanini o`qitishning dolzarb muammolari. // Academic Research in Educational sciences. 2022. NUU. Conference 2. - 812-816-pp.
36. Masharipova G.K. Azamjonova S. Sh. Special Characteristics Of Aybek's Historical Novel «Sacred Blood» In Youth Education // International Congress on Multidisciplinary Studies in Education and Applied Sciences Bilbao, Spain March 27th 2022 conferencezone.org. - pp.16-19.
37. Masharipova G.K., A'zamjonova S. Interesting Events From The Life Of Famous Scientist Oybek. // International Consortium on Academic, Trends on Education and Science Hosted from London. - April 3rd -4th 2021. - pp. 15-17.