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### **THE SCIENTIFIC SCHOOL OF MIRZO ULUGBEK AND ITS ROLE IN THE DEVELOPMENT OF ASTRONOMY AND MATHEMATICS**

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#### **Abstract:**

This article analyzes the scientific school of Mirzo Ulugbek and its role in the development of astronomy and mathematics in Central Asia during the fifteenth century. The study examines the formation of the Samarkand scientific environment, the activity of Ulugbek's madrasah and observatory, and the contribution of prominent scholars such as Qazizada Rumi, Ghiyath al-Din Jamshid al-Kashi, and Ali Qushchi. The article argues that Ulugbek's scientific school was not only an educational institution, but also a research center where astronomical observations, mathematical calculations, and scientific discussions were systematically organized. The findings show that the scientific heritage created in Samarkand, especially the astronomical tables known as "Zij-i Jadid-i Guragani", played an important role in the history of world science.

**Keywords:** Mirzo Ulugbek, Samarkand scientific school, astronomy, mathematics, observatory, Zij-i Guragani, Ali Qushchi, Qazizada Rumi, al-Kashi.

#### **Introduction**

The fourteenth and fifteenth centuries occupy a special place in the intellectual history of Central Asia. This period, often described as the Second Renaissance



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of the East, was marked by the development of science, education, literature, architecture, and art. Among the great representatives of this era, Mirzo Ulugbek holds a particularly important position. He was not only a Timurid ruler, but also a prominent astronomer, mathematician, historian, and patron of science.

Mirzo Ulugbek ruled Movarounnahr from 1409 to 1449. During his reign, Samarkand became one of the major political, cultural, and scientific centers of the Islamic world. His deep interest in science and education led to the construction of madrasahs in Samarkand, Bukhara, and Gijduvan, as well as the establishment of the famous Samarkand observatory. These institutions created a strong intellectual environment in which many scholars worked together.

The aim of this article is to analyze the structure, activity, and scientific significance of Mirzo Ulugbek's scientific school. The article focuses on the role of the Samarkand madrasah, the observatory, and the scholars who contributed to the development of astronomy and mathematics under Ulugbek's leadership.

### **Methods**

The article uses historical-analytical, comparative, and source-based methods. The research is based on historical information about Mirzo Ulugbek, his scientific activity, the Samarkand observatory, and the scholars of his period. The study also applies a contextual approach in order to understand the connection between political power, educational institutions, and scientific progress in the Timurid period.

The activity of Ulugbek's scientific school is examined through several key aspects: the establishment of educational institutions, the organization of astronomical observations, the contribution of scholars, and the influence of scientific works produced in Samarkand. Special attention is given to the role of the observatory and the creation of astronomical and trigonometric tables.



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### **Results**

The analysis shows that Mirzo Ulugbek's scientific school was formed as a result of several interconnected factors. First, Ulugbek's personal interest in science created favorable conditions for scholars. He invited talented scientists to Samarkand and supported their research activities. Among them were Qazizada Rumi, Ghiyath al-Din Jamshid al-Kashi, and Ali Qushchi, who played a major role in the development of the Samarkand scientific environment.

Second, the construction of the Samarkand madrasah became an important step in the institutional development of science. The madrasah was built between 1417 and 1420 and became known as "Madrasayi oliya", meaning a higher educational institution. It attracted more than one hundred scholars and students. Mirzo Ulugbek himself, together with Qazizada Rumi and Ghiyath al-Din al-Kashi, participated in teaching and scientific discussions.

Third, the Samarkand observatory became the main research center of Ulugbek's scientific school. In the observatory, astronomers observed the movement of stars and planets, while mathematicians processed the collected data. This cooperation between astronomy and mathematics led to the preparation of accurate astronomical and trigonometric tables.

One of the most important achievements of this scientific school was the creation of "Zij-i Jadid-i Guragani". This work included astronomical tables, observations of celestial bodies, and data on the positions of stars. According to historical information, Ulugbek and his scholars determined the length of the year with remarkable accuracy. They also prepared a star catalogue containing 1018 stars and calculated the geographical coordinates of many settlements.

Ali Qushchi played a special role in preserving and spreading the scientific heritage of Ulugbek's school. After the death of Qazizada Rumi and al-Kashi, Ali Qushchi became one of the leading scholars of the observatory. Later, he



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contributed to the dissemination of Samarkand astronomical knowledge in other regions. His works on mathematics and astronomical geography reflected the achievements of the Samarkand scientific tradition.

### **Discussion**

The scientific school of Mirzo Ulugbek may be considered one of the most advanced research centers of its time. Its uniqueness lies in the fact that it combined education, observation, calculation, and scientific writing within a single intellectual environment. Unlike ordinary educational institutions, Ulugbek's school functioned as a center for both teaching and research.

The cooperation between astronomers and mathematicians was one of the main strengths of this school. Astronomers observed the sky and recorded the positions of planets and stars, while mathematicians processed the results through calculation. This interdisciplinary approach increased the accuracy of scientific results and contributed to the development of mathematical astronomy.

Another important aspect is the role of state patronage. Mirzo Ulugbek's position as both ruler and scholar enabled him to provide material and organizational support for science. He built madrasahs, gathered scholars, established the observatory, and personally participated in scientific activities. This shows that political authority, when directed toward knowledge and education, can become a powerful factor in scientific progress.

The international significance of Ulugbek's scientific heritage is also noteworthy. His star catalogue and astronomical tables later became known in Europe. The publication of Ulugbek's astronomical works in Oxford in the seventeenth century contributed to the recognition of his achievements in the history of world astronomy.



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At the same time, the fate of the Samarkand observatory shows the fragility of scientific institutions when they depend heavily on the personality and support of a single ruler. After Ulugbek's death in 1449, the scholars of the observatory dispersed to different regions. However, this dispersion also helped to spread the scientific ideas of the Samarkand school beyond Central Asia.

### **Conclusion**

Mirzo Ulugbek's scientific school was one of the most important centers of astronomy and mathematics in the medieval East. It united education, scientific observation, mathematical calculation, and scholarly cooperation. The Samarkand madrasah and observatory created favorable conditions for the development of scientific thought.

The achievements of this school, especially "Zij-i Jadid-i Guragani", the star catalogue, and the astronomical tables, demonstrate the high level of scientific knowledge in fifteenth-century Central Asia. Scholars such as Qazizada Rumi, Ghiyath al-Din al-Kashi, and Ali Qushchi made a significant contribution to the development of this intellectual tradition.

In conclusion, Mirzo Ulugbek should be regarded not only as a ruler, but also as a great scientist and organizer of science. His scientific school remains an important part of the history of world astronomy and mathematics. The study of this heritage is significant for understanding the role of Central Asia in the development of global scientific civilization.

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