

THE LIFE AND WORK OF ELIA MILLOSEVICH (1848-1919)

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Abstract. In this contribution we briefly present the biography and professional activities of the Italian astronomer Elia Millosevich, professor of nautical astronomy at the Royal Institute of the Merchant Navy in Venice and later the director of the Roman College Observatory, whose family originates from the town of Dobrota in Boka Kotorska, present-day Montenegro.

1. INTRODUCTION

The idea for this work came up while doing research for the celebration of the 100th anniversary of the International Astronomical Union (IAU) (Arbutina 2019). Namely, the IAU was founded on 28 July 1919 in Brussels, on the sidelines of the 3rd inter-allied conference of scientific academies (18-28 July 1919), when WWI winners (the Entente Powers), including Serbia, established the International Research Council as a successor to the International Association of Academies (1899-1914) and an umbrella organization of professional unions (International Union of Geodesy and Geophysics, International Union of Pure and Applied Chemistry, International Union of Radio Science, etc.) (Blaauw 1994). The already established Kingdom of Serbs, Croats and Slovenes was represented at the conference by the well-known Serbian mathematician Mihailo Petrović and renowned geographer Jovan Cvijić, both professors of the University of Belgrade and members of the Serbian Royal Academy. The fledgling state, however, was not among the founders of the IAU, probably because it had no astronomer representative in the preparatory meetings (Arbutina 2021).

According to available data, Vojislav Mišković, a professor of the University of Belgrade and the director of the Astronomical Observatory of Belgrade, is the first Serbian/Yugoslav member of IAU. Before Yugoslavia was accepted, at the 5th General Assembly in Paris, in 1935, by a letter dated 31 March 1933 the IAU Secretary General F.J.M. Stratton informed the University of Belgrade Rector's Office that the Executive Committee had elected V. Mišković as a member of the Commission 20 for minor planets (Mišković 1933). However, there was a member of IAU committees established in Brussels in 1919, whose name is strongly resonant of South Slavic origin – that of Elia Millosevich (Serbo-Croat: Ilija Milošević), who represented Italy, which joined the Entente in 1915.

Italy officially joined the IAU in 1921, although it was *de facto* a (founding) member from 1919 (Trimble 1997). Formal problems were a delay in the formation of the National Committee of Astronomy, the payment of annual fee and sudden deaths of Annibale Ricco and Elia Millosevich in 1919 (Zanini, Gargano and Gasperini 2019).

In 1920 *Societa degli Spettroscopisti Italiani* transformed into the Italian Astronomical Society (Chinnici 2020), which allowed the National Committee of Astronomy to be formed. Not long after, honoring the 1919 invitation by Annibale Ricco, the 1st IAU General Assembly was held in Rome in 1922. Annibale Ricco, astronomy professor at the University of Catania and the director of Mt. Etna Observatory, was a member of the first IAU Executive Committee (one of the IAU vice-presidents) and a member of four committees. Elia Millosevich was a member of three committees (Campbell and Stebbins 1920):

5. *Committee on Abstracts and Bibliography* – BAILLAUD, *Chairman*, BIGOURDAN, H. D. CURTIS, FOWLER, KNOBEL, MILLOSEVICH, STROOBANT.

20. *Committee on Asteroids* – BROWN, *Chairman*, ANT. ABETTI, ANDOYER, BIGOURDAN, BOURGET, COWELL, CROMMELIN, FAYET, GONESSIAT, KRASSOWSKI, LEUSCHNER, METCALF, MILLOSEVICH, STROOBANT.

32. *Committee on the Reform of the Calendar* – CARDINAL MERCIER, *Honorary Chairman*, BIGOURDAN, *Chairman*, CAMPBELL, CRAWFORD, DESLANDRES, DYSON, LECOINTE, METCALF, MILLOSEVICH, RICCO, SAMPSON.

2. BIOGRAPHY

Elia's family originates from the town of Dobrota in Boka Kotorska (Italian: *Bocche di Cattaro*), present-day Montenegro. His grand-uncles were Natale (Božan) and Vido Milošević, Dobrota's merchants, sea captains and ship-owners, who built in 1828 the Palace Milošević, the youngest and the largest palace in Dobrota (Antović 1992). The third brother Ilija, Elia's grandfather, moved to live in Venice where he and his son Filip, Elia's father, ran a branch of the Milošević family maritime-trading company (Antović 2004). Elia was born in Venice, in the parish of St. Maria Formosa, on 5 September 1848. His mother was a noblewoman Elisabetta Morosini, and he had two younger sisters: Maria and Carolina (Gullino 2010).

Young Elia began his studies at the St. Caterina high school in Venice, then the best educational institution in the city. Although the Miloševićs acquired a certain level of prosperity in Venice, the family soon fell into a financial crisis. Filip had to start to work at a Lloyd's branch and Elia had to leave school. The collapse of the family fortune was probably accelerated by the death of Elia's grandfather on 7 December 1863, followed by that of his father on 29 July 1865. Elia had to find a job and, thanks to his knowledge and the reputation his family enjoyed, in 1866 he started to work at the Venice Post Office. At the same time, he moved with his mother and sisters to the less central Venetian parish of St. Felice. His passion for astronomy was already present while working at the post office – in the few hours of free time he had Santini's "Astronomia" in his hands, and he had learned the elementary astronomical knowledge from this book, all by himself (Cerulli 1919).

He continued his self-education and, despite lacking a degree, in March 1872 he took a public exam at the University of Padua, before a commission chaired by Giovanni Santini. The exam was successful and immediately afterwards he was hired as a teacher of nautical astronomy at the Institute of Merchant Navy in Venice (*Istituto di marina mercantile di Venezia*). In July 1872 Elia married Vittoria Fanton, with whom he had three children: Filippo, born in 1873, Federico in 1875, and Emma in

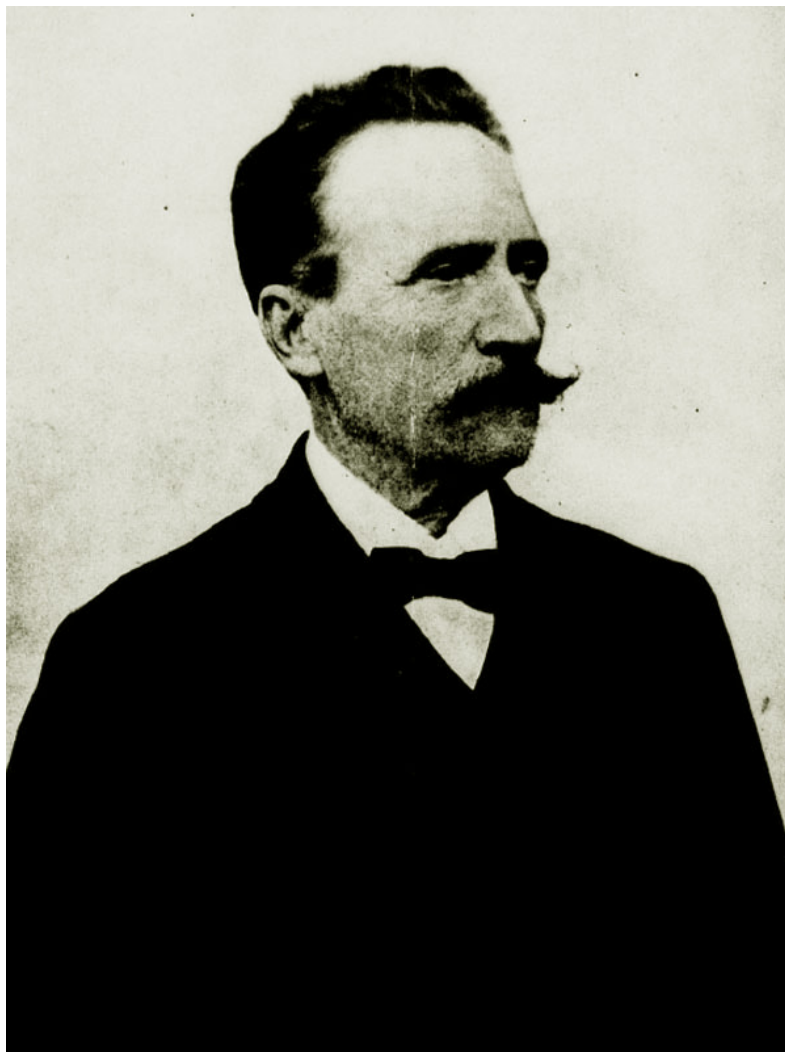


Figure 1: Elia Millosevich (1848-1919) (photograph from Cerulli 1919).

1878.¹ In 1879 he moved to Rome, where he was deputy director of the Roman College Observatory (*Osservatorio del Collegio Romano*) in the period 1891-1902, and the director in the period 1902-1919. He died in Rome on 5 December 1919.

3. PROFESSIONAL ACTIVITIES

Among various astronomical phenomena, Elia Millosevich showed great interest in the transits of Venus and published a paper on the Earth–Sun distance determination from such a transit as early as in 1870 (Millosevich 1870). After this first pamphlet,

¹Antović (1992) lists Filippo, Federico and Lisetta.

in the forthcoming years Millosevich published a number of his studies on the then-forthcoming 1874 and 1882 transits.^{2,3}

After he became a teacher of nautical astronomy at the Institute of Merchant Navy in Venice in 1872, Millosevich focused on determining the geographical coordinates of a terrestrial location, based on astronomical observations. He presented a lecture and published a paper on the topic together with his colleague Andrea Zambelli (Millosevich and Zambelli 1873). In 1876 he managed to set up a small astronomical observatory in the Institute where he was teaching and, before he started conducting more systematic observations and numerous other tasks in practical astronomy, Millosevich determined and published the coordinates of the observatory. Other specialized publications followed: on the calculation of orbits, occultations, transits across the solar disk, and various problems of celestial mechanics.

The turning point in Millosevich's scientific career happened in 1879, when Pietro Tacchini, who succeeded Angelo Secchi as the head of the Roman College Observatory, invited him to Rome, where he was appointed the deputy director of the newly established Central Meteorological Office (*Ufficio Centrale di Meteorologia*), Tacchini being the director. Despite the relatively high position, Millosevich's salary was quite modest, which is why in the early days he had to work as a substitute teacher in some schools and give private lessons. When in July 1891, the Roman College Observatory was separated from the Central Meteorological Office, Millosevich became deputy director and in August 1902, the director of the Observatory, succeeding Tacchini who withdrew a few months earlier.

In the early Roman years, Millosevich's work was, for obvious reasons, focused on meteorology, with particular reference to atmospheric phenomena (including the papers on the quantity and distribution of precipitation in various regions of the Italian peninsula). From around 1885 Millosevich was able to devote himself increasingly more to astronomical research, demonstrating his observational skills and practical knowledge in the calculation of orbits. In this respect, as a result of systematic observations, between 1882 and 1904 he published stellar catalogues (e.g. Millosevich and Peyra 1896), which were an important reference for the observation of minor planets and comets, and their orbits calculation. As a result of his passionate observations, on 12 February 1891, Millosevich discovered minor planet i.e. asteroid 303 Josephina, and on 1 March of the same year asteroid 306 Unitas.

Nevertheless, the work that attracted the attention of astronomical community the most and gave him international recognition was the study of the minor planet 433 Eros (Millosevich 1899). The first near-Earth asteroid Eros was discovered inde-

²Elia's grandfather Ilija had five children: Jozo, Luisa, Elena, Lucia and Filip. Since his brother Natale (Božan) in Dobrota did not have descendants, he asked Ilija to send him one of his sons or grandsons to adopt him. Ilija first sent him Elia, but he did not stay long in Dobrota. Then Ilija sent him Jozo's son Marko, who stayed for about a year, and finally Marko's brother Ivan (Antović 1992). Ivan Milošević, a professor of Nautical and Grammar School in Kotor, published an essay on the 1874 Venus transit *O najskorijem prehodu Danice preko Sunčanog kola*, the first such work in Serbo-Croat (Stipanić 1956, Protić-Benišek 2002).

³As a side note, a famous Ragusan Roger Boscovich (Serbo-Croat: Ruđer Bošković, Italian: Ruggiero Boscovichs), with whom Elia Millosevich shares some similarities (origin and background, life and work in Italy) intended to observe Venus transit in 1761 from Constantinople, but failed, as he did not arrive in time. Yet, he wrote an interesting travelogue about his journey from Constantinople to Poland (Bošković 1937). He was invited by the Royal Society of London to undertake an expedition to California to observe the 1769 transit, but was prevented for some political reasons.

pendently on 13 August 1898 by C.G. Witt at the Berlin Urania Observatory and A. Charlois at the Nice Observatory (Scholl and Schmadel 2002). It has the semi-major axis of 1.458 astronomical units, orbital period of 643 days and eccentricity of 0.2228 (MPC 2023). Due to the large eccentricity, the asteroid makes close approaches to the Earth (at opposition), offering an excellent opportunity for determination of the solar parallax (distance to the Sun, i.e. the astronomical unit). Starting from the elements provided earlier by Adolf Berberich, Millosevich realized that one of these great oppositions would occur in 1900, and became determined to calculate the exact orbit. For this purpose, besides using the position of Eros in 1898 at the time of its discovery, Millosevich searched for and found trails of the asteroid in photographic plates taken two years earlier, in 1896. This made it possible for him to determine the exact ephemeris of Eros, which at the time was the best available, and to confirm the Earth-Sun distance to about 149.5 million kilometers (Gullino 2010).

Aside from his work on transits and occultations, stellar catalogues, observations of comets and asteroids, and calculations of their orbits, Millosevich also worked in the field of history of astronomy and chronology (Gullino 2010, La Greca 2020). He wrote on Dante's astronomy, heliacal rising of Sirius in ancient Egypt, the year of origin of the Olympics and the astronomical concepts in the manuscripts of Leonardo da Vinci. For about forty years, he published the calendars of the Roman College, including the concordances between the Gregorian and the Julian, Mohammedan, Jewish, Abyssinian and Coptic calendars. He was not only a prestigious scientist, but also a great lecturer and science communicator. All in all, during his long professional career, Elia Millosevich was remarkably productive. Astrophysics Data System lists 357 entries authored by him in the period 1873–1919. More complete bibliography shows that Millosevich published 449 works in Italian and international journals (Gullino 2010, see also Antović 2004).

4. HONORS

Elia Millosevich was a member of numerous Italian and foreign societies and academies. Together with Pietro Blaserna and Annibale Ricco, he was a member of the presidential council of the *Società degli Spettroscopisti Italiani* in the period 1910-1919. Millosevich was a corresponding member of the *Accademia Nazionale Reale dei Lincei* from 1893, national member from 1905 and secretary of the class of physical, mathematical and natural sciences from 1906. He was a member (and administrator since 1909) of the *Società Italiana delle Scienze detta dei XL*. He was also a member of Italian Geodetic Commission, and councilor (1891-1906) and vice-president (1906-1918) of the Italian Geographical Society (*Società Geografica Italiana*) (Bianchi 1920, Gullino 2010, La Greca 2020).

Millosevich was awarded the Prize for Astronomy (*Premio per l'Astronomia*) of the *Accademia Nazionale Reale dei Lincei* for his work on a stellar catalogue together with Domenico Peyra in 1898 and again in 1904 for the calculation of the orbit of Eros. In 1911 he was awarded the Pontécoulant Prize (*Prix Gustave de Pontécoulant*) of the French *Académie des Sciences de Paris*. In 2004 the main-belt asteroid 69961 Millosevich, discovered by Italian astronomers Piero Sicoli and Francesco Manca in 1998 at the Sormano Astronomical Observatory, was named in his honor (MPC 2023).

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