

Žarko Mijajlović, Nadežda Pejović
Faculty of Mathematics, University of Belgrade

DIGITIZATION OF PUBLICATIONS OF THE ASTRONOMICAL SOCIETY „RUĐER BOŠKOVIĆ“

Abstract. We present periodicals and other editions of the Astronomical society “Ruđer Bošković” from Belgrade, published by the Society since its founding in 1934. All these publications were digitized recently and are deposited in the Virtual Library of the Faculty of mathematics in Belgrade. There are two periodicals, the astronomical journal *Saturn* which was published in Belgrade in the period 1935 -1940 and *Vasiona* which have been published since 1953 till today. Other editions of the Society are twenty one books, the first one printed in 1939, while the last one was published in 2020.

1. INTRODUCTION

Academic astronomical Society of the University of Belgrade (Akademsko astronomsko društvo Univerziteta u Beogradu), founded in 1934, was the forerunner of the oldest Serbian amateur astronomical association which today bears the name *Astronomical Society “Ruđer Bošković”* (ADRB). The founders of the Society wanted to stress the Yugoslav character of the Society, so they changed its name in 1935 to *Yugoslav astronomical society* (Jugoslovensko astronomsko društvo). The German attack on Yugoslavia in 1941 broke the activity of the Society, but already in 1951 it continued its work with new name *Belgrade astronomical club “Rudjer Bošković”* (Beogradski astronomski klub “Ruđer Bošković”). Finally, in the next year the Society became *Astronomical Society “Ruđer Bošković”*. For more historical details one may consult [Aleksić, Stanić, 2017]. The main purpose of this article is to announce that all publications of the Society are completely digitized and made available, as the open access publications, to the general public. Digital copies of these editions are deposited in the Virtual Library of the Faculty of mathematics in Belgrade.

Before WWII there were not so many astronomical publications in Serbia, in particular periodicals. Overviews on early astronomical books printed in Serbia, or written by scientists of the Serbian origin, one can find in Pejović and Mijajlović (2011), Martocchia and Marchionni (2013) and Milisavljević et al (2011). A lot of valuable historical information are published in proceedings of biannual conferences *Razvoj astronomije kod Srba* (Development of astronomy among Serbs), organized by professor Milan Dimitrijević. The first Serbian astronomical periodicals appeared in the third decade of the XX century. Belgrade astronomical observatory started to publish in that time almost in parallel three periodicals in astronomy: *Annuaire de l'Obs. Astr. Belgrade*, *Memoires de l'Obs. Astr. Belgrade* and *Godišnjak našeg neba* (Almanac). The first two journals were published for six years, while the last volume of *Godišnjak* (for 1962) was printed in 1961. However, *Nautički Godišnjak* (Nautical Almanac, published by Stevo Šegan) may be considered as a successor of *Godišnjak našeg neba*. The messenger *Saturn* of ADRB was the first Serbian astronomical periodical oriented to the general public interested in astronomy, geodesy and meteorology and other

related sciences. The printing of *Saturn* stopped in 1940 due to the approaching war circumstances. In 1953, its successor *Vasiona* appeared and the printing of this periodical have been lasted until today.

2. MESSENGER *SATURN*

The publication of *Saturn* was started in 1935 as a messenger of *Yugoslav Astronomical Society*, founded in Belgrade a year before. The founder of the journal and the society as well was Đorđe M. Nikolić (1908-1971), the Serbian but pro-Yugoslav science historian. Nikolić got Degree and PhD in Astronomy in France, where he acted as a member of the Resistance during WWII. He wrote rather recognized papers on Ruđer Bošković and south-Slav astronomy, as noted by A. Martocchia and S. Marchionni in their paper "Đorđe Nikolić Yugoslavs in Astronomy" (2013). The journal was supported by Hypothecary Bank in Belgrade.

This monthly periodical was regarded as a semiprofessional journal with many popular articles intended to astronomy lovers. The journal was also planned to be useful to professional astronomers, surveyors, meteorologists and seismologists, so there were published also scientific articles in these areas. Popular and professional articles were separated into different sections, and there also was a section with short notes and news for people interested in astronomy. Articles were published in Cyrillic and Latin, reflecting in this way both variants of Serbo-Croatian, following pro-Yugoslav founder's attitude. Slovenian authors published in Slovenian. Some of the leading Yugoslav astronomers and physicists published there, e.g. Serb Milutin Milanković, Croat Stjepan Mohorovičić and Slovenian Lavo Čermelj.

The members of the Editorial board were prominent Yugoslav scientists and professionals in astronomy and related sciences. Most of them were from Belgrade, but there were members from Croatia and Slovenia as well. Some of them had very interesting biographies, while the most of them were holding PhD degree in astronomy obtained in then the leading scientific centers in Europe. Đorđe Nikolić was the main editor, while the other members were the following scientists. We give here their short biographies.

General and academician Stevan Bošković (1869-1957), was geodesists and professor at Military Academy in Belgrade. He is known for his very extensive geodetic measurements in Serbia in the first decade of XX century and his translation of the famous Tsinger's three volume book on astronomy. Bošković translated these books not by chance. He used Tsinger's method for the exact time determination needed for measurements the points of all geographic latitudes in Serbia during his geodetic surveying. Tsinger's book without doubt was his valuable companion during this exploration. He spent some time in the late XIX century studying astronomy and geodesy at the Pulkovo Observatory. Bošković certainly met Tsinger there who was then the leading Russian geodesists and professor in St. Petersburg, see Pejović and Mijajlović (2011).

Vojislav Grujić (1904-1944) obtained his doctoral dissertations in mathematics related to astronomy at Strasbourg University in 1933. Before he went to Strasbourg he worked as an associate at the Astronomical observatory in Belgrade. However, due to some social circumstances he was not admitted to the Observatory upon his return from Strasbourg. Hence, in spite of his very high education and background in astronomy he had no proper chance to work in astronomy professionally. He tragically lost his life in the eve of the very end of WWII.

Fran Dominko (1903-1987), Slovenian physicist and astronomer, got his Degree and PhD in Bologna, Italy. He worked in Belgrade since 1932, first as an astronomer and later as a gymnasium teacher until WWII. He moved to Ljubljana in 1948 where he took a position of university professor of astronomy. More details about him one can find for example in Wikipedia, Slovenian edition.

Ladislav S. Mužinić was the member of the first editorial board. We do not know much about him except that he lived in Zagreb before WWII. He published a short note *Breitenbestimmungsversuch von Zagreb* (Attempt to determine the latitude of Zagreb, 1936) in *Astronomical notes*, the predecessor of *Astronomische Nachrichten*. He also wrote articles for "Saturn" on astronomy and geodesy.

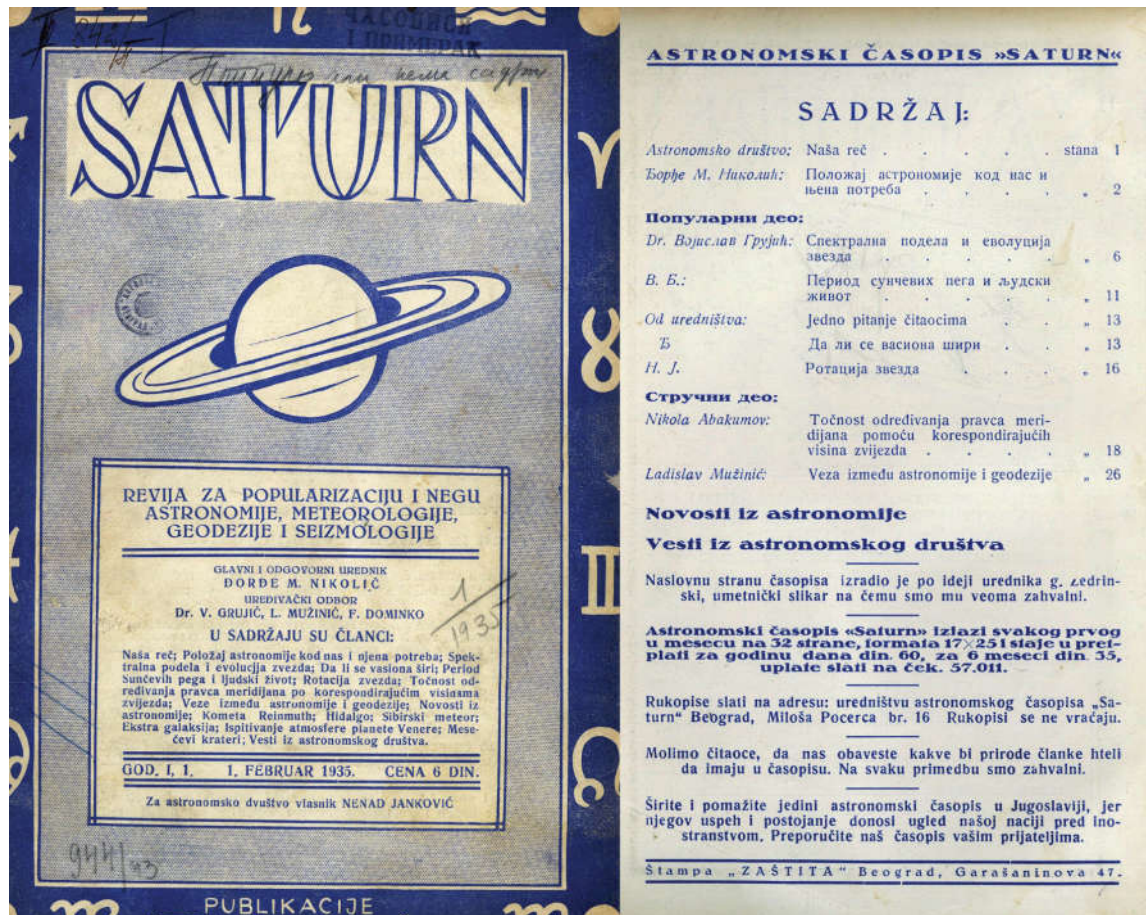


Figure 1, The cover page of the first volume of Saturn

Nenad Janković (1911-1997) was jurist, but as professor Milan Dimitrijević described him, "his love and passion and his life's commitment were astronomy". He was the great popularizer of astronomy. For more details see Dimitrijević (1998). On the cover page of the first volume of *Saturn* we can see that Janković was the owner of the journal.

Many interesting, actual and informative articles were published in *Saturn*. They were in agreement with the current knowledge in astronomy and related sciences and obeyed surprisingly high scientific standards. Some of the best Yugoslav scientists, university professors, often academicians wrote articles for *Saturn*: Milutin Milanković, Vječeslav Žardecki, Branislav Petronjević, Stevan Bošković and others. Translations of articles by the most famous astronomers and scientists have also been printed, e.g. Willem de Sitter, Arthur Eddington and Albert Einstein. All contributions, including

short notes and reviews were carefully divided into the sections "Popular part", "Professional part" and "News and notices". On the other side articles are accordingly classified into subjects: astronomy, meteorology, seismology, geodesy, personal news etc. It was not given priority to any particular discipline. For example, in astronomy articles cover many topics, from comets to time measurement and from supernova to cosmology. The used mathematical apparatus was correct and nontrivial. We can freely say that *Saturn* in many senses could compete with other astronomical journals published in that time in Belgrade. Obviously, editors put a lot of effort in preparing each volume of the journal.

As an illustration we give two examples, short notices printed in the journal. The first one is the obituary of Willem de Sitter (1872 - 1934), a prominent Dutch mathematician, physicist, and astronomer. A short biography and his contribution to science are presented. Đorđe Nikolić published in the same volume the article *Da li se vasiona proširuje* (Does the universe expand) where de Sitter views in cosmology are presented. The second one is the notice on Hans Ertel's¹ formula $gm^2 + mc = \pi h e^2 \Lambda$ (*Saturn*, year 1935, vol. 3, page 91) which connects fundamental physical constants: the Newton gravitational constant g , electron mass m , the Planck constant h , the electron charge e , speed of light c and Einstein's cosmological constant Λ .

Here are divisions and the titles of the main articles of the first volume of the journal. Introductory part: *Introductory word, Position of astronomy in Yugoslavia and do we need it*. Popular part: *Spectral division and evolution of stars, Sunspots periods and human life, One question to the readers, Does the Universe expand, Star rotation*, Professional part: *The accuracy in determining the direction of the meridians using the corresponding height of the stars, Connection between astronomy and geodesy*.

3. PERIODICAL VASIONA

After the end of the Second World War, the Society started in 1953 the magazine *Vasiona* (Universe) of a similar character as *Saturn*. This time the magazine was thematically dedicated to astronomy and astronautics alike. At the time the magazine was founded, the world witnessed the great and rapid development of jets, advanced rocket constructions and the beginning of the space race between the greatest powers of that time, the USSR and the USA. The first intercontinental rockets appeared, and in October 1957, the first artificial satellite "Sputnik" was launched. Before that, as early as 1946, the first space photograph of the Earth was taken from an American rocket with German technology, which shows its curvature. In 1948, the R-1 rocket, a replica of the German V2 rocket, was successfully launched in the Soviet Union. In the summer of 1950, the first two-stage *Bumper 2* rocket was launched from Cape Canaveral in the USA, whose second stage reached a height of 400 km. Much has been written about these first cosmic successes, not only in the professional, but also in the daily press. Both the professional and general audiences were very interested in these endeavors, which opened a window into a completely new and unknown world. Hence, it is not surprising that at that time there was the great interest in the world and in our country as well for astronautics, a new type of mankind activity which brought the new age and great breakthroughs in technology and the conquest of until then unattainable and unexplored spaces. *Vasiona* was obviously founded bearing in mind these events.

¹ Hans Ertel (1904-1971) was a German natural scientist and a pioneer in geophysics, meteorology and hydrodynamics.

Leading engineers and experts in Serbia have been publishing the first-class articles on the topic of astronautics and cosmonautics in "Vasiona" for almost three decades. For example, Milivoj Jugin (1925-2013), engineer and the great popularizer of cosmonautics, who was also a member of the Editorial Board for a while, wrote many articles on cosmonautics, rocket designs and numerous rocket probes.

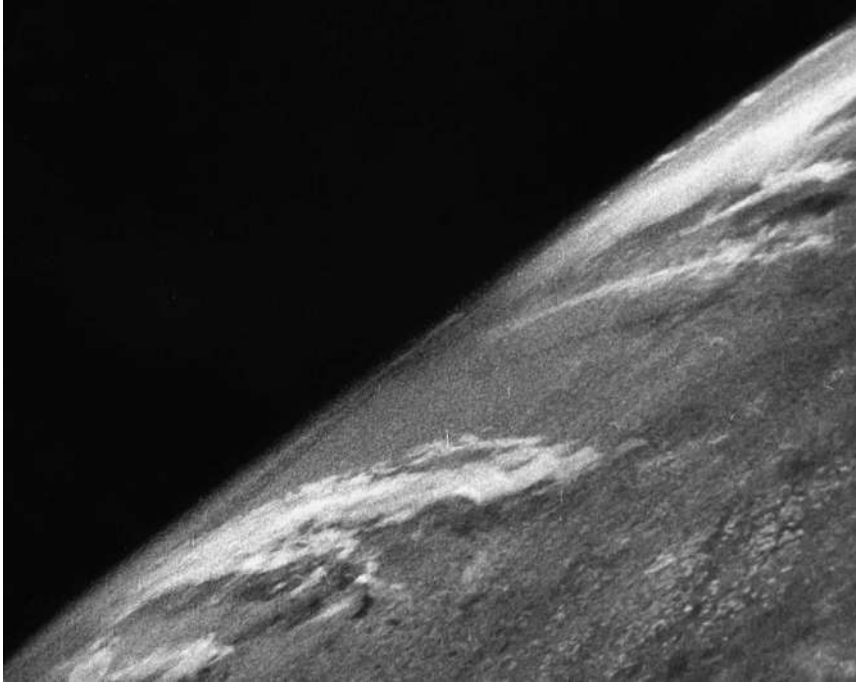


Figure 2. The first photograph of the Earth from space. New Mexico, USA, 1946, V2 rocket, altitude 106 km.

We quote the introductory text in the first volume of *Vasiona* which best explains the founder's intentions and to which public the journal was intended:

The Astronautical Society "Ruđer Bošković" and magazine initiators convinced that they were responding to the wishes of many fans of astronomy and astronautics, decided to launch the magazine *Vasiona*, which the reader now has before him. This magazine, which is supposed to fill the gap that was once filled by our first astronomical magazine *Saturn*, is intended primarily for the popularization of astronomy and astronautics. The journal will therefore bring articles accessible to people of general education, and especially to those who show interest in these two sciences and want to expand their knowledge in these areas. In addition, *Vasiona* will inform readers about phenomena in the sky, new discoveries and other news and interesting things.

Vasiona is published almost for seven decades still under the same name. There were rough times in the life of the journal, particularly in the last two decades. For example, *Vasiona* was not published for six years, in the period 2011-2017. One reason is the lack of finance; the other one is that Internet and electronic editions is the great rival to the printed editions. It should be also mentioned that today the working scientists and specialists are much less interested to give contributions to such a type of magazines as such articles are not properly valued and recognized by the scientific community. Simply, writing such articles consumes the valuable time for writing

original scientific papers. Professor Milan Dimitrijević started again the journal in 2017, and it is still published mainly due to his efforts.

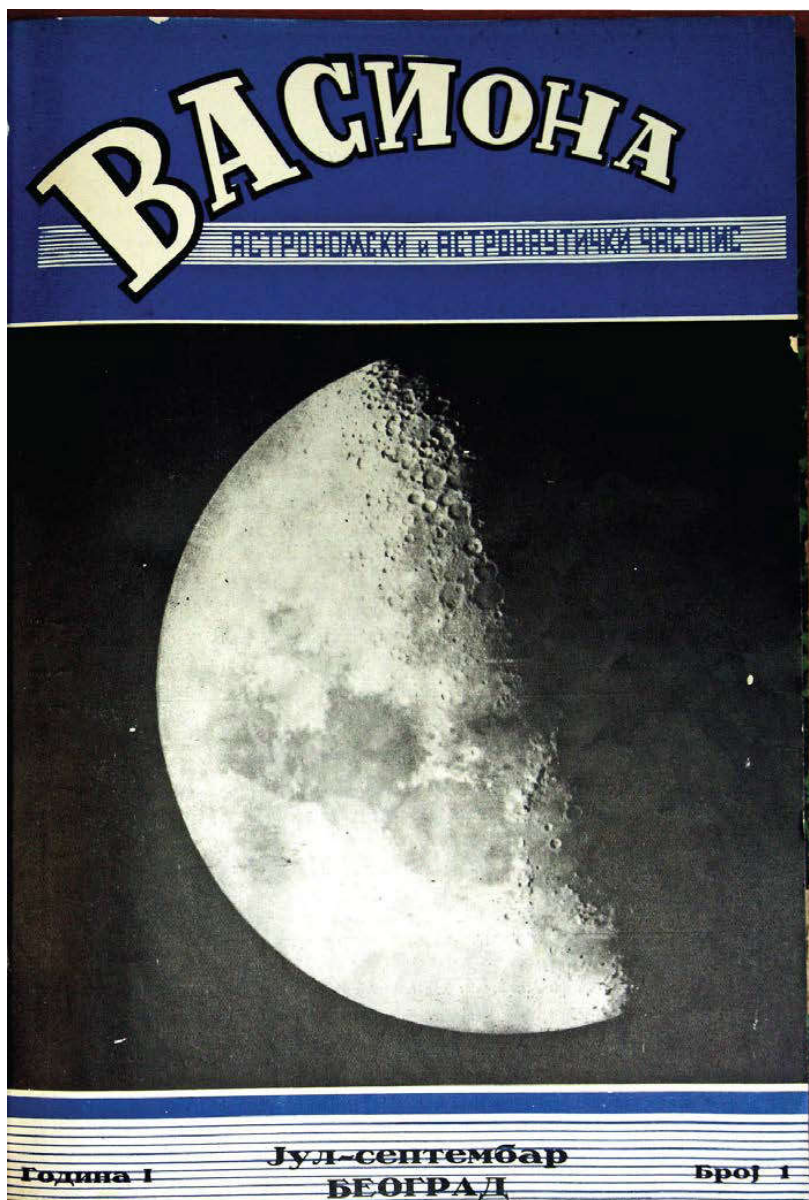


Figure 3. The cover page of the first issue of the journal *Vasiona*, triple volume July - September 1953.

First Editorial Board:

Pero Đurković,

Nenad Janković,

Bogdan Kuzmanović,

dr. Đorđe Nikolić,

eng. Dr. Svetopol Pivko and Milorad Protić

Editor-in-chief:

Nenad Janković

Editor-in-chief since 2017:

Prof. Milan Dimitrijević

The journal has four volumes annually. Occasionally, two volumes are printed as one issue. Many authors have written about *Vasiona*: Milan Dimitrijević, Milan Jeličić, Vojislava Protić-Benišek, Jovan Aleksić and others.

We also learn from the editorial that *Vasiona* was actually founded and later published by two associations. In addition to the ADRB, another institution was the Astronautic Society, which operated within the Yugoslav Air Force. On the cover page of *Vasiona* it was written that it was a journal of astronomy and astronautics. Unlike *Saturn*, which came out once a month, *Vasiona* was published once every three months. The first issue of *Vasiona* for the July-September quarter was printed in 1953.

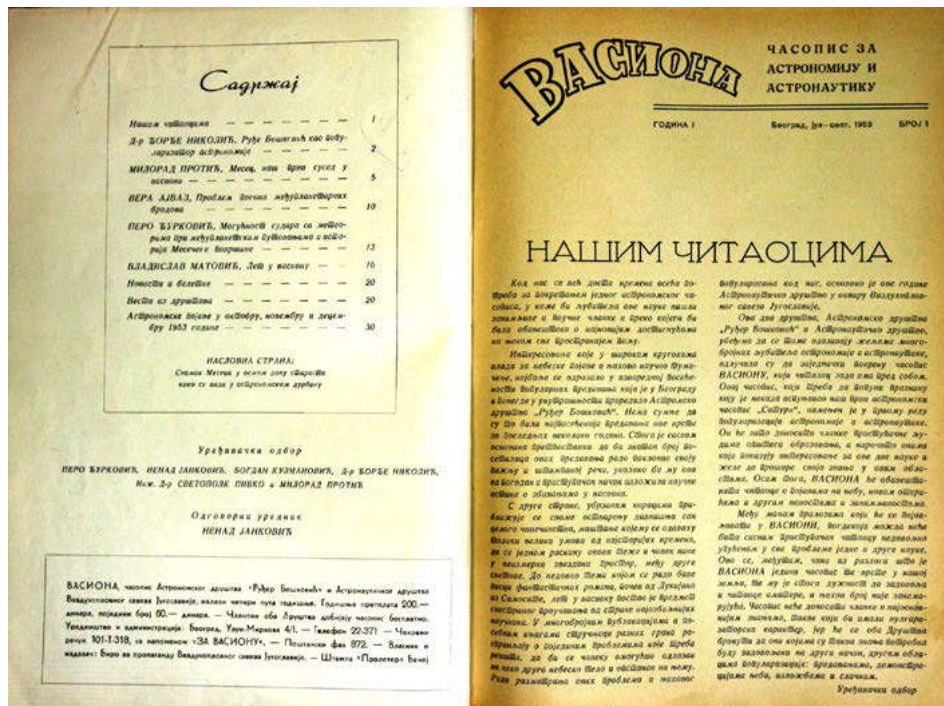


Figure 4. The cover page of the front cover and the first page of the first issue of *Vasiona*

For the first few decades, the content of *Vasiona* equally covered astronomy and astronautics, but also the activities that touched or were applied in these two great sciences. Leading Yugoslav authorities published highly professional articles with elements of original scientific contributions. As an illustration of both these facts, we cite the title of one such article written by professors of the University of Belgrade and pioneers of computer science in Serbia: Nedeljko Parezanović and Jovan Petrić, *Solution of nonlinear algebraic equilibrium equations in a gas mixture on a digital machine type "Univac 60"* (VIII, 1960, 46). Well-known scientists of various professions, e.g. academician Tatomir Andjelic, professor of mechanics of the Belgrade University, Vladimir Ajvaz, engineer who wrote the famous book on rocket engines, already mentioned Milivoj Jugin, aeronautical engineer and famous popularizer of astronautics and television commentator on all major space launches. Astronomer Pero Đurković, once the director of AOB, and the great amateur astronomer and popularizer of astronomy Radovan Danić, a doctor by profession, have a special place in the history of *Vasiona*. These people also have a great merit for opening in 1964 the so called Narodna Observatory (Public observatory), where ADRB is still situated. Over time, topics in astronomy took up more and more space in the Universes, so that today it is primarily a popular science magazine in astronomy.

4. OTHER PUBLICATIONS

In addition to the magazines *Saturn* and *Vasiona*, the Society has published 21 books and conference proceedings. Some of the books popularize science, in particular astronomy. However, most of them were the proceedings of the conference organized by the Society. The first two books were published before World War II:

1. Stars and Atoms, Arthur Eddington, 1938, translated by M.B. Protic
2. The role of France in the development of mathematics, Eli Cartan, 1941, with a foreword by Mihailo Petrović Alas.

There was a pause lasting four full decades in printing of new editions. Hence, the third book in this series is "Records and Memories of the Astronomical Society" by Nenad Janković, published in 1984. A series of 18 books that followed were conference proceedings:

1. Development of astronomy among Serbs (nine conferences).
2. Serbian-Bulgarian Astronomical Conferences (six conferences)
3. National Conference of Yugoslav Astronomers (one conference, 1984).

Editor of all these editions was professor Milan Dimitrijević and they are published mainly due to his efforts. These books in most cases are very large, some of them having more than one thousand pages. The following books of the biographical character have also been published in this series:

1. *Astronomer-poet-traveler Milan S. Dimitrijević* (Astronom-pesnik-drumovnik, 2015).
2. *Collected works of Nadežda Pejović* (Sabrana dela Nadežde Pejović, 1920)

5. DIGITIZATION

All publications discussed in this paper were digitized in 2020. During this short project 72 tomes of the magazine *Saturn*, about 2500 printed pages, and about 250 volumes of *Vasiona* published in 62 years, what makes more than 8000 pages, were digitized. Books, averaging 500 pages each, make all together more than 10000 pages. Hence, the total volume of digitized editions of the Society amounts more than 20000 pages. Digital copies of these editions are deposited in the Virtual library of the Faculty of Mathematics.

For both journals and books as well, a fairly high level of text character recognition (OCR) has been done. This gives a special technical value to digital versions of the scanned publications because it allows one to quickly search for text by any words. The digitization project, financed from their private funds, was implemented by the authors of this article during 2020. They had the support of prof. Milan Dimitrijević, the editor-in-chief of the magazine *Vasiona*, and Milan Jeličić, the secretary of the ADRB, primarily because they made printed copies of *Saturn* and *Vasiona* available to them. We had also a support from the "Copy Planet", a company specialized in scanning and printings which gave us a significant cost discount for scanning the printed material.

6. CONCLUSION

The magazines *Saturn* and *Vasiona* and other publications of the Astronomical Society "Ruđer Bošković" are an invaluable source of information from astronomy and related sciences. These publications are also a testimony to events in development of technology and science since 1930's till today, as well as the people who participated in

it. By browsing these journals and books, the reader will have the opportunity to travel between the infinitely large and the infinitely small, to switch from stars to atoms then to return to the stars and thus get to know the natural forces and phenomena that bind them. Along the way, they will meet many great names from science and then current space technology: Eddington, Einstein, De Sitter, Werner von Braun and many others. With the digitization, these editions became available to everyone, everywhere and immediately, and in that respect they also became directly available for the study of the history of astronomical sciences in the world and in our country.

References

1. Aleksić, J., Stanić, N.: Publ. Astron. Obs. Belgrade, 96 (2017), 469 -473
2. Dimitrijević, M. S., Serb. Astron. J., 158(1998), 131–145.
3. Martocchia, A., Marchionni, S.: 2013, Semantic scholar, Corpus ID: 219332281.
4. Milisavljević, S., Samardžija, B., Marčeta, D., Šegan, S., NCD Review, 18(2011), 75–82.
5. Pejović, N., Mijajlović, Ž. NCD Review, 19(2011), 11-25.
6. Protić Benišek, V., Dimitrijević, M., Publ. Astr. Soc "Rudjer Bošković", 13(2014), 625–630.
7. Šegan, S., Vidojević, S., Racković, K., NCD Review, 14(2009), 9–12.
8. Simovljević, J. L.: 1980, Trideset godina Prirodno-matematičkog fakulteta Univerziteta u Beogradu, 1947-1977, PMF, Beograd.
9. Virtual Library, <http://elibrary.matf.bg.ac.rs>, Faculty of Mathematics in Belgrade.
10. Working group history of geophysics and cosmic physics, <http://verplant.org/history-geophysics/wdschroeder.htm>.

zarkom@matf.bg.ac.rs

nada@matf.bg.ac.rs