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**DIGITIZED BOOKS OF ĐORĐE STANOJEVIĆ  
IN THE VIRTUAL LIBRARY  
OF FACULTY OF MATHEMATICS**

**Abstract.** We present the books by Đorđe Stanojević that are digitized and are in the Virtual Library of the Faculty of Mathematics, University of Belgrade. Đorđe Stanojević was a respected electrical engineer, physicist and astronomer of the second half of the nineteenth and the beginning of the twentieth century. He taught applied physics at the Grand School and at the University of Belgrade after its foundation in 1905. He is responsible for the electrification of Belgrade after that Belgrade has become one of the first cities in Europe lightened by electricity.

This digital collection contains seven his books: *Starry sky of independent of Serbia*, *From the science of light*, *Walk through the clouds*, *Incorrect celebration of the Resurrection in the Orthodox Church and the reform of the calendar*, *The universal energy and modern physics*, *Nikola Tesla and his discoveries*, *Industry of cold*.

**Virtual Library**

Virtual Library of the Faculty of Mathematics <http://elibrary.matf.bg.ac.rs> has the largest database of digitized texts in Serbia which is open for public use. At this moment, it contains almost 800 books. Since April 2008 seven hundred books were uploaded into the Library. Important collections in this library are a collection of 360 doctoral theses in mathematical sciences from the great majority defended at the Faculty of Mathematics of the University of Belgrade and rare books from the 18th and 19 century. Most of these books are rare, some of them exist only in one copy and practically inaccessible to the public.

**Short biography of Đorđe Stanojević**

Đorđe Stanojević (1858–1921) was born in Negotin a town in Serbia. He finished Grand School in Belgrade, the forerunner of the Belgrade University. He then served as Grand School assistant to Professor Kosta Alković (1836–1909). After that, in 1883, he was a teacher at the First Belgrade Gymnasium. As a cadet of the Military Ministry during the period 1883-1887 he was sent to study and work in the most famous European astronomical and meteorological observatories (Potsdam, Hamburg, Meudon Observatory near Paris, Greenwich Observatory and Pulkovo Observatory near Saint-Petersburg). Due to his results he was invited by the Paris Observatory to participate in scientific research expedition to examine the Sun and in Petrovski where he participated in the study of total solar eclipses. Two years later he joined a France research expedition to Sahara in order to study the Sun and its thermal spectrum. At this time he published several scientific papers on astronomy in the editions of the Paris Academy of Sciences. These papers are the first scientific works in astrophysics among Serbs.



**Đorđe Stanojević**

Stanojević was a versatile, educated man with active interest in many fields of science and technology. His interest in physics was rather great. Upon return home he devoted himself to the study of modern physics. He became the lecturer in physics and engineering at the Military Academy. Also he taught applied physics and mechanics in High School and at the Belgrade University after establishing it in 1905. He is responsible for the construction of many hydropower plants in Serbia (Vučje, Negotin, Užice, Ivanjica and other places) and the electrification of Belgrade. Due to this effort of his, Belgrade became one of the first European capitals with full electric lighting. He died in Paris in 1921.

The Virtual Library contains seven digitized Stanojević' books: *Starry sky of independent Serbia*, 1882, Belgrade; *Walk through the clouds*, 1884, Belgrade; *The universal energy and modern physics* (introductory lecture on the occasion of his entrance to the Department of Physics at the Military Academy),

1887, Belgrade; *Nikola Tesla and his discoveries*, in 1894, Belgrade; *From the science of light*, 1895, Belgrade; *Industry of cold*, 1909, Belgrade; *Incorrect celebration of the Resurrection in the Orthodox Church and the reform of the calendar*, 1908, Belgrade

On this occasion we shall present four of these books: *Starry sky of independent of Serbia*, *From the science of light*, *Walk through the clouds* and *Incorrect celebration of the Resurrection in the Orthodox Church and the reform of the calendar*.

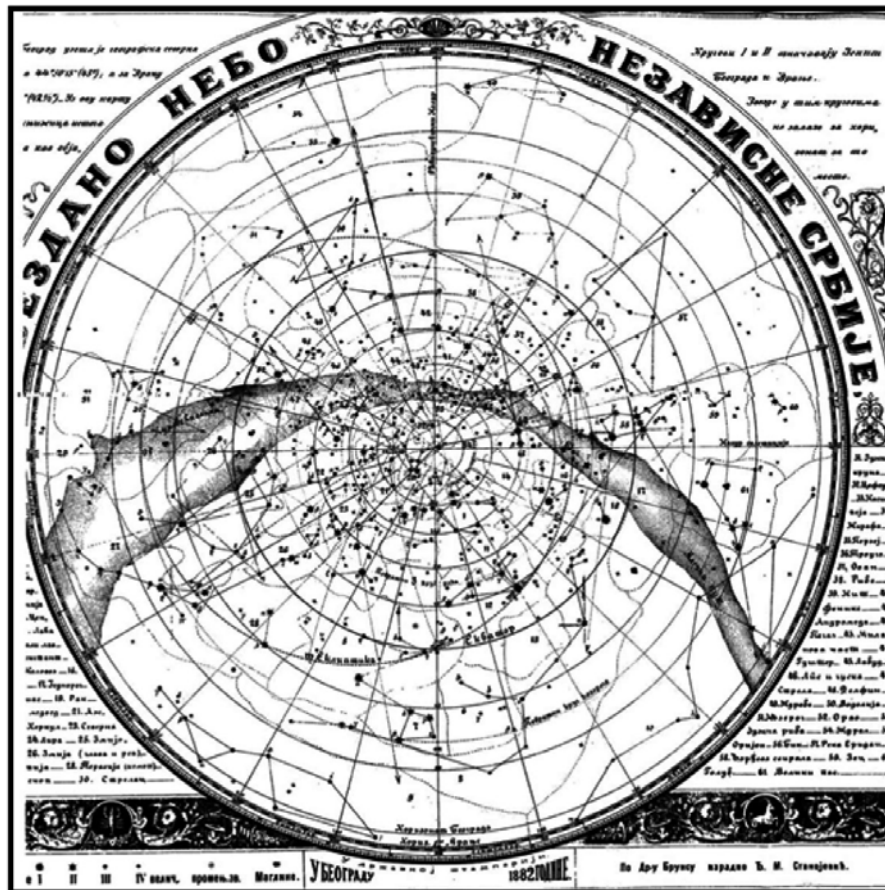
### **Starry sky of independent Serbia**

This book is one of the first books on astronomy written in Serbian. It was published by the Royal-Serbian printing shop in 1882 in Belgrade. The hard copy of this book is located in the University Library in Belgrade, registered under the inventory number. 13006. The book is small in volume, but the content is a true jewel of our scientific literature of the nineteenth century. Stanojević studied in fine schools in European centers and he was well acquainted with foreign languages. So he wrote the book using then available literature written in several European languages. There are two French and one German book in the bibliography.

This is a small book, it has only 70 pages. The book consists of a preface, ten chapters and one star chart and has 22 pictures. It has the following chapters: *Stars in general*, *Astronomical division of the sky*, *Number, range and distribution of stars in size*, *Stellar maps*, *Star clusters and their stars*, *Starry skies change due to precession*, *Nutation*, *Aberration and refraction*, *Proper motion of stars*, *Variable stars and novae*, *Double stars*, *Star clusters and nebulae* and *Milky Way*.

Although this book is not great in the volume, from the titles of the chapters we can conclude that the reader of that time could gain a solid insight into astronomy. The book clarifies astronomical concepts in a simple and transparent way with the beautiful language. There is also a lot of the accompanying drawings and illustrations. Stanojević gave special attention to the description of the starry sky, particularly to the constellations description, orientation in the sky by constellations and by use a star maps. We especially emphasize Stanojević's writing skill in exposition of often complex astronomical phenomena. His

explanation of these phenomena is mostly descriptive and without mathematical expressions, but using fine graphics. Due to the methodical way in which this book was written, its content, clarity and easiness of presentation, it can be still recommended to today's high school students and teachers, not only of astronomy but also of mathematics, physics and geography.



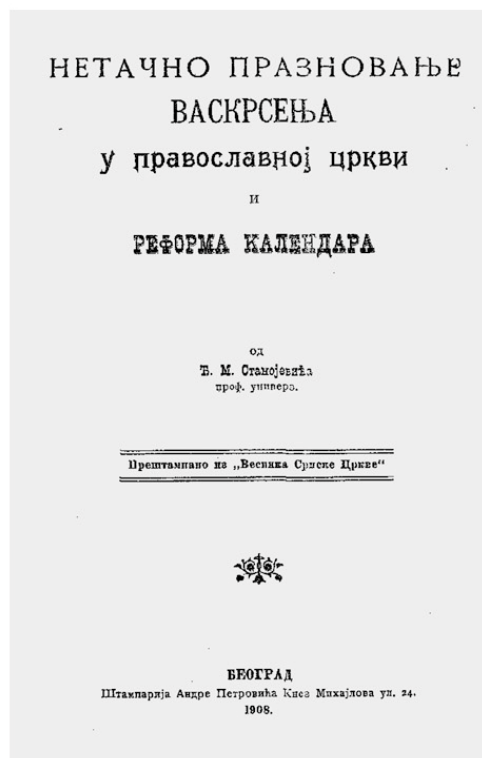
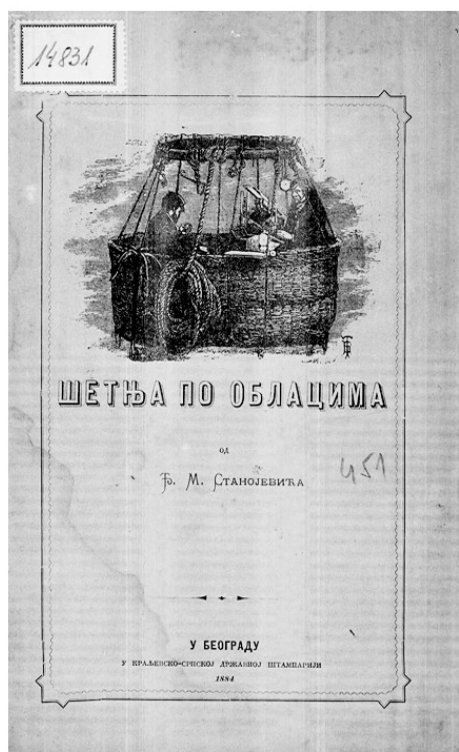
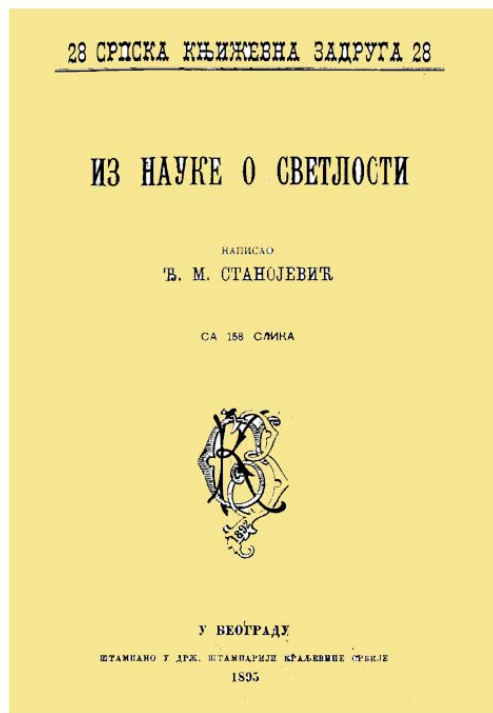
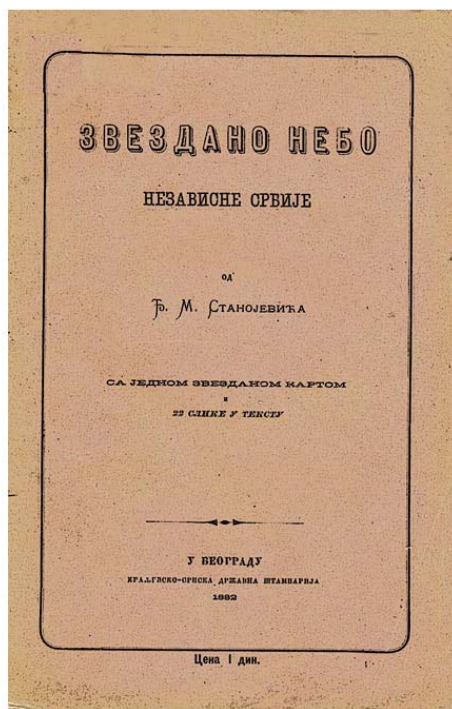
### From the science of light

This book has 257 pages with the addendum of the 22 pages. There are 158 pictures scattered throughout the book. The book was published by the State Printing House of the Kingdom of Serbia in Belgrade in 1895. The hard copy of the book can be found in the library of the Serbian Academy of Sciences and Arts. It has five chapters: *Introduction, The science of light, Light sources, Propagation of light, Speed of light and reflections.*

Stanojević explains in the Preface that he wrote the book by the invitation of the Serbian Literary Management Co-operatives to prepare one book in the area in which he was working. He also writes that the book is aimed “*to explain by the scientific truth about light a part of incomprehensible and strange light phenomena which we encountered either by ourselves or were told us by others. How I did it, it remains to the readers to judge*”.

This book is written in clear and simple language. It is easy to read and understand. It has no equations, patterns and formulas, but there are many illustrations and sketches for better understanding of light phenomena and effects. Special attention is paid to the description of light phenomena that occur in nature and brought the fear to at that time in general illiterate people. Stanojević describes these phenomena and explains all mysteries

attached to them. In each chapter for all of these phenomena he is trying to explain and eliminate prejudice against them, to free a view of the general reader of blunders and superstition. The book is well written, it is methodologically sound and we believe that it is interesting for the contemporary reader, particularly for students and teachers.



### **Walk through the clouds**

This is the first book on aeronautics written in Serbian. In fact, the greatest part of the book is devoted to the balloons flying. Book was published by the Royal-Serbian state printing in 1884 in Belgrade. The hard copy of the book is located in the Library of the Serbian Academy of Sciences and Arts. It is short book; it has only 102 pages and is divided into seven chapters: *How to walk through the clouds*, *Preparation for travel*, *On the road*, *Clouds*, *Descent* and *Several air travel*.

Before he started to write this book, Stanojević wanted to translate *Promenades dans les Nuages* by French writer Charles Delon, a book on balloons flying. The reason was that Stanojević wanted to introduce Serbian readers with balloons and principles of balloons flying (air ballooning). But as he observed in the introduction of his book, Delon's book was written for the French audience and a simple translation of Delon's book would surpass the understandings of an average Serbian reader. Therefore he wrote a new book where he arranged the themes differently and focused more on individual episodes and history on balloons flying. In writing this book it was handy a book *Les ballons (A History of Balloons and Balloon Voyages*, printed in 1870) by F. Marion, as Stanojević explained in the preface. Let us mention that both books of French authors are digitized and can be freely download from Internet.

Stanojević describes in his book in details the first (Nov 21, 1783, in Paris, France) untethered manned air balloon flight that was made by Jean-François Pilâtre de Rozier and François Laurent d'Arlandes in a hot air balloon created in December 1782 by the Montgolfier brothers (Joseph and Etienne). The balloon was launched from the centre of Paris and flew for a period of 20 minutes. This event was the birth of hot air ballooning.

However, it should be mentioned that on the 19th September 1783 Pilâtre De Rozier, a scientist, launched the first hot air balloon called *Aerostat Reveillon*. The passengers were a sheep, a duck and a rooster and the balloon stayed in the air for a grand total of 15 minutes before crashing back to the ground. We can also learn from the Stanojević's book that already in the year to come (1794) there were 52 air balloons flights. Stanojević describes several similar historical events in air ballooning, but also describes physical principles of balloon flights and related notions such as aerostatic buoyancy which enables the flight of air balls, the term Stanojević used for air balloons.

Stanojević obviously wanted with his book to contribute to the scientific enlightening and education of his people, to learn more about then the latest technological achievements. In the case of this book, the focus was on balloons and principles of air ballooning as a part of then the modern scientific progress. The book is written clearly and **it is** easy for reading in spite of many scientific and technical details. There are no graphical illustrations or drawings as in the other Stanojević' books.

### **Incorrect celebration of the Resurrection in the Orthodox Church and the reform of the calendar**

Stanojević wrote this book in the beginning of the XX century and printed it (print shop of Andra Petrović) in 1908 in Belgrade. This book was in fact the first issue of the *Messenger of Serbian Church*. The hard copy of the book can be found in the Library of the Serbian Academy of Sciences and Arts.

This book is also small, it has only 83 pages. It is devoted to the study of the calendar and it points out to some errors found in the calculation of dates that are celebrated by the



Serbian Orthodox Church. Besides, Stanojević discusses the reasons for the reform of the Calendar and proposes how to do that.

The book consists of an introduction and nine chapters. The first six chapters are devoted to the determination of the date of Easter with a detailed historical overview, while the last three chapters are related to the reform of the Julian calendar that was used by the Serbian and other Orthodox churches. He explains that there are the errors and irregularities in the determination of the date of Easter and that they should be corrected. In the Introduction, he says: *It can be said that the preparation and celebration of Easter starts at the beginning of Lent, especially eight days before Easter, Lazarus Saturday. These activities should remind Christians of Christ arrival in Jerusalem, the place of his suffering, death and resurrection.* Stanojević further emphasizes the importance of Easter as the greatest Christian holiday, and compares this holiday with the Solar System: *Easter with their holidays and rituals stands as the Sun stands with its planet system in which all the planets are dependent of it - the Sun. The planets are moving following him while the Sun is steering them.*

Stanojević also writes that in the second half of the second century Christians split into two groups. Some of them celebrate Easter as the Jews, whose Passover falls 14 Nisan of their calendar, and they are called *četnaestnici* (fourteeners) and others, most of the Christians, who celebrate Easter on the first Sunday after that date. Stanojević explained the further history of division related to the date for celebrating Easter. Those who celebrated Easter on the first Sunday after that date but were tied for the week after the full moon after the equinox he called *ravnodnevičari* (equinoxers). The divisions were still occurring. In the fourth century, the Romans took for the beginning of spring and the vernal equinox March 18th, while the Alexandrians, having at that time in Egypt developed astronomy, for the beginning of spring took March 21st.

In more details, originally, the early Christians had followed the Jewish calendar and celebrated the resurrection on the Passover, which was the fourteenth day of Nisan, the first month of the Jewish year (*luna 14*, the fourteenth day of the first lunar month of spring). In time, Easter became separated from the Jewish festival. The Council of Nicaea, convened by Constantine the Great in AD 325, declared that Easter was to be celebrated on the Sunday after Passover, that is, between Nisan fifteen and twenty-first. And, if Easter did fall on the fourteen, even though that day was a Sunday, the Roman church still celebrated the following week, on the twenty-first. Stanojević warns that sometimes incorrectly it is stated that the Council of Nicaea corrected the calendar. The Council had not corrected the calendar, but only at the Council passed the proposal, that all Christians should celebrate Easter on the same day and the Alexandrian Church, which the vernal equinox tied for March 21st, should tell the date of the Easter.

In order to eliminate the errors in the Julian calendar used by the Serbian Church, Stanojević proposed the following three simple rules for reforming this calendar:

- a. The year that is not divisible by 4 is simple (old rule).
- b. The year that is divisible is leap year (old rule).
- c. The year that is divisible by 128 is simple (new rule).

So, in the respect to the year when Stanojević wrote this book, the years 1920, 2048, 2176 will be the first simple years according to the third, new rule.

It should be mentioned that there are other Serbian scientists who also proposed the reform of the Julian calendar which would be then more accurate than the Gregorian calendar. The most notable proposal of the reform is that one by Milutin Milanković. It was accepted in general at the congress of Orthodox churches in Istanbul in 1923. However, it was not accepted by the Serbian Church, this Church is still using the old, Julian calendar. Probably one

reason for non-acceptance is that Milanković' calendar almost coincides with the Gregorian calendar, the first difference will occur in the year 2800.

### Conclusion

We presented four books written by Đorđe Stanojević from the collection of seven books that are digitized and uploaded into the Virtual Library of the Faculty of mathematics in Belgrade (see [9]). The presented books are: *Starry sky of independent Serbia*, *From the science of light*, *Walk through the clouds*, *Incorrect celebration of the Resurrection in the Orthodox Church and the reform of the calendar*. A short biography of this prominent Serbian scientist and engineer is also given. From his work we see that he had broad interest in many branches of science, particularly in physics and astronomy. Some of his books were written in a popular manner with the aim to explain the physical phenomena to the general public. Due to his very good and engaging style of writing, his books should be also interesting to the today's readers.

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### ДИГИТАЛИЗОВАНЕ КЊИГЕ ЂОРЂА СТАНОЈЕВИЋА У ВИРТУЕЛНОЈ БИБЛИОТЕЦИ МАТЕМАТИЧКОГ ФАКУЛТЕТА

Представљамо књиге Ђорђа Станојевића које су дигитализоване и налазе се у Виртуелној библиотеци Математичког факултета Универзитета у Београду. Ђорђе Станојевић био је угледан електроинжењер, физичар и астроном из друге половине XIX и с почетка XX века. Предавао је примењену физику на Великој школи, а по оснивању и на Београдском универзитету. Заслужан је за електрификацију Београда, чиме је Београд постао један од првих градова у Европи осветљен електричном струјом.

Ова дигитална колекција садржи седам књига: *Звездано небо независне Србије*, *Из науке о светлости*, *Шетња по облацима*, *Нетачно празновање Васкрсења у православној цркви и реформа календара*, *Васионска енергија и модерна физика*, *Никола Тесла и његова открића*, *Индустрија хладноће*.

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