

# ŽARKO MIJAJLOVIĆ

## BIOGRAPHY



Žarko Mijajlović was born on July 1<sup>st</sup>, 1948 in Prokuplje, Serbia. In 1971 he completed his undergraduate studies in mathematics at the Faculty of Natural Sciences and Mathematics in Belgrade in 1971 with an average grade of 9.61 (of 10). He received his Master's degree from the same faculty in 1973 with an average grade of 10 upon defending his thesis “Boolean Algebra in Logic” and received his PhD in 1977. The title of the doctoral dissertation is “Contributions to the Theory of Models and Boolean Algebras”. From 1972 to 1979 he worked as an assistant at the Institute of Mathematics of the Faculty of Natural Sciences and Mathematics in Belgrade, from 1979 to 1986 as an assistant professor (Algebra and Model Theory), from 1986 until 1993 as an associate professor for the same subjects and from 1993 until his retirement in 2014, as a full professor for a group of subjects in algebra and logic. He held courses for and postgraduate studies at the universities in Niš, Kragujevac, Podgorica and Novi Pazar. He was elected a full professor at the State University in Novi Pazar in 2014, where he taught for two years until 2016. For one semester each year from 2017 to 2019, he lectured as a visiting professor at the Plekhanov Russian University of Economics (Российского экономического университета имени Г. В. Плеханова) in Moscow, giving courses in mathematical logic with applications in computer science.

He spent study stays at the University of Wisconsin (Madison, USA) at four time periods: first time in the academic year 1973/1974 as a graduate student and recipient of a Fulbright Scholarship, then in 1978 (one semester), 1990 (two weeks) and 1991/1992 (one semester) as a honorary fellow and visiting professor. In 1990 he spent a month at the Courant Institute, New York. On all these occasions he gave one or more lectures on mathematical logic. He also lectured twice as a visiting professor at the Hebrew University (1990 for one semester and one month in 1993). Apart from these universities, he held numerous lectures by invitation: in Warsaw (the University and Mathematical Institute of the Polish Academy of Sciences), Sofia, at the Department of Mathematics of the University of California in San Jose, in Prague, Skopje, Podgorica, Zagreb, Novosibirsk (Institute of Applied Mathematics of the Russian Academy of Sciences) and Irkutsk. He was a member of the American Mathematical Society and the Association for Symbolic Logic until March 24<sup>th</sup>, 1999.

In the period 1988–1991, he served as the head of the Department of Mathematics of the Mathematical Institute of the Serbian Academy of Sciences and Arts (MISANU), then as the head of the Seminar for Mathematical Logic of MISANU (1977–1988), head of the Institute of Mathematics of the Department of Mathematics, Mechanics and Astronomy of the Faculty of Natural Sciences and Mathematics in Belgrade (the present-day Faculty of Mathematics), President of the Scientific Board of the said Department (1987–1989), President of the Scientific Board of the Archaeological Institute in Belgrade (2010–2014), during the 2000s served two terms as the President of the Council for the Scientific Fields of Mathematics and Physics of the University of Belgrade and three terms as a Member of the Council of the University of Belgrade. From 1987 until the breakup of Yugoslavia, he was an expert of the Federal Committee for Science for the evaluation of federal projects in mathematics and computer science. From the beginning of the 1980s until his retirement, he continuously led projects or subprojects of the Ministry of Science. He won the May Day Prize in the late 1960s, the first prize of the Balkan Union of Mathematicians in the mid-1970s, and received a Fulbright Scholarship on two occasions (1973 and 1990). He is also the recipient of the 2021 MISANU Award.

Since 1983 he has been a member of the editorial board of the leading Serbian mathematical journal *Publications de l'Institut Mathématique* and its editor-in-chief from 2005 to 2012. During his editorial term of service, in 2011, this journal entered the SCI list. In 2002, he founded the journal *NCD Review*, published by the Faculty of Mathematics, University of Belgrade, and served as its editor-in-chief from 2002 to 2014. He founded the Virtual Library of the Faculty of Mathematics (<http://elibrary.matf.bg.ac.rs/>) which contains nearly 5000 bibliographic units and practically all doctoral dissertations of Serbian mathematicians, starting with the first one, by Dimitrij Danić, defended in 1885 at the University of Jena (Germany).

He has mentored 16 doctoral dissertations and approximately the same number of master's theses in mathematics and computer science.

### **Scientific work**

Žarko Mijajlović has published over 160 scientific papers and six books (three university textbooks and three monographs), three as author, and three as co-author. He has written papers in several scientific fields: mathematical logic (mainly on model theory), algebra (mainly on the theory of Boolean algebras), astronomy (mainly on cosmology), theoretical computing, but also in the field of history and philosophy of mathematics and other areas of mathematics. Here are some of his main results that are recognized in the mathematical literature worldwide.

In the theory of Boolean algebras (during the seventies of the twentieth century): He was the first to apply Vaught's theorem in solving Boolean equations. A whole chapter in the monograph by S. Rudeana (see bibliography) is dedicated to this method. Other mathematicians (especially D. Banković) applied and further developed the method in a series of papers. He also proved that the saturated Boolean algebras are exactly the algebras that contain Parovichenkov's spaces as dual spaces. These results are also presented in other monographs on the theory of Boolean algebras (J. Monk, G. H. Miller, H. Draskoviceva et al, see bibliography).

In the theory of non-standard models of arithmetic, he was the first, or at about the same time as C. Smorunski (1980s), to prove that non-standard models of arithmetic are partially recursively saturated. This result is considered very significant due to its application in the study of the structure of non-standard arithmetic models, and as such is considered one of the most significant results in this field in the 1980s (see Ali Enauat, *Self-Embeddings: from Vaught to Tanaka*, *32ème Journées sur les Arithmétiques Faibles*, 2012, 2013, also P. Hauek, P. Pudlak 1993, see bibliography).

Applying the theory of finite fields (during the nineties of the last century), he made an important contribution to the development of the procedure for numerical verification of the famous Kurepa hypothesis on the left factorial and similar hypotheses from the theory of numbers. This method was further used and developed by several of our mathematicians (G. Gogić, M. Živković, A. Petojević, B. Malešević and others). The result is presented in the monographs by R. Guu and Jean-Marie De Koninck, Arnel Mercier (see bibliography).

By applying the methods of the model theory of differential fields, he introduced (first decade of this century) a criterion which determines the differential transcendence of important functions such as the Riemann zeta-function. Particularly notable is the application of this method by Serbian mathematician B. Malešević, but also by several foreign mathematicians (H. Alzer, H. Nagoshi, C. G. Raab and others).

He was the first to apply Karamata theory of regularly varying functions (in the second decade of this century) in the analysis of Friedman's equations that describe the evolution of cosmological parameters. Namely, starting from the theory developed by the Serbian mathematician and academician Vojislav Marić, referring to the application of regularly varying functions to solving and analyzing ordinary linear differential equations of the second order, Mijajlović obtained well-known solutions to this famous equation, but also refinements of these solutions that can serve as the basis for explaining certain cosmological phenomena. He published these results in reputable international and domestic journals and in cooperation with several of our astronomers and mathematicians (N. Pejović, S. Šegan, V. Marić). One of the world's leading astrophysicists and cosmologists, John Barrow, likewise showed interest in these results in personal correspondence.

## Žarko Mijajlović: Bibliography

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### Abbreviations

**Publ. Inst. Math. Belgrade:** Publications de IŠInstitut Mathématique Belgrade, Publisher: Mathematical Institute SASA (Matematički institut SANU), ISSN: 0350-1302

**NCD Review:** Review of the National Center for Digitization (Pregled Nacionalnog centra za digitalizaciju, SEEDI Communication) ISSN: 1820-0109

**VB:** Virtual Library of Faculty of Mathematics, Belgrade, <http://elibrary.matf.bg.ac.rs>.

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### 3 Books

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98. Ž. Mijajlović, *An introduction to model theory*, Univ. of Novi Sad, 1987, (monography, VB)
99. Ž. Mijajlović, N. Božović, *Uvod u teoriju grupa*, "Naučna knjiga", Beograd, 1990. (University textbook, VB)
100. Ž. Mijajlović, *Algebra 1* (University textbook, VB)
101. Z. Petrović, Ž. Mijajlović, *Matematička logika - elementi teorije skupova*, Zavod za udžbenike, Beograd, 199 str., 2012. (University textbook)

102. Ž. Mijajlović, D. Arandelović, M. Rašković, R. Đorđević, *Nestandardna analiza*, Matematički fakultet, Univ. u Beogradu, 336 str. 2014. (Napisao uvod i osam poglavlja), (Monography).

## 4 Editor

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104. *Sabrana dela Bogdana Gavrilovića*, t. I-V, priredio Ž. Mijajlović, Matematički institut SANU, 1997. (VB)
105. *Collected Works of Dušan Adamović*, priredili Ž. Mijajlović i S. Knjazev, Matematički fakultet u Beogradu, 2009. (elektronsko izdanje, VB)
106. *Selected papers of Đuro Kurepa*, A. Ivić, Z. and Mamuzić, Ž. and Mijajlović (main editor) and S. Todorčević Mathematical Institute SASA, Belgrade, Serbia, 1996. (VB, ISBN 86-80593-21-4)
107. Mihailo Petrović – sabrana dela I-XV, Zavod za udžbnike, Beograd, 1999. Priredio knj. IV, Algebra, 285p. ISBN 13: 9788617065117
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110. *Mihailo Petrović Alas – rodonačelnik srpske matematičke škole*, Katalog izložbe (maj-jun 2018) povodom 150 godina od rođenja (Serbian ed.), *Mihailo Petrović Alas – The Founding Father of thr Serbian School of Mathematics* (English ed.), Exhibition catalog on the occasion of the 150th anniversary of his birth, Editor: Ž. Mijajlović, Srpska akademija nauka i umetnosti, 147 p., Beograd, 2018. (ISBN 978-86-7025-768-9)
111. *Mihailo Petrović Alas – divot, delo, vreme*, povodom 150 godina od rođenja (Serbian ed.), *Mihailo Petrović Alas – Life, Work, Times*, (English ed.), Editors: S. Pilipović, G. Milovanović, Ž. Mijajlović, Srpska akademija nauka i umetnosti, 375 p., Beograd, 2019. (ISBN 798-86-7025-808-2)
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## 5 Biographical papers

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115. Ž. Mijajlović, *On the scientific work of Slaviša B. Prešić*, A tribute to S. B. Prešić – Papers celebrating his 65th birthday, Mathematical Institute SASA, Belgrade, 9-14, 2001. (Invited lecture, Math-History, VB)
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117. N. Pejović, S. Malkov, N. Mitić, Ž Mijajlović *Milutin Milanković digital legacy* Proc. IX Bulgarian-Serbian astronomical conference: astroinformatics, Sofia, Bulgaria, july 2-4, 2014, Publ. Astron. Soc. "Rudjer Bošković, 15, 179-185, 2014. (VB)
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121. Ž. Mijajlović, in [110]: *Biography of Mihailo Petrović Alas*, 11-28, *A chronology of important events 1868-1943*, 131-136, *Mathematical genealogical tree of Mihailo Petrović*, 137-143.
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## 6 History and Philosophy of mathematics

124. Ž. Mijajlović, *Reč-dve o otklonjivosti nekih pretpostavki u dokazima*, u knj. "problem postojanja u matematici", edicija "Matematički vidici", Matematički institut SANU, 31–36, 1979. (Math - Philosophy, VB)

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145. Ž. Mijajlović et al., *Logic in Serbia in Logic in Central and Eastern Europe*, ed. A. Schumann, University Press of America, 2013. (Math-History, ISBN 978-0-7618-5891-1, <https://rowman.com/ISBN/9780761858911>)



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155. Ž. Mijajlović, Ž. N. Pejović, *Digitization of the book "Principles of physics" of Vuk Marinković*, NCD Review 31, 25-29, 2017.
156. N. Pejović, Ž. Mijajlović, *O jednom prilogu Mihaila Petrovića Alasa astronomiji*, Proc. Conf. Development of astronomy among Serbs X Belgrade, April 22-26, 2019 Publ. Astron. Soc "Rudjer Bošković", 19, 331-343, 2019. VB
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158. Ž. Mijajlović *Review of the book "Mihailo Petrović Alas - Life, Work, Times"*, Flogiston (ISSN 2620-1720), 28, 403-410, SANU, 1920. (Math - History)
159. Ž. Mijajlović, N. Pejović, *Saturn - a Serbian journal on astronomy from the past*, Publ. Astron. Obs. Belgrade No. 100, 301-305, 2021. (Astronomy - History)
160. N. Pejović, Ž. Mijajlović, *Digitized works of professor Dragomir Simeunović* NCD Review 38, 40-47, 2021.

## 7 Preprints

1. Ž. Mijajlović, M. Milošević, A. Perović, *A Method of Generating Sums of Like Powers*, 1-5, 2005. (Math-NumberTheory, ArXiv preprint math/0511393)
2. Ž. Mijajlović, M. Milošević, A. Perović, *Some Properties of Posynomial Rings*, 1-11, 2005. (Math-Algebra, ArXiv preprint math/0506530)
3. Ž. Mijajlović, A. Pejović, *Computing finite models using free Boolean generators*, 1-20, 2013. (CompSci, Math-Logic, ArXiv:1310.6978)
4. Ž. Mijajlovic, D. Brankovic, *On algebraic dependence of cosmological parameters*, Authorea Preprints, 2020, 16 pages,  
<https://www.authorea.com/users/315216/articles/445583-on-algebraic-dependence-of-cosmological-parameters>

## 8 Extended abstracts, Short articles (selection)

1. On elementary end extension, Jour. of Symbolic Logic, Vol. 44, No. 3, 1979, 452-453.
2. Saturated Boolean algebras, Abstracts, 6th. Int. Congress of Logic, Methodology and Philosophy of Science, Hanover 1979, 124-126.
3. Partial saturation of nonstandard models of arithmetic, Jour. of Symb. Logic, Vol. 48, No. 4, 1983, 1212-1213.
4. Model-theoretic properties of Parovicenko space, Jour. of Symb. Logic, Vol. 49, No. 2, 1984, 697-698.
5. Definable points in models of Peano arithmetic, Jour. of Symb. Logic, Vol. 50, No. 1, 1985, 271-271.
6. On the number of  $\omega_1$  - like extensions of countable models of PA, Jour. of Symb. Logic, Vol. 52, No. 4, 1074-1074.
7. The reducibility of  $L(Q)$  to  $PR_1$ , Jour. of Symb. Logic, Vol. 52, No. 1, 1987, 332-332.

8. Restricted generalized quantifiers, Jour. of Symb. Logic, Vol. 54. No. 2, 1989, 664-664.

## 9 Conferences (selection)

Attended about one hundred conferences. Organized about 15 conferences and was in the organizing boards of the same number of scientific meetings.

### **International Conferences, Lectures:**

1. Congress of Balkan's Mathematicians, Belgrade 1974.
2. Congress of Balkan's Mathematicians, Varna (Bulgaria), 1977.
3. Logic Colloquium '77, Wroclaw 1977.
4. Symposium: Set theory. Foundation of Mathematics, Belgrade 1977.
5. 6th International Congress of Logic, Methodology, and Philosophy of Science, Hannover 1979.
6. The Conference of laureates of the Balkan Union of mathematicians, Sofia, 1977 (First prize).
7. Summer Conference of Association for Symbolic Logic, Patras 1980.
8. Logic Colloquium '81, Marseille 1981.
9. Logic Colloquium '82, Firenze 1982.
10. Logic Colloquium '83, Aachen 1983.
11. Logic Colloquium '85, Paris 1985.
12. Symposium on Nonstandard Analysis, Hull (England) 1986.
13. Logic Colloquium '86, Hull (England), 1986.
14. Symposium on Model Theory and Set Theory, Jachranka (Poland) 1987.
15. Logic Colloquium '87, Granada (Spain), 1987.
16. Hebrew University, Jerusalem, Israel, 1990.
17. "Quantifiers", Chlewiska, Poland, 1991.
18. Southern Wisconsin Logic Colloquium 1991, SAD, 1991.
19. San Jose University, San Jose, USA, 1991.
20. Warsaw, Poland, "Second order logic", 1994.

21. Joint meeting of American Mathematical Society and Israel Mathematical Union, May 23-26, Jerusalem, 1995
22. Intelligent systems, MGU, Moscow, 1996.
23. "International mathematical symposium dedicated to the memory of Djuro Kurepa", Faculty of Mathematics, Belgrade, 1996.
24. Inst. Math., Univ. "Lajos Koshut", Debrecen, (Hungary), 1997.
25. Workshop on Philosophy of Mathematics and Science, CEU, Budapest, 1998.
26. 1st Balkan workshop on industrial mat., Aristotle Univ. of Thessaloniki, Thessaloniki, Greece, 1998.
27. 2st Balkan workshop on industrial mat, Aristotle Univ. of Thessaloniki, Thessaloniki, Greece, 1999
28. Inst. of Informatics, Univ. of Skopje, 2000.
29. Workshop "Multiscale approximations (wavelets, splines, RBF) and applications to Image and Signal Processing" accompanying CFT 2002, Varna (Bulgaria), 2002
30. International Congress MASSEE 2003, Borovets (Bulgaria) 2003. Yugoslav Mathematical Conferences:
31. Ž. Mijajlović, *A survey of digitization projects carried out by Mathematical Institute and Faculty of Mathematics Belgrade*, International Congress MASSEE, 2003, (<http://atlas-conferences.com/cgi-bin/abstract/cakq-31>)

#### **National conferences**

1. Natural languages and Mathematical Logic, Partizanske vode 1979.
2. I Conference in Algebra, Skopje 1980
3. Kongres matematičara, fizičara i astronoma Jugoslavije (Congress of Yugoslav mathematicians, physicists and astronomers), Budva 1980.
4. II Conference in Algebra, Novi Sad 1981.
5. III Conference in Algebra, Belgrade 1982.
6. IV Conference in Algebra, Zagreb 1984.
7. V Conference in Algebra, Cetinje 1986
8. I Yugoslav Seminar for Logic and Computer Science, Novi Sad 1987.
9. II Yugoslav Seminar for Logic and Computer Science, Ohrid (Macedonia) 1988.

10. III Yugoslav Seminar for Logic and Computer Science, Kragujevac 1989.
11. International Conference in Algebra, Logic and Discrete Mathematics, Niš 1995.
12. 2nd Mathematical conference in Priština, Priština, 1996.
13. Yugoslav Conference on Algebra and Logic, Novi Sad, 1998.
14. Symposium dedicated to the scientific work of Slaviša Prešić, Belgrade, 1998.
15. Kongres matematičara Jugoslavije (Congress of Yugoslav mathematicians), Beograd 2000.
16. I National symposium on digitization, Mathematical faculty, Belgrade 2002.
17. Annual meeting of the Serbian mathematical society, NiŽ 2003.
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2. "Old maps, engravings and photographs - collection of the City Museum of Belgrade", private edition, editor in chief, 1997.
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4. Memorial CD on the occasion of 125 anniversary of the Mathematical faculty, editor in chief, 1999.
5. Memorial CD on the occasion of 130 anniversary of the Mathematical faculty, editor in chief, 2005.

## 11 Software

1. Information system of the Mathematical institute in Belgrade (used since 1990).
2. Software for evaluation of scientific projects of the Ministry of Science of Serbia (used 1990-1996).

## 12 Citation (selection)

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10. Paper [22]: Jean-Marie De Koninck, Armel Mercier, *1001 Problems in Classical Number Theory*, MAS (American Math. Soc), 2004,
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Aleksandar Jovanović (1982 komentor prof. Slaviša Prešić), *Prilog teoriji ultra-proizvoda*, Matematički fakultet u Beogradu.

Slobodan Vujošević (1982), *Prilog teoriji Heytingovih algebri*, Matematički fakultet u Beogradu.

Miodrag Rašković (1983), *Logike sa merom u Lajbnicovom univerzumu*, Matematički fakultet u Beogradu.

Rade Živaljević (1983, komentor prof. Dragoljub Arandelović), *Deset etida o hiperkonaènom*, Matematički fakultet u Beogradu.

Milan Grulović (1984), *Forsing u teoriji modela*, Matematički fakultet u Beogradu.

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