



RADE ŽIVALJEVIĆ

Elected a full member of SANS on April 12, 2023.

Rade Živaljević was born on October 12, 1954 in Sarajevo. He obtained a Ph.D. degree from the University of Belgrade in 1983. The second Ph.D. degree thesis was defended at the University of Wisconsin-Madison in 1985. He has been a member of the Mathematical Institute of the Serbian Academy of Sciences and Arts (SASA) since 1977, where he was appointed as a full research professor in 1995. He has been also ranked as a full professor at the University of Belgrade (Faculty of Physics) in 2008. R. Živaljević was in 1995 awarded (together with Siniša Vrećica) the City of Belgrade Award for the solution of the “Colored Tverberg’s Problem”. This award was at the time in Serbia the highest award for scientific research and other achievements.

Fields of Research: The main contributions of Rade Živaljević are in the areas of topological and geometric combinatorics, discrete and computational geometry, and applied algebraic topology. He has also published papers in mathematical logic (non-standard analysis), polyhedral combinatorics, cooperative game theory, teaching of mathematics, etc.

Publications: Rade Živaljević is the author of 76 research papers and numerous review and expository publications. Among the research publications are papers published in highly ranked international mathematical journals which include *Advances in Mathematics*, *Mathematische Annalen*, *J. Reine Angew. Math.*, *Trans. Amer. Math. Soc.*, *J. London Math. Soc.*, *Combinatorica*, *Izvestiya RAN: Mathematics*, etc.

Selected Results: The main contributions may be classified in three thematic circles: Homotopy colimits and the Ziegler-Živaljević-formulae; Configuration space-test map-scheme with applications in discrete and computational topology; Homotopic and cohomological methods in topological combinatorics.

The Ziegler-Živaljević-formulae for the arrangements of subspaces (see representative publications [1] and [5]) appeared in the official 2001 DFG-press release [ZieglerZivaljevic-Formeln](#) as one of the two key achievements, illustrating the contributions of Günter Ziegler, as a recipient of the Leibniz Prize (Germany's highest research honor). The solution of the “Colored Tverberg’s Problem” and the introduction of “chessboard complexes”, as new configuration spaces (see representative papers [2] and [4]), paved the way for the solution of the “point selection problem“, „weak ε -net problem“, „hitting set problem“, „halving hyperplanes problem“, and „ k -set problem“ by N. Alon, I. Bárány, Z. Füredi, D. Kleitman, and L. Lovász. R. Živaljević was one of pioneers in the development of the „configuration space/test map scheme“ (see [3], [Guide I](#) and [Guide II](#)), as a general method (proof scheme) for applying topological methods in combinatorics and discrete geometry, see also <https://www.msri.org/programs/309>, for more recent developments.

Selected Conferences, Lectures and Citations: Following *Google Scholar* (as of May 1, 2023) the papers of Dr Živaljević have 1811 citations, the h-factor is 20 and the i10-index is 37. He was an invited speaker at numerous conferences, seminars and schools, including the following: Steklov Inst., Moscow, 2022, 2021, 2018, etc.; Okayama (Japan) 2019, St. Petersburg 2022, 2018; Applied Topology in Bedlewo (Poland) 2017, 2013; Princeton Algebraic Topology Seminar (March 2023, October 2016), M.I.T. Topology Seminar (October, 2016); Oberwolfach 2015; Applied Algebraic Topology, Castro Urdiales 2014; Jerusalem, 2007; Berkeley (MSRI), 2006; Manchester, 2003; Jerusalem (Midrasha Mathematicae), 2003; etc. Longer visits include: Univ. of Illinois (Urbana-Champaign), Konrad Zuse Zentrum, Berlin; Mittag-Leffler Institut, Stockholm; Math. Institut Bern, University of Wisconsin-Madison, etc.

Academic Mentorship: R. Živaljević was a mentor for 7 PhD degree theses, defended at the University of Belgrade (P. Blagojević, V. Grujić, D. Jojić, Đ. Baralić, Ž. Kovijanić, M. Muzika Dizdarević, M. Timotijević) and two international PhD degree internship programs (S. Hell, TU Berlin, L. Vicente Mauri, Univ. of Sao Paulo).

Projects and Other (Selected) Academic Responsibilities: R. Živaljević is the founder (with Vladimir Dragović) of the Center for Dynamical Systems, Geometry and Combinatorics [DSGC-synergy](#) (Mathematical Institute SASA). He was a coorganizer of a [thematic semester](#) „Topology in Motion“, [ICERM](#), Brown University 2016, and the head of the project [ЖИВА МАТЕМАТИКА](#), for popularization of science and introducing students into research of mathematics. He was an invited speaker at the summer school [school](#) "Contemporary Mathematics" ([Dubna](#), Russia, 2018).

Contribution to Non-linear Sciences: [Algebraic Topology](#) is by default a non-linear science. Rade Živaljević and Siniša Vrećica were the pioneers of algebraic topology in Serbia, when they included this discipline (in the late eighties of the XX century) into the program of the newly founded Geometry – Topology – Algebra seminar (GTA). Early participants included A. Vučić and Z. Petrović, and somewhat later V. Grujić, P. Blagojević and others. „Topological Methods in Nonlinear Analysis“ (TMNA) <https://www.tmna.ncu.pl/>, is a journal published by the *Juliusz P. Schauder Center for Nonlinear Studies* [Juliusz Schauder Center](#) (Nicolaus Copernicus University in Toruń). Dr Živaljević has published four papers in this journal, applying topological methods to different problems, from discrete and computational geometry to mathematical economics

Five representative publications:

- [1] G. Ziegler, R. Živaljević, Homotopy types of subspace arrangements via diagrams of spaces, *Mathematische Annalen*, 295:527-548, 1993.
- [2] R. Živaljević, S. Vrećica, The colored Tverberg's problem and complexes of injective functions, *J. Combin. Theory, Ser. A* 61 (2), 1992, 309-318.
- [3] R.T. Živaljević. Topological methods in discrete geometry. Chapter 21 in Handbook of Discrete and Computational Geometry (Third Edition), J.E. Goodman, J. O'Rourke, C.D. Tóth eds, CRC Press LLC. Preliminary version (2017).
- [4] A. Björner, L. Lovász, S. Vrećica, and R. Živaljević, Chessboard and matching complexes, *J. London Math. Soc.* (2), 49:25-39, 1994.
- [5] V. Welker, G. Ziegler, R. Živaljević, Homotopy colimits - comparison lemmas for combinatorial applications, *J. Reine Angew. Math.*, 509 (1999), 117-149.