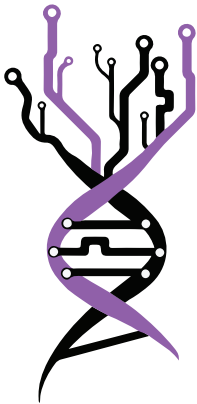


#BelBi2023 • Belgrade, Serbia

BOOK OF ABSTRACTS



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Dr. Ivana Morić

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FOREWORD

Dear colleagues and friends,

The 4th Belgrade Bioinformatics Conference - BelBi2023, where many high-quality scientific contributions were presented, has just ended. With great thanks to all participants, we now proudly present a book of abstracts that both reflects the scientific abundance and diversity of the conference and serves as a reminder of a memorable event.

Several research institutions, faculties, and scientific societies from Serbia joined forces in organizing this international conference, which covered numerous topics in computational biology, bioinformatics, and biomedical and health informatics. The main goal of BelBi2023 was to foster contact between scientists, both early stage career and senior researchers, allowing them to share experiences and latest advances in their fields. We sincerely hope that BelBi2023 has served as a platform for researchers from around the world to meet, initiate new collaborations, and expand professional contacts, and that all of you would become a part of the growing BelBi community.

We are grateful and proud to have welcomed more than 250 researchers from 21 countries. We have had 28 scientific sessions, consisting of more than 60 lectures (including eight Keynote talks), 47 presented posters, as well as three workshops and one satellite event – COST action. We have also organized seven industry lectures, including the NGS Challenge,

two Meet the Expert Sessions, and one Business Coffee Break where ten start-up companies took part. And finally, the future BIO4 campus was presented and first panel on Serbia's resources for storage and analyses of genetic data was organized.

We would like to thank all the members of the International Advisory Board and the International Program Committee for their efforts and help in making this event a success. We are very grateful to the Ministry of Science, Technological Development and Innovation of the Republic of Serbia, SAIGE project, and UNDP-Serbia for their support. Finally, the Local Organizing Committee is very grateful to all the sponsors of the conference - BGI, Illumina & Elta'90MS, PacBio & East Diagnostics, ThermoFisher Scientific & Vivogen, Huawei, Labena, DSP Chromatography, RNIDS, Telekom Srbija, Alfa Genetics, Kefo and Superlab, hoping that they will stay with us for many years to come.

Looking forward to seeing you again at the 5th Belgrade Bioinformatics Conference.

Belgrade, July 2023

*Dr. Valentina Đorđević
& Dr. Ivana Morić,*
On behalf of BelBi2023
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**Machine intelligence and network science for complex systems
big data analysis**

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I will present our research at the Center for Complex Network Intelligence (CCNI) that I recently established in the Tsinghua Laboratory of Brain and Intelligence at the Tsinghua University in Beijing. We adopt a transdisciplinary approach integrating information theory, machine learning and network science to investigate the physics of adaptive complex networked systems at different scales, from molecules to ecological and social systems, with a particular attention to biology and medicine, and a new emerging interest for the analysis of complex big data in social and economic science.

Our theoretical effort is to translate advanced mathematical paradigms typically adopted in theoretical physics (such as topology, network and manifold theory) to characterize many-body interactions in complex systems. We apply the theoretical frameworks we invent in the mission to develop computational tools for machine intelligent systems and network analysis. We deal with: prediction of wiring in networks, sparse deep learning, network geometry and multiscale-combinatorial marker design for quantification of topological modifications in complex networks. This talk will focus on two main theoretical innovation. Firstly, the development of machine learning and computational solutions for network geometry, topological estimation of nonlinear relations in high-dimensional data (or in complex networks) and its relevance for applications in big data, with a emphasis on brain connectome analysis. Secondly, we will discuss the Local Community Paradigm (LCP) and its recent extension to the Cannistraci-Hebb network automata, which are brain-inspired theories proposed to model local-topology-dependent link-growth in complex networks and therefore are useful to devise topological methods for link prediction in sparse deep learning, or monopartite and bipartite networks, such as molecular drug-target interactions and product-consumer networks.

Keywords: Network topology and geometry, network automata, network biology, network neuroscience, artificial intelligence.

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