


## Research interests:

area: | description:

- Network science: spreading processes, non-poissonian spreading, SI model, community structure, temporal networks, bursty temporal patterns, large networks simulations;
- Cayley graphs: symmetric group, permutations, Pancake graph, Star graph, structure of cycles, characterization of cycles, Hamiltonicity problem, prefix-reversal Gray codes, spectral characteristics;
- Stochastic processes: branching processes, non-Poisson processes, contact process with power-law distributed inter-event time, percolation, first passage percolation, locally tree-like graphs

## Education:

date: | university:

- 2016  Ph.D. (magna cum laude), Central European University, Budapest, Hungary  
Doctor candidate (~ Ph.D.), Sobolev Institute of Mathematics, Novosibirsk, Russia
- 2012 ● M.Sc., Novosibirsk State University, Novosibirsk, Russia  
thesis title: On the cyclic structure of the Pancake graph  
supervisor: Elena Konstantinova, Ph.D.
- 2010 ● B.Sc., Novosibirsk State University, Novosibirsk, Russia  
thesis title: Characterisation of cycles of length seven in the Pancake graph  
supervisor: Elena Konstantinova, Ph.D.

## PhD thesis:

- title: «The role of the topology in non-Poissonian spreading dynamics on temporal networks»  
supervisors: Janos Kertesz, Ph.D. (BME; Center of Network Science, CEU, Budapest), Gabor Pete, Ph.D. (BME; Renyi Institute, Budapest)  
received: June, 2016  
«In current thesis we study the SI spreading model on graphs with transmission times following power-law distribution with infinite mean. We derive the results both for deterministic graphs and for specific models of random graphs. We study how the introduction of one extra edge to a tree severely accelerates SI spreading on it. Empirically we study how the introduction of bridges influences the speed of the SI spreading on the real Big Dataset of mobile phone calls. It turns out that the key factor governing the spreading speed is average degree and the introduction of topological bridges boosts the spreading. The observed phenomena is replicated on a network null model.»
- title: «Analysis of the structure of cycles in some families of Cayley graphs on symmetric group»  
supervisor: Elena Konstantinova, Ph.D. (NSU; Sobolev Institute of Mathematics, Novosibirsk)  
received: September, 2016  
«In current dissertation we propose the approach for describing all small cycles in Pancake graphs, which are Cayley graphs on symmetric group generated by prefix-reversals, and apply this approach on Star graphs, which are Cayley graphs on the same group generated by prefix-transpositions. We show the existence of families of maximal cycle covers in these graphs and introduce a new concept of Hamiltonian cycles, which is directly related to Prefix-Reversal Gray Codes. Finally, we study the distribution of cycles of length  $O(n)$  in the Star graph using the shortest-path routing algorithm, which can be used further for studying the First Passage Percolation problem on Star graphs.»



## Awards and scholarships:

date: | award:

- 2017 ↑ co-Author of one of the outstanding results of Sobolev Institute of Mathematics of Siberian Branch of Russian Academy of Sciences
- 2013 ● Full Doctoral Scholarship, 3 years, Central European University  
tuition fee waiver: 10000 € / year  
stipend: 220000 HUF / month
- 2012 Prize honored in the name of A.A.Lyapunov  
amount: 5000 RUR  
awarded to 2 students out of ~ 100
- 2011 ● Stipend honored in the name of A.A.Lyapunov  
amount: 30000 RUR / year  
awarded to 2 students out of ~ 500



## Experience:

area: | experience:

- Courses: | Groups, graphs and their limits (Miklos Abert, Renyi Institute);  
Random graphs (Bela Bollobas, University of Cambridge, University of Memphis);  
Stochastic processes (Gabor Pete, BME, Renyi Institute).
- Research: | visiting researcher, Aalto university, Espoo, Finland  
year of visit: 2015  
hosting professor: Kimmo Kaski, D.Phil.  
  
visiting researcher, University of Primorska, Koper, Slovenia  
year of visit: 2015  
hosting professor: Klavdija Kutnar, Ph.D.
- Teaching: | private teacher, Probability theory, Statistics & Operations Research;  
exchange student's tutor, Department of Mathematics, CEU;  
assistant on lecture course «Combinatorial problems on Cayley graphs», NSU;



## Grants participation:

- Grant 16-01-00499 of the Russian Foundation of Basic Research  
duration: 2016-2018  
awarded to 251 out of ~ 1000 applications
- Grant 15-01-05867 of the Russian Foundation of Basic Research  
duration: 2015-2017  
awarded to 259 out of ~ 1000 applications
- Grant NSh-1939.2014.1 President of Russia for Leading Scientific Schools  
duration: 2014-2016  
awarded to 400 out of ~ 1500 applications
- Interdisciplinary Integration Project of SB RAS N.21 under the title «Investigation of regularities and trends of self-organizing systems on the examples of the Web space and biological communities»  
duration: 2012-2014  
funding: ~ 3.000.000 RUR / year
- Grant 12-01-00448 of the Russian Foundation of Basic Research  
duration: 2012-2014

## Publications:

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- A.N. Medvedev, J.C. Delvenne, R. Lambiotte, *Modelling structure and predicting dynamics of discussion threads in online boards*, arXiv:1801.10082, 2018
- M. Dehmer, A.A. Dobrynin, O.A. Klimenko, E.V. Konstantinova, A.N. Medvedev, E.V. Rychkova, Yu.I. Shokin, A.Yu. Vesnin, *Analysis of Webspaces of the Siberian Branch of Russian Academy of Sciences and Fraunhofer-Gesellschaft*, to appear in Information Technology in Industry, 2018
- A. Medvedev, G. Pete, *Speeding up non-Markovian First Passage Percolation with a single extra edge*, arXiv:1708.09652, 2017
- A. Medvedev, J. Kertesz, *Empirical study of the role of the topology in spreading on communication networks*, Physica A: Statistical Mechanics and its Applications, Vol. 470, 2017
- A. Medvedev, *The number of small cycles in the Star graph*, Siberian Electronic Mathematical Reports, Vol.13, 2016
- E. Konstantinova, A. Medvedev, *Independent even cycles in the Pancake graph and greedy Prefix-reversal Gray codes*, Graphs and Combinatorics, Vol.32, I.5, 2016
- E. Konstantinova, A. Medvedev, *Small cycles in the Pancake graph*, Ars Mathematica Contemporanea, Vol.7, I.1, 2014
- E. Konstantinova, A. Medvedev, *Small cycles in the Star graph*, Siberian Electronic Mathematical Reports, Vol.11, 2013
- E. Konstantinova, A. Medvedev, *Cycles of length nine in the Pancake graph (in Russian)*, Discrete Analysis and Operations Research, Vol.18, I.6, 2011
- E. Konstantinova, A. Medvedev, *Cycles of length seven in the Pancake graph (in Russian)*, Discrete Analysis and Operations Research, Vol.17, I.5, 2010

## Computer skills:

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### Science:

C++ ●●●●●

Boost ●●●●●

Java ●●●●●

Python ●●●●○

Matlab ●●●●○

Latex ●●●●○

### Design:

HTML ●●●●○

CSS ●●●○○

InDesign ●●●●○

Illustrator ●●●●○

Premiere ●●●●●

After Effects ●●●●●

## Languages:

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