TAMÁS RÓBERT MEZEI

Mathematician

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🌐trm.hu 🎓Google Scholar 📅Oct 26, 1989

EXPERIENCE

Assistant research fellow – pre- & post-doc
Alfréd Rényi Institue of Mathematics

📅 Sep 2016 – Aug 2019   📍 Budapest, Hungary

Visiting researcher
Notre Dame University

📅 July 2019   📍 USA

Studied network growth & dynamics with Prof. Zoltán Toroczkai

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Visiting researcher
Western Sydney University

📅 Sep 2019 – Oct 2019   📍 Australia

Studied phylogenetic networks with Prof. Andrew Francis

Research fellow – Young researcher grant
Alfréd Rényi Institue of Mathematics

📅 Sep 2019 – Sep 2023   📍 Budapest, Hungary

Worked on the following topics & grants
- Traditional & non-trad. methods in extremal combinatorics
- Synthetic networks
- Modern extremal combinatorial problems
- Graph theory & combinatorial scientific computing
- Clustering in wireless networks (industry collaboration)

EDUCATION

Ph.D. in Mathematics & its applications
Central European University (Budapest)

📅 Sep 2013 – Nov 2017   🔤 English language program

Ph.D. thesis title: Extremal solutions to some art gallery and terminal-pairability problems
Supervisor: Prof. Ervin Győri

B.Sc. & M.Sc. in Mathematics
Eötvös Loránd University (Budapest)

📅 Sep 2008 – Jul 2011 & Sep 2011 – Jul 2013

B.Sc. thesis title: Combinatorial Nullstellensätze
M.Sc. thesis title: Seating couples and Tic-Tac-Toe

MOST PROUD OF

🏆 **Academic Youth Award**
Awarded by the Hungarian Academy of Sciences to recognise outstanding scientific achievements. Received in Feb 2022.

📄 **Co-authored 20 scientific papers**
Contributed to a broad range of topics, including (extremal) graph theory, computational geometry, network theory, and bioinformatics.

👥 **Multiple finalist in Challenge 24**
24 hour programming contest between teams of 3. Organised by the Budapest University of Technology (BME). Finalist in 2010 and in 2014.

STRENGTHS

Combinatorics · Algorithm design · Theory building · Scientific writing

Mental stamina · Team player · Interdisciplinary experience

COMPUTER SKILLS

Julia · LaTeX · Vim · Git · C++

Self-hosting · Linux · Postfix · Nginx · Gitea · QEMU · Matrix/Element

LANGUAGES

English
TOEFL iBT, Score 109/120
September 2012
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German
ÖSD B2 (Mittelstufe)
June 2007
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Hungarian
native
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HOBBIES

Road cycling · Cooking · Reading · DIY · Home improvement · Enamel arts

SELECTED PUBLICATIONS

[1] P. L. Erdős, G. Harcos, S. R. Kharel, P. Maga, T. R. Mezei, and Z. Toroczkai, "The sequence of prime gaps is graphic," *Mathematische Annalen*, Feb. 6, 2023.

[2] P. L. Erdős and T. R. Mezei, "Minimizing interference-to-signal ratios in multi-cell telecommunication networks," *Algorithms*, vol. 16, no. 7, p. 341, Jul. 2023, Number: 7 Publisher: Multidisciplinary Digital Publishing Institute.

[3] T. R. Mezei, "Covering simple orthogonal polygons with r-stars," *arXiv*, no. 2304.13699, Apr. 26, 2023.

[4] P. L. Erdős, C. Greenhill, T. R. Mezei, I. Miklós, D. Soltész, and L. Soukup, "The mixing time of switch markov chains: A unified approach," *European Journal of Combinatorics*, vol. 99, pp. 99–146, Jan. 1, 2022.

[5] S. R. Kharel, T. R. Mezei, S. Chung, P. L. Erdős, and Z. Toroczkai, "Degree-preserving network growth," *Nature Physics*, vol. 18, no. 1, pp. 100–106, Jan. 2022, Number: 1 Publisher: Nature Publishing Group.

[6] E. Győri and T. R. Mezei, "Mobile versus point guards," *Discrete & Computational Geometry*, vol. 61, no. 2, pp. 421–451, Mar. 1, 2019.

[7] E. Győri, T. R. Mezei, and G. Mészáros, "Terminal-pairability in complete graphs," *Journal of Combinatorial Mathematics and Combinatorial Computing*, vol. 107, pp. 221–231, Nov. 1, 2018.

[8] D. Dedinszki, F. Szeri, E. Kozák, *et al.*, "Oral administration of pyrophosphate inhibits connective tissue calcification," *EMBO Molecular Medicine*, e201707532, Jul. 12, 2017.

Short description of the above papers

Networks and graphs: we develop general processes in [4] and [5] that are able to efficiently reproduce the structure of a subset of real world and theoretical networks [1]. Both approaches are based on the degree sequence of graphs, but they offer different theoretical and practical advantages.

Extremal combinatorics, computational geometry: in [3], [6], I have discovered new min-max theorems about covering simple orthogonal polygons with static and mobile guards. This enabled developing fast algorithms for solving the corresponding minimum covering problems.

Wireless networks: in [2] we provide a deterministic and fast algorithm for an NP-hard optimization problem that appears in assigning clients to towers in clustered MIMO wireless networks.

Extremal graph theory: in [7] we have devised a novel solution to the edge-disjoint paths problem in complete graphs.

Bioinformatics: I collaborated with biologists for [8]. I developed the method and software for analyzing & measuring the hundreds of noisy microscope images.

ABOUT MYSELF

For as far back as I started secondary school, I have held a comprehensive interest towards the sciences and technology. As I started coming of age, my focus homed in on mathematics and computing, so it was only natural for me to study mathematics at university.

During my PhD, my professional interest crystallized in combinatorics and algorithms. The research topics I have studied in combinatorics are diverse, their nature hovering around the boundary of theoretical and applied mathematics. Extremal and graph theoretical themes are often featured in my papers.

When I am seeking inspiration, I enjoy reading about antrohopology, philoshophy, physics, and economics. Some of my best ideas emerged while I was cycling the forest tracks of the Buda, Pilis, and Mátra mountain ranges. I also treasure cooking dishes of several different cuisines. Sometimes I try my hands at the meticulous processes involved in creating enameled copper plates.