Gergely Bunth - Curriculum Vitae

1 Personal information

Born: 1994, Budapest, Hungary

Nationality: Hungarian

E-mail: bunth.gergely@renyi.hu

Homepage: `https://users.renyi.hu/~bunth`

Marital status: married

2 Scientific activities

Research field: matrix analysis, quantum information theory, quantum optimal transport theory, dissimilarity measures of quantum states, quantum Wasserstein distances and divergences, quantum Rényi divergences.

Employment history

2024-2025	Associate research fellow, MTA RI "Momentum" Optimal Transport and Quantum Information Geometry Research Group, HUN-REN Alfréd Rényi Institute of Mathematics, Budapest
2022-2024	Assistant research fellow, MTA RI "Momentum" Optimal Transport and Quantum Information Geometry Research Group, HUN-REN Alfréd Rényi Institute of Mathematics, Budapest
2019-2022	Assistant research fellow, MTA-BME "Momentum" Quantum Information Theory Research Group

List of publications

Gergely Bunth, József Pitrik, Tamás Titkos, and Dániel Virosztek. *Wasserstein Distances and Divergences of Order* p *by Quantum Channels*. January 24, 2025. arXiv: `2501.08066 [math-ph]`

Gergely Bunth, József Pitrik, Tamás Titkos, and Dániel Virosztek. "Metric Property of Quantum Wasserstein Divergences". In: *Physical Review A* 110.2 (August 7, 2024), p. 022211. DOI: `10.1103/PhysRevA.110.022211`. arXiv: `2402.13150 [math-ph, physics:quant-ph]`

Gergely Bunth. "On Quantum Rényi Divergences". PhD thesis. Budapest University of Technology and Economics (Hungary), 2024. DOI: `http://hdl.handle.net/10890/57305`

Milán Mosonyi, Gergely Bunth, and Péter Vrana. "Geometric Relative Entropies and Barycentric Rényi Divergences". In: *Linear Algebra and its Applications* 699 (October 15, 2024), pp. 159–276. ISSN: 0024-3795. DOI: `10.1016/j.laa.2024.06.005`. arXiv: `2207.14282 [quant-ph]`

Gergely Bunth and Péter Vrana. "Equivariant Relative Submajorization". In: *IEEE Transactions on Information Theory* 69.2 (2023), pp. 1057–1073. ISSN: 1557-9654. DOI: `10.1109/TIT.2022.3214465`. arXiv: `2108.13217`

Gergely Bunth, Gábor Maróti, Milán Mosonyi, and Zoltán Zimborás. "Super-Exponential Distinguishability of Correlated Quantum States". In: *Letters in Mathematical Physics* 113.1 (January 11, 2023), p. 7. ISSN: 1573-0530. DOI: 10.1007/s11005-022-01620-4. arXiv: 2203.16511

Gergely Bunth and Péter Vrana. "Asymptotic Relative Submajorization of Multiple-State Boxes". In: *Letters in Mathematical Physics* 111.4 (July 14, 2021), p. 94. ISSN: 1573-0530. DOI: 10.1007/s11005-021-01430-0. arXiv: 2007.11258 [quant-ph]

György Szabó and Gergely Bunth. "Social Dilemmas in Multistrategy Evolutionary Potential Games". In: *Physical Review E* 97.1 (January 11, 2018), p. 012305. DOI: 10.1103/PhysRevE.97.012305

Talks and posters

Gergely Bunth, Pitrik József, Titkos Tamás, Virosztek Dániel. *Wasserstein Distances and Divergences of Order p.* Seminar Talk. Analysis Seminar, Rényi Institute, Budapest, Hungary, May 15, 2025

Gergely Bunth. *On Quantum Rényi Divergences.* Public Defense of Dissertation. Budapest University of Technology and Economics, Budapest, Hungary, July 22, 2024

Gergely Bunth. *On Quantum Rényi Divergences.* Departmental Defense of Dissertation. Budapest University of Technology and Economics, Budapest, Hungary, April 24, 2024

Gergely Bunth. *Characterization of State Transformations with Monotones in Shannon Theory.* Seminar Talk. Analysis Seminar, Rényi Institute, Budapest, Hungary, November 23, 2023

Zoltán Zimborás, Bunth Gergely, Maróti Gábor, Mosonyi Milán. *Super-Exponential Distinguishability of Correlated Quantum States.* Conference Talk. 25th Annual Conference on Quantum Information Processing, Ghent, Belgium, February 3, 2023

Zoltán Zimborás, Bunth Gergely, Maróti Gábor, Mosonyi Milán. *Super-Exponential Distinguishability of Correlated Quantum States.* Conference Talk. Beyond IID in Information Theory 10, (online event), September 30, 2022

Gergely Bunth, Vrana Péter. *Equivariant Relative Submajorization.* Poster. Quantum Information Theory and Mathematical Physics 2022, Budapest, June 14-17, 2022

Gergely Bunth, Vrana Péter. *Equivariant Relative Submajorization.* Poster. 25th Annual Conference on Quantum Information Processing, (online event), March 7-11, 2022

Gergely Bunth, Vrana Péter. *Asymptotic Relative Submajorization of Multiple-State Boxes.* Poster. 21th Asian Quantum Information Science Conference, (online event), September 1-4, 2021 (Best student poster award)

Péter Vrana, Bunth Gergely, Perry Christopher, Werner Albert H. *The Semiring of Dichotomies and Asymptotic Relative Submajorization.* Conference Talk. 24th Annual Conference on Quantum Information Processing, (online event), February 1, 2021

Tamás Tasnádi, Bunth Gergely. *Geometric Aspects of Majorization and Catalytic Majorization.* Poster. Quantum Information Theory and Mathematical Physics 2019, Budapest, September 2-5, 2019

Reviewing activities

Quantum, IEEE Transactions on Information Theory, Periodica Mathematica Hungarica, Methodology and Computing in Applied Probability, 13th Beyond IID in Information Theory

3 Studies

2018-2022 Mathematical physics Phd, Budapest University of Technology and Economics
Supervisor: Associate prof. Milán Mosonyi
Field: Quantum information theory, Quantum state transitions, Quantum Rényi divergences
Thesis: On quantum Rényi divergences

2018 Msc in Physics, Budapest University of Technology and Economics
Supervisor: Associate prof. Milán Mosonyi
Thesis: Quantum mechanical state transitions and Rényi information quantities

2016 Bsc in Physics, Budapest University of Technology and Economics
Supervisor: György Szabó, Head of Complex Systems group Research Institute for Technical Physics and Materials Science
Thesis: Társadalmi dilemmák háromstratégiás játékokban (Social dilemmas in three-strategy games)

4 Awards, grants

2022-2025 Pre-doc grant, HUN-REN Alfréd Rényi Institute of Mathematics, Budapest

2021 Best Student Poster Award, 21th Asian Quantum Information Science Conference

2018-2022 State scholarship for PhD students, Hungary

5 Teaching activities

2018-2022 Teaching assistant in Analysis for engineers, Multivariable analysis for engineers, Quantum information theory at the *Budapest University of Technology and Economics, Institute of Mathematics*

6 Additional activities

2024 Co-editor of the following (Hungarian) volume: Tábor Béla - A mítoszomlástól a személyiségig.

2018- Founder and leader of the "Philosophy seminar" at the Eugene Wigner College of Advanced Studies at Budapest University of Technology and Economics.

2016-2017 Deputy Editor-in-Chief at "Pikkász", the newspaper of the Faculty of Natural Sciences at Budapest University of Technology and Economics.

2015-2016 Editor-in-Chief at "Pikkász", the newspaper of the Faculty of Natural Sciences at Budapest University of Technology and Economics.

2012-2018 Board member at "Pikkász", the newspaper of the Faculty of Natural Sciences at Budapest University of Technology and Economics.

7 External links

Link to homepage, Link to MTMT, Link to arXiv, Link to ORCID, Link to Web of Science, Link to Scopus, Link to Google Scholar

8 Additional skills

Language: Hungarian (native), English (fluent), French (advanced).

Computer: User level with Matlab, Mathematica, Latex.

Budapest, June 4, 2025