

# Curriculum Vitae

## Personal:

**Name:** Gabor Lippner

**Born:** 26/11/1979, Budapest, Hungary

## Language skills:

**English:** fluent

**German:** fair

## Positions:

2020-now Associate Professor, Northeastern University, Department of Mathematics

2014-2020 Assistant Professor, Northeastern University, Department of Mathematics

2010-2014 Postdoctoral fellow, Harvard University, Department of Mathematics (advisor: S.-T. Yau)

2008-2009 Research Assistant, Eotvos University Budapest, Department of Computer Science

2006-2008 Research Assistant, Alfred Renyi Institute of Mathematics, Hungarian Academy of Sciences  
Young researcher

## Education:

- Eotvos University Budapest, Ph.D. in Mathematics (summa cum laude) 2009. Title of thesis: Multiple-point formulas and their applications, Supervisor: András Szűcs
- Marie Curie Fellowship at the University of Liverpool (January - July 2005, supervisor: Victor Goryunov)
- Eotvos University Budapest, Diploma (M.Sc equivalent) in Mathematics, 2003. Title of thesis: Multiple point manifolds of immersions, Supervisor: András Szűcs

## Grants:

- Simons Foundation Collaboration Grant for Mathematicians (2022-2027, \$42,000)
- NSF Grant No DMS-1800738 (2018-2021, \$150,000)
- Simons Foundation Collaboration Grant for Mathematicians (2017-2022, \$42,000, terminated in 2018)
- ARO Grant No 68668 (years 2016-2019, joint with Dima Krioukov and Maxim Kitsak, \$350,000)
- BSF Grant No 2014208: Geometric, Analytic and Probabilistic Aspects of Harmonic functions on Graphs and Manifolds (years 2015-2019, joint with Dan Mangoubi and Shing-Tung Yau, \$108,000).
- AMS-Simons Travel Grant (2013-2015)

## Awards:

- Renyi Kato Prize of the J. Bolyai Math. Soc (2002)
- Schweitzer Math. Competition (3rd Prize: 2000,2002; 2nd Prize: 2001)

- International Math. Competition for University students: 2nd Prize (1999), 1st Prize (2000), Grand 1st Prize (2001,2002)
- International Mathematical Olympiad (gold medal: 1997, 1998)

#### Phd Students:

- Yujia Shi, PhD in Mathematics, Northeastern University, expected in 2024
- Xutao Hu, PhD in Mathematics, Northeastern University, expected in 2023
- Hiu Ying Man, PhD in Mathematics, Northeastern University, expected in 2023
- Whitney Drazen, PhD in Mathematics, Northeastern University, 2021  
Thesis: Phenomena in Quantum State Transfer  
First position: postdoc at Brandon University, CA
- Jonier Antunes, PhD in Mathematics, Northeastern University, 2021  
Thesis: Evolutionary Graph Processes with Reshuffling and the Promotion of Cooperation  
First position: Lecturer at Harvard University, MA
- Tong Zhang, PhD in Mathematics, Northeastern University, 2017 (co-advisor)  
Thesis: SCOT Modeling and Its Statistical Applications of Time Series  
First position: Research Scientist at Afiniti, Washington DC

#### Other advising:

- Shuang Liu (Visiting Graduate Student from Renmin University, Beijing, China, 10/2015 - 09/2016)
- Florentin Munch (Visiting Graduate Student from University of Potsdam, Germany, 01/2017 - 12/2017)
- Ariya Shajii (Weston High School, MA), Yau Awards Competition, 2012  
Title of Paper: Computationally Determining the Dimensions of the Homology Groups of Directed Graphs.  
Result: Bronze Medal.

#### Teaching:

##### Northeastern University

- Introduction to Graph Theory (MATH 3545): spring 2020, fall 2021
- Graph Theory (MATH7233): Every fall term since 2014
- Calc 1 (MATH1341): fall 2017, fall 2018, fall 2019
- Calc 2 (MATH1342): spring 2015, spring 2017
- Discrete Mathematics (MATH2310): fall 2015
- Mathematical Heritage of Hungary, Dialogue of Civilizations Program, Summer 2019, Summer 2020 (virtual)

##### Harvard University

- Graph limits (268x, fall 2011)

##### Eotvos Uni. Budapest

- Introduction to Discrete Mathematics (2000-2009)
- Algebraic topology (2003,2004,2006,2009)
- Algebraic topology problem solving seminar (2004)
- Calculus II (2003,2005)
- Calculus I (2006,2007)
- Amenable groups (2009)

##### Budapest Semesters in Mathematics

- Combinatorics (2007 Spring, 2008 Spring)
- Geometric graph theory (teaching assistant) (2007 Fall)
- Introduction to topology (2008 Spring, 2008 Fall, 2009 Fall)

**Invited talks:**

**Conferences:**

- September 2003, Singularity Theory and Its Applications, Sapporo, Japan
- August 2004, Keldysh Centennial Conference, Moscow, Russia
- March 2010, Combinatorics, Groups, Algorithms and Complexity, Columbus, OH
- December 2010, Complex Networks, Arlington, VA
- June 2011, Groups, graphs, and stochastic processes, Banff, Canada
- January 2013, AMS-MMA Joint Meeting, San Diego, CA
- August 2016, Workshop on Discrete Analysis, Shanghai, China
- September 2016, AMS Sectional Meeting, Bowdoin College, Maine
- May 2017, CCEGN-2017, Critical and Collective Effects in Graphs and Networks
- Aug 2017, International Conference on Analysis and Geometry and Graphs and Manifolds, Potsdam, Germany
- April 2018, Algebraic Graph Theory and Quantum Walks Workshop, Waterloo, CA
- June 2018, SIAM Discrete Mathematics Conference, Denver, CO
- June 2018, CCEGN-2018, Critical and Collective Effects in Graphs and Networks, Eindhoven, Netherlands
- Sept 2018, AMS Sectional Meeting, Wilmington, DE
- April 2019, AMS Sectional Meeting, Hartford, CT
- December 2019, Fan Chung 70 Birthday Conference, Sanya, China
- March 2020, Logic and Graph Limits, ASL Annual Meeting, UC Irvine (cancelled)
- March 2020, Geometry of Metric Spaces, Sanya, China (cancelled)

**Seminars:**

**2005:**

Singularity Seminar, University of Liverpool, UK  
 Topology Seminar, University of Manchester, UK

**2008:**

Topology Seminar, Renyi Institute, Budapest, Hungary

**2009:**

Combinatorics Seminar, Renyi Institute, Budapest, Hungary  
 Large Networks Seminar, Eotvos University, Budapest, Hungary

**2010:**

Differential Geometry Seminar, Harvard University, Cambridge, MA  
 SCANS Seminar, Northeastern University, Boston, MA

**2011:**

Large Graphs Seminar, Renyi Institute, Budapest, Hungary  
 Basic Notions Seminar, Harvard University, Cambridge, MA  
 Differential Geometry Seminar, Harvard University, Cambridge, MA

**2012:**

Combinatorics Seminar, MIT, Cambridge, MA  
 Everytopic Seminar, Brandeis University, Waltham, MA  
 Basic Notions Seminar, Harvard University, Cambridge, MA  
 Geometry and Topology Seminar, Brown University, Providence, RI  
 Combinatorics Seminar, University of Rhode Island, Kingston, RI  
 GASC Seminar, Northeastern University, Boston, MA

**2013:**

Geometry Seminar, Boston College, Chestnut Hill, MA

**2014:**

Special Colloquium, ETH Zurich

Special Colloquium, University of Waterloo

**2015:**

Combinatorics Seminar, MIT, Cambridge, MA

Differential Geometry Seminar, Harvard University, Cambridge, MA

Analysis and Geometry Seminar, Northeastern University, Boston, MA

**2016:**

CS Theory Seminar, Northeastern University, Boston, MA

GASC Seminar, Northeastern University, Boston, MA

Combinatorics Seminar, MIT, Cambridge, MA

Combinatorics Seminar, Brandeis, Waltham, MA

**2017:**

CMSA Colloquium, Harvard University, Cambridge, MA

Large Graphs Seminar, Renyi Institute, Budapest, Hungary

Analysis and PDE Seminar, Hebrew University, Jerusalem, Israel

GASC Seminar, Northeastern University, Boston MA

**2018:**

Large Graphs Seminar, Renyi Institute, Budapest, Hungary

Combinatorics Seminar, OSU, Columbus, OH

**2019:**

Discrete Mathematics Seminar, WPI, Worcester, MA

Probability Seminar, MIT, Boston, MA

Combinatorics Seminar, Yale, New Haven, CT

Combinatorics Seminar, BYU, Provo, UT

AIM Seminar, Northeastern University, Boston, MA

Arts and Sciences Seminar Series, Clarkson University, Potsdam, NY

Renmin University, Beijing, China

**2020:**

Colloquium, UMass Lowell, MA

**2021:**

Algebraic Graph Theory Seminar, Waterloo, CA (online)

Algebraic Topology and its Applications Seminar, HSE, Moscow (online)

**Service:**

- Currently co-organizing the Sixth Workshop on Critical and Collective Effects in Graphs and Networks (CCEGN-6) to be held 2022, Cape Cod, MA. <https://www.dk-lab.net/cegn6/>
- Member of NSF DMS Combinatorics Review Panel, 2018-19
- Organized a special session "Extremal Graph Theory and Quantum Walks on Graphs" at the 2018 Spring AMS Northeastern Sectional meeting.
- Organized the "Random graphs, simplicial complexes, and their applications" workshop Northeastern.
- Member of the committee of the Arany Daniel mathematics competition for high school students (2001-2009)

- Secretary of the Scientific Section of the Bolyai Janos Mathematical Society (2006-2009)
- Secretary of the Schweitzer Math. Competition Problem Committee (2006, 2008)

## Publications:

### Preprints and in preparation

- [1] W. Drazen, O. Eisenberg, M. Kempton, G. Lippner, Pretty good fractional revival via magnetic fields, in preparation
- [2] G. Lippner, D. Mangoubi, Strong Liouville theorem on nilpotent groups - an elementary proof, in preparation
- [3] Pim van der Hoorn, Gabor Lippner, Carlo Trugenberger, and Dmitri Krioukov. Ollivier curvature of random geometric graphs converges to Ricci curvature of their Riemannian manifolds. (2020) submitted, [arXiv](#)
- [4] Frank Bauer and Gabor Lippner. Eigenvalue sum estimates for lattice subgraphs. *To appear in Pure and Appl Math Quart* (2022)
- [5] Ada Chan, Gabriel Coutinho, Whitney Drazen, Or Eisenberg, Chris Godsil, Mark Kempton, Gabor Lippner, Christino Tamon, and Hanmeng Zhan. Fundamentals of fractional revival in graphs. *Linear Algebra and its Applications* **655**(2022) 129–158, [DOI](#), [arXiv](#)
- [6] Gabor Lippner and Shuang Liu. Li-Yau inequality on virtually Abelian groups. *To appear in Comm. Analysis and Geometry* **30**(2022) no. 6,, [arXiv](#)
- [7] Marco Tulio Angulo, Gabor Lippner, Yang-Yu Liu, and Albert-László Barabási. Sensitivity of Complex Networks. (2016) preprint, [arXiv](#)
- [8] Gábor Elek and Gábor Lippner. An analogue of the Szemerédi Regularity Lemma for bounded degree graphs. (2008) preprint, [arXiv](#)

### Published

- [9] Gabor Lippner, Dan Mangoubi, Zachary McGuirk, and Rachel Yovel. Strong convexity for harmonic functions on compact symmetric spaces. *Proc Amer Math Soc* **online**(2022), [DOI](#), [arXiv](#)
- [10] Pim van der Hoorn, Gabor Lippner, and Elchanan Mossel. Regular graphs with linearly many triangles. *Elect. J. Combin.* **29**(2022) no. 1, P1.7, [DOI](#), [arXiv](#)
- [11] Ada Chan, Whitney Drazen, Or Eisenberg, Mark Kempton, and Gabor Lippner. Approximate quantum fractional revival in paths and cycles. *Algebraic Combinatorics* **4**(2021) no. 6, 989–1004, [DOI](#), [arXiv](#)
- [12] Pim van der Hoorn, William J. Cunningham, Gabor Lippner, Carlo Trugenberger, and Dmitri Krioukov. Ollivier-Ricci curvature convergence in random geometric graphs. *Physical Review Research* **3**(2021) no. 1, 013211, [DOI](#), [arXiv](#).
- [13] Mark Kempton, Gabor Lippner, and Florentin Münch. Large scale Ricci curvature on graphs. *Calculus of Variations and Partial Differential Equations* **59**(2020) no. 5,, [DOI](#), [arXiv](#).
- [14] Chris Godsil, Krystal Guo, Mark Kempton, Gabor Lippner, and Florentin Münch. State transfer in strongly regular graphs with an edge perturbation. *Journal of Combinatorial Theory, Series A* **172**(2020) 105181, [DOI](#), [arXiv](#).
- [15] Benjamin Allen, Christine Sample, Robert Jencks, James Withers, Patricia Steinhagen, Lori Brizuela, Joshua Kolodny, Darren Parke, Gabor Lippner, and Yulia A. Dementieva. Transient amplifiers of selection and reducers of fixation for death-Birth updating on graphs. *PLoS Computational Biology* **16**(2020) no. 1, e1007529, [DOI](#), [arXiv](#).
- [16] Michael T. Schaub, Austin R. Benson, Paul Horn, Gabor Lippner, and Ali Jadbabaie. Random Walks on Simplicial Complexes and the Normalized Hodge 1-Laplacian. *SIAM Review* **62**(2020) no. 2, 353–391, [DOI](#), [arXiv](#).

- [17] Benjamin Allen, Gabor Lippner, and Martin A. Nowak. Evolutionary games on isothermal graphs. *Nature Communications* **10**(2019) 5107, [DOI](#), [arXiv](#).
- [18] Or Eisenberg, Mark Kempton, and Gabor Lippner. Pretty good quantum state transfer in asymmetric graphs via potential. *Discrete Mathematics* **342**(2019) no. 10, 2821–2833, [DOI](#), [arXiv](#).
- [19] Pim van der Hoorn, Gabor Lippner, and Dmitri Krioukov. Sparse Maximum-Entropy Random Graphs with a Given Power-Law Degree Distribution. *Journal of Statistical Physics* **173**(2017) no. 3-4, 806–844, [DOI](#), [arXiv](#).
- [20] Mark Kempton, Gabor Lippner, and Shing-Tung Yau. Pretty good quantum state transfer in symmetric spin networks via magnetic field. *Quantum Information Processing* **16**(2017) no. 9,, [DOI](#), [arXiv](#).
- [21] Benjamin Allen, Gabor Lippner, Yu-Ting Chen, Babak Fotouhi, Naghmeh Momeni, Shing-Tung Yau, and Martin A. Nowak. Evolutionary dynamics on any population structure. *Nature* **544**(2017) no. 7649, 227–230, [DOI](#), [arXiv](#).
- [22] Mark Kempton, Gabor Lippner, and Shing-Tung Yau. Perfect state transfer on graphs with a potential. *Quantum Information and Computation* **17**(2017) no. 3&4, 303–327, [DOI](#), [arXiv](#).
- [23] Marco Tulio Angulo, Jaime A. Moreno, Gabor Lippner, Albert-László Barabási, and Yang-Yu Liu. Fundamental limitations of network reconstruction from temporal data. *Journal of The Royal Society Interface* **14**(2017) no. 127, 20160966, [DOI](#), [arXiv](#).
- [24] Endre Csóka and Gabor Lippner. Invariant random perfect matchings in Cayley graphs. *Groups, Geometry, and Dynamics* **11**(2017) no. 1, 211–243, [DOI](#), [arXiv](#).
- [25] Gabor Lippner and Dan Mangoubi. On the sharpness of a three circles theorem for discrete harmonic functions. *International Mathematics Research Notices* (2016) rnw069, [DOI](#), [arXiv](#).
- [26] Omar Antolín Camarena, Endre Csóka, Tamás Hubai, Gábor Lippner, and László Lovász. Positive graphs. *European Journal of Combinatorics* **52**(2016) 290–301, [DOI](#), [arXiv](#).
- [27] Endre Csóka, Gábor Lippner, and Oleg Pikhurko. König’s Line Coloring and Vizing’s Theorems for Graphings. *Forum of Mathematics, Sigma* **4**(2016), [DOI](#), [arXiv](#).
- [28] Gabor Lippner and Dan Mangoubi. Harmonic functions on the lattice: Absolute monotonicity and propagation of smallness. *Duke Mathematical Journal* **164**(2015) no. 13, 2577–2595, [DOI](#), [arXiv](#).
- [29] Frank Bauer, Paul Horn, Yong Lin, Gabor Lippner, Dan Mangoubi, and Shing-Tung Yau. Li-Yau inequality on graphs. *Journal of Differential Geometry* **99**(2015) no. 3, 359–405, [DOI](#), [arXiv](#).
- [30] Paul Horn and Gabor Lippner. Two Layer 3D Floor Planning. *The Electronic Journal of Combinatorics* **20**(2013) no. 4, P16, [DOI](#), [arXiv](#).
- [31] Yong Lin, Gábor Lippner, and Shing-Tung Yau. Quantum Tunneling on Graphs. *Communications in Mathematical Physics* **311**(2012) no. 1, 113–132, [DOI](#), [arXiv](#).
- [32] Gábor Elek and Gábor Lippner. Borel oracles. An analytical approach to constant-time algorithms. *Proceedings of the American Mathematical Society* **138**(2010) no. 08, 2939–2939, [DOI](#), [arXiv](#).
- [33] Gábor Lippner and András Szűcs. Multiplicative properties of Morin maps. *Algebraic & Geometric Topology* **10**(2010) no. 3, 1437–1454, [DOI](#), [arXiv](#).
- [34] Gábor Elek and Gábor Lippner. Sofic equivalence relations. *Journal of Functional Analysis* **258**(2010) no. 5, 1692–1708, [DOI](#), [arXiv](#).
- [35] Yong Lin, , Gábor Lippner, Dan Mangoubi, and Shing-Tung Yau and. Nodal geometry of graphs on surfaces. *Discrete & Continuous Dynamical Systems - A* **28**(2010) no. 3, 1291–1298, [DOI](#), [arXiv](#).
- [36] Gábor Lippner. Singularities of projected immersions revisited. *Algebraic & Geometric Topology* **9**(2009) no. 3, 1623–1635, [DOI](#), [arXiv](#).

- [37] Victor Goryunov and Gabor Lippner. Simple framed curve singularities. In *Geometry and topology of caustics*. Institute of Mathematics Polish Academy of Sciences, 2008. [DOI](#).
- [38] Pavel Valtr, Gábor Lippner, and Gyula Károlyi. Empty convex polygons in almost convex sets. *Periodica Mathematica Hungarica* **55**(2007) no. 2, 121–127, [DOI](#).
- [39] Gábor Braun and Gábor Lippner. Characteristic numbers of multiple-point manifolds. *Bulletin of the London Mathematical Society* **38**(2006) no. 04, 667–678, [DOI](#).
- [40] Gábor Lippner and András Szűcs. A new proof of the Herbert multiple-point formula. *Journal of Mathematical Sciences* **146**(2007) no. 1, 5523–5529, [DOI](#).
- [41] Gábor Lippner. On double points of immersions of spheres. *manuscripta mathematica* **113**(2004) no. 2, 239–250, [DOI](#).
- [42] Gábor Kun and Gábor Lippner. Large empty convex polygons in  $k$ -convex sets. *Periodica Mathematica Hungarica* **46**(2003) no. 1, 81–88, [DOI](#).