

# Zhiyu Wang

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## Curriculum Vitae

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### Research Interests

Probabilistic and extremal combinatorics, structural graph theory, discrete geometry, spectral graph theory, extremal set theory, applications of discrete mathematics to theoretical computer science.

### Education

- 2015-2020 **Ph.D. Mathematics**, *University of South Carolina*, Columbia, SC  
Advisor: Linyuan Lu
- 2011-2015 **B.S. Mathematics**, *Carnegie Mellon University*, Pittsburgh, PA  
Additional major in Computer Science, University Honors

### Academic Employment

- Aug 2020-present **Hale Visiting Assistant Professor**  
School of Mathematics, Georgia Institute of Technology, Atlanta, GA
- Aug 2015-May 2020 **Graduate Teaching/Research Assistant**  
Department of Mathematics, University of South Carolina, Columbia, SC
- Fall 2013-Fall 2014 **Undergraduate Teaching Assistant**  
Department of Mathematical Sciences, Carnegie Mellon University, Pittsburgh, PA

### Publications and Preprints

#### Preprints

24. X. Liu, J. Schroeder, Z. Wang and X. Yu, **Polynomial  $\chi$ -binding functions for  $t$ -broom-free graphs**, arXiv:2106.08871.
23. X. Liu, Z. Wang and X. Yu, **Counting Hamiltonian cycles in planar triangulations**, arXiv: 2105.07551.
22. L. Lu, A. Meier and Z. Wang, **Anti-Ramsey number of edge-disjoint rainbow spanning trees in all graphs**, arXiv:2104.12978.
21. M. N. Ellingham, L. Lu and Z. Wang, **Maximum spectral radius of outerplanar 3-uniform hypergraphs**, arXiv: 2010.04624.
20. L. Lu and Z. Wang, **On the size of planar graphs with positive Lin-Lu-Yau Ricci curvature**, arXiv: 2010.03716.
19. S. Bai, Y. Lin, L. Lu, Z. Wang, and S. T. Yau, **Ollivier Ricci-flow on weighted graphs**, arXiv: 2010.01802.
18. L. Lu and Z. Wang, **Concentration inequalities in spaces of random configurations with positive Ricci curvatures**, arXiv:1906.03550.
17. L. Lu and Z. Wang, **A note on 1-guardable graphs in the cops and robber game**, arXiv:1804.02802.

## Publications

16. L. Lu and Z. Wang, **On the cover Turán number of Berge hypergraphs**, *European J. Combin.*, 98 (2021), 103416.
15. L. Lu and Z. Wang, **On Hamiltonian Berge cycles in [3]-uniform hypergraphs**, *Discrete Math.*, 344(8) (2021), 112462.
14. L. Kang, L. Liu, L. Lu and Z. Wang, **The extremal  $p$ -spectral radius of Berge-hypergraphs**, *Linear Algebra Appl.*, 610 (2021), 608-624.
13. G. Damásdi, B. Keszegh, D. Malec, C. Tompkins, Z. Wang and O. Zamora, **Saturation problems in the Ramsey theory of graphs, posets and point sets**, *European J. Combin.*, 95 (2021), 103321.
12. L. Lu and Z. Wang, **Anti-Ramsey number of edge-disjoint rainbow spanning trees**, *SIAM J. Discrete Math.*, 34(4) (2020), 2346-2362.
11. L. Lu and Z. Wang, **On the cover Ramsey number of Berge hypergraphs**, *Discrete Math.*, 343(9) (2020), 111972.
10. É. Czabarka, I. Singgih, L.A. Székely and Z. Wang, **Some remarks on the midrange crossing constant**, *Studia Sci. Math. Hung.*, 57 (2) (2020), 187-192.
9. J. Kim, R. R. Martin, T. Masařík, W. Shull, H. C. Smith, A. Uzzell, and Z. Wang, **On difference graphs and the local dimension of posets**, *European J. Combin.*, 86 (2020), 103074.
8. M. Javidian, Z. Wang, L. Lu and M. Valtorta, **On a hypergraph Bayesian network model**, *Ann. Math. Artif. Intell.*, 88(9) (2020), 1003-1033.
7. N. Salia, C. Tompkins, Z. Wang and O. Zamora, **Ramsey numbers of Berge-hypergraphs and related structures**, *Electron. J. Comb.*, 26(4) (2019), P4.40.
6. É. Czabarka, J. Reischig, L.A. Székely and Z. Wang, **Midrange crossing constants for graphs classes**, *Indian J. Discrete Math.*, 5(1) (2019), 23–35.
5. J. Asplund, É. Czabarka, G. Clark, G. Cochran, A. Hamm, G. Spencer, L.A. Székely, L. Taylor and Z. Wang, **Using Block Designs in Crossing Number Bounds**, *J. Combin. Des.*, 27(10) (2019), 586-597.
4. É. Czabarka and Z. Wang, **Erdős-Szekeres theorem for cyclic permutations**, *Involvement*, 12(2) (2019), 351-360.
3. L. Lu and Z. Wang, **On the size-Ramsey number of tight path**, *SIAM J. Discrete Math.*, 32(3) (2018), 2172-2179.
2. J. Asplund, T. Do, A. Hamm, L. Székely, L. Taylor, and Z. Wang,  **$k$ -planar crossing number of random graphs and random regular graphs**, *Discrete Appl. Math.*, 247 (2018), 419-422.
1. A. Hasan, Z. Wang and A. Mahani, **Fast Estimation of Multinomial Logit Models: R Package mnlogit**, *J. Stat. Softw.*, 75(3) (2016), 1-24. (R package 'mnlogit' available at <https://CRAN.R-project.org/package=mnlogit>)

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## Honors and Awards

- Fall 2020 **Honor Roll Recipient**, *Student Recognition of Excellence in Teaching: Class of 1934 CIOS Honor Roll*, Georgia Institute of Technology  
Recognized based on Instructor's respect and concern for students, Instructor's level of enthusiasm about the course, and Instructor's ability to stimulate interests in the subject matter.
- May 2020 **Peer Excellence Award**, *Department of Mathematics, UofSC*  
Selected by graduate students in the Department of Mathematics, UofSC.

- 2018-2019 **Breakthrough Graduate Scholar**, University of South Carolina  
1 of 13 awarded by University of South Carolina for outstanding research
- 2018-2019 **Outstanding Graduate Student Award**, Department of Mathematics, UofSC  
Awarded to one graduate student each year by Department of Mathematics, UofSC
- 2015 **University Honors**, *Carnegie Mellon University*
- 2006–2010 **Singapore Ministry of Education School-based Scholarship (SM1)**  
4-year full scholarship to study in Raffles Institution, Singapore

## Funding and Grants

### Research Fundings

- 2018–2019 Research Assistantship (full academic year) from ONR contract N00014-17-1-2842.  
Summer 2017, 2019 Research Assistantship from NSF contract #DMS-1600811.

### Teaching Grants

- 2019–2020 **Principal Investigator** on the Graduate Teaching Assistant Teaching Resource Development Grant, University of South Carolina. (\$750)

### Workshop Grants

- Jul. 2017 Fully funded participant: Rocky Mountain-Great Plains Graduate Research Workshop in Combinatorics, Denver, US. (NSF-DMS #1604458)
- Jun. 2017 Fully funded participant: Mathematics Research Communities (AMS): Crossing Numbers of Graphs, Utah, US. (NSF-DMS #1641020)
- May- June. 2017 Fully funded participant: Summer School on Random Graphs and Probabilistic Methods, Fields Institute, Toronto, Canada. (CAD\$1350)
- Jul. 2017 Fully funded participant: São Paulo School of Advanced Science on Algorithms, Combinatorics and Optimization, Brazil. (R\$ 5795)

## Research Visits

- Summer 2018 50-days research visit to Alfred Rényi Institute of Mathematics, Budapest, Hungary to collaborate with Gyula O. H. Katona's research group
- Aug. 2019 10-days research visit to Harvard University Center of Mathematical Sciences and Applications, Cambridge, MA, to collaborate with Shing-Tung Yau's research group

## Teaching Experience

### Georgia Institute of Technology, Atlanta, GA

- Fall 2020- Present **Instructor of Record**, *School of Mathematics*.
- MATH 8803/4803: Special Topics: Spectral Graph Theory (Fall 2021)
  - MATH 4022: Intro to Graph Theory (Fall 2021)
  - MATH 4280: Introduction to Information Theory (Spring 2021)
  - MATH 3012: Applied Combinatorics (Fall 2020, Summer 2021)

### University of South Carolina, Columbia, SC

- Fall 2015- Present **Instructor of Record**, *Department of Mathematics*.
- MATH 344L/544L: Numerical Linear Algebra Lab (Spring 2020)
  - MATH 170: Finite Mathematics (Spring 2019, Fall 2019)
  - MATH 122: Business Calculus (Spring 2017)
  - MATH 115: Pre-Calculus (Fall 2016)

Fall 2015- **Graduate Teaching Assistant**, *Department of Mathematics*.

- Present ○ MATH 142: Calculus 2 (Fall 2018)
- MATH 141: Calculus 1 (Fall 2015, Spring 2016)

*Carnegie Mellon University, Pittsburgh, PA*

2013-2014 **Undergraduate Teaching Assistant**, *Department of Mathematical Sciences*.

- 21-259: Calculus in Three Dimensions (Spring 2014)
- 21-242: Honors Matrix Theory (Fall 2013)

Fall 2014 **Grader**, *Department of Mathematical Sciences*.

- 21-295: Putnam Seminar

Fall 2013 **Undergraduate Teaching Assistant**, *School of Computer Science*.

- 15-112: Fundamentals of Programming

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## Professional Development

Fall 2020 **Mentor**, *Directed Reading Program*, Georgia Institute of Technology

Worked with an undergraduate on a semester-long reading project on statistical learning.

2015-2020 **Preparing Future Faculty (PFF) Credential**

Center for Teaching Excellence, University of South Carolina

Oct. 2019 **Invited presenter for *Oktoberbest: A Celebration of Teaching Symposium***, *UofSC*

Organized a workshop to demonstrate innovative teaching strategies in combinatorics courses.

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## Presentations

### Invited Talks

Aug. 2021 **Polynomial  $\chi$ -binding functions for  $t$ -broom-free graphs**

Atlanta Lecture Series XXV (Virtual), Georgia State University, Atlanta, GA.

Jul. 2021 **Polynomial  $\chi$ -binding functions for  $t$ -broom-free graphs**

SCMS Combinatorics Seminar (Virtual), Shanghai Center for Mathematical Sciences, China

Jun. 2021 **Anti-Ramsey number of edge-disjoint rainbow spanning trees in all graphs**

Combinatorics Seminar (Virtual), Nankai University, Tianjin, China

Apr. 2021 **Saturation problems in Ramsey theory, ordered sets and geometry**

Discrete Maths Seminar (Virtual), Illinois State University, Normal, IL

Oct. 2020 **Maximum spectral radius of outerplanar 3-uniform hypergraphs**

AMS Sectional Meeting (virtual), Special Session on Structural and Extremal Graph Theory

Jan. 2020 **Find Berge hypergraphs by looking at the shadow**

Joint Mathematics Meetings, AMS Special Session on Extremal and Probabilistic Combinatorics, Denver, CO

Jan. 2020 **On difference graphs and the local dimension of posets**

Joint Mathematics Meetings, AMS Special Session on Research from the Rocky Mountain-Great Plains Graduate Research Workshop in Combinatorics, Denver, CO

Nov. 2019 **On the cover Turán number of Berge hypergraphs**

AMS Sectional Meeting, Special Session on Extremal and Probabilistic Combinatorics, University of Florida, Gainesville, FL

Oct. 2019 **Find Berge hypergraphs by looking at the shadow**

Department discrete seminar, University of California San Diego, La Jolla, CA

Aug. 2019 **Find Berge hypergraphs by looking at the shadow**

Department Colloquium, West Virginia University, Morgantown, WV

- Mar. 2019 **On the cover Ramsey number of Berge hypergraphs**  
AMS Sectional Meeting, Special Session on Recent Developments in Graph Theory, Auburn University, Auburn, AL
- Mar. 2019 **On difference graphs and the local dimension of posets**  
50th Southeastern International Conference on Combinatorics, Graph Theory & Computing, Boca Raton, FL
- Mar. 2019 **Erdős-Szekeres theorem for cyclic permutations**  
Carolina Math Seminar, Lander University, Greenwood, SC
- Jul. 2018 **Color-disjoint rainbow spanning trees of edge-colored graphs**  
Alfred Rényi Institute of Mathematics, Budapest, Hungary
- Contributed Conference Talks**
- Sep. 2019 **Anti-Ramsey number of  $t$  edge-disjoint rainbow spanning trees**  
2019 Erdős Lecture Series, University of Memphis, Memphis, TN.
- Jun. 2018 **Cover half graph with complete bipartite graph**  
8th Emléktábla Workshop on Combinatorial Geometry, Gárdony, Hungary
- Oct. 2017 **On 1-guardable graphs in the cops and robber game**  
MCCCC31, University of West Georgia, GA

## Professional Service

### Academic service

- Fall 2015-  
Present **Referee for the following journals & Workshops:**
- Discrete Mathematics
  - European Journal of Combinatorics
  - European Journal of Mathematics
  - International Mathematics Research Notices
  - Journal of Combinatorial Theory, Series A
  - Science China Mathematics
  - SIAM Journal on Discrete Mathematics
  - Studia Scientiarum Mathematicarum Hungarica
  - Journal of the Ramanujan Mathematical Society
  - WG2021: 47th International Workshop on Graph-Theoretic Concepts in Computer Science
- Mar 2022 **Co-organizer, AMS Spring Southeast Sectional Meeting**  
Special Session on Structural and extremal graph theory , University of Virginia, VA
- Fall 2020-  
present **Co-organizer, Georgia Tech Graph Theory Seminar**  
Georgia Institute of Technology, Atlanta, GA
- June 2021 **Coordinator, Round the World Relay in Combinatorics (Virtual)**
- Apr. 2019 **Presentation Reviewer, Discover UofSC 2019**  
Columbia Metropolitan Convention Center, Columbia, SC
- Fall 2018-  
Spring 2019 **Vice President, SIAM Student Chapter**  
University of South Carolina, Columbia, SC
- Fall 2016-  
present **Organizer, Combinatorics Reading Seminar**  
University of South Carolina, Columbia, SC
- Nov. 2017 **Panelist, Math Internship Panel, SIAM Student Chapter**  
University of South Carolina, Columbia, SC
- Apr. 2016  
& 2017 **Problems writer, 14th & 15th Annual Integration Bee**  
University of South Carolina, Columbia, SC

Fall 2015- **Secretary, SIAM Student Chapter**  
Spring 2016 University of South Carolina, Columbia, SC  
Fall 2014- **Secretary, SIAM Student Chapter**  
Spring 2015 Carnegie Mellon University, Pittsburgh, PA

### Community Outreach

Aug 2021- **Mentor, Georgia Institute of Technology**  
present Mentor a high school student for research on Ramsey-type problems.  
2017-2020 **Proctor, Volunteer and IT support, 31st, 32nd, 33rd & 34rd High School Math Contest**  
University of South Carolina, Columbia, SC  
Mar. 2016 **Judge, 60th South Carolina Region II Science & Engineering Fair**  
University of South Carolina, Columbia, SC

### Industry Experience

Summer **Software Engineer Intern, LinkedIn Corporation, California, CA**  
2014, 2015 Worked on graph algorithms to improve LinkedIn's internal cross-product development platform & dependency service platform  
Summer **Scientific Computing Engineer Intern, Sentrana Corporation, Washington, D.C.**  
2013 Design and optimize high performance R packages for quantitative modelling

### Relevant Skills

Languages English, Chinese (Mandarin)  
Programming Python, C, C++, Sage, R, Java, SML, Matlab, Maple, HTML, Javascript, SQL, Neo4j

### References

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