He Guo

Postdoctoral Fellow in Mathematics

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Appointment

2024–present **Postdoctoral Fellow**, *Department of Mathematics and Mathematical Statistics, Umeå University*, Umeå, Sweden.
Host: István Tomon

2021–2024 **Postdoctoral Fellow**, *Faculty of Mathematics, Technion - Israel Institute of Technology*, Haifa, Israel.
Host: Ron Aharoni

Education

2015–2021 **Ph.D. in Algorithms, Combinatorics, and Optimization**, *Georgia Institute of Technology*, Atlanta, USA.
Advisor: Lutz Warnke
Minor: Stochastic Processes and Machine Learning
Top Graduate Award, School of Mathematics, Georgia Institute of Technology

2014–2015 **Visiting Student**, *Harvard University*, Cambridge, USA.
Department of Mathematics and School of Engineering and Applied Sciences

2011–2015 **B.S. (with distinction)**, *Zhejiang University*, Hangzhou, China.
Major: Mathematics and Applied Mathematics
Ranked 1st of 15 in the Shing-Tung Yau's Mathematics Elite Class, Chu Kochen Honors College

Current Research

- Probabilistic Combinatorics, Extremal Combinatorics

Publications

1. Packing nearly optimal Ramsey $R(3,t)$ graphs (with Lutz Warnke) *Combinatorica* **40** (2020), 63–103
2. On the power of random greedy algorithms (with Lutz Warnke) *European Journal of Combinatorics* **105** (2022), Article 103551, 15 pp.
3. Non-uniform degrees and rainbow versions of the Caccetta-Häggkvist conjecture (with Ron Aharoni, Eli Berger, Maria Chudnovsky, Shira Zerbib) *SIAM Journal on Discrete Mathematics* **37** (2023), 1704–1714
4. Bounds on Ramsey games via alterations (with Lutz Warnke) *Journal of Graph Theory* **104** (2023) 470–484
5. Prague dimension of random graphs (with Kalen Patton and Lutz Warnke) *Combinatorica* **43** (2023), 853–884
6. Rainbow cycles for families of matchings (with Ron Aharoni) *Israel Journal of Mathematics* **256** (2023), 1–8
7. Tight infinite matrices (with Ron Aharoni), *Linear and Multilinear Algebra*, in press
8. Looms (with Ron Aharoni, Eli Berger, Joseph Briggs, Shira Zerbib) *Discrete Mathematics* **347** (2024), Article 114181, 15 pp.
9. Short rainbow cycles for families of matchings and triangles. *Journal of Graph Theory*, in press
10. 2-covers of wide Young diagrams (with Ron Aharoni, Eli Berger, Daniel Kotlar) arXiv:2311.17670, submitted

11. Intersections of matroids (with Ron Aharoni, Eli Berger, Daniel Kotlar) arXiv:2407.08789, submitted
12. The list chromatic number of the intersection of two generalized partition matroids arXiv:2407.08796, submitted
13. Coloring the intersection of two matroids (with Eli Berger) arXiv:2407.09160, submitted

Works in Progress

14. Semi-random greedy independent set algorithm (with Lutz Warnke), 40+pages (abstract of a talk)
15. Topological Hall (with Ron Aharoni, Eli Berger, and Erel Segal-Halevi)

Talks and Presentations

Invited talks

Sept. 2024	Discrete Mathematics Seminar, Umeå University, Umeå, Sweden
Aug. 2024	Combinatorics and Graph Theory Seminar, Xi'an Jiaotong University, Xi'an, Shaanxi, China
June 2024	Combinatorics Seminar, Tel Aviv University, Tel Aviv, Israel
Jan. 2024	Combinatorics Seminar, Technion, Haifa, Israel
Nov. 2023	Combinatorics Seminar, University of California San Diego, USA
Aug. 2023	Combinatorics Summer School, Soochow University, China
May 2023	Discrete Mathematics Seminar, Shandong University, China
Mar. 2022	Combinatorics Seminar, Technion, Haifa, Israel
Nov. 2021	Discrete Mathematics Seminar, University of South Carolina, Columbia, South Carolina, USA
Nov. 2021	DMS Combinatorics Seminar, Auburn University, Auburn, AL, USA
Sept. 2021	Young Mathematician Forum, Shandong University, China
Aug. 2021	Atlanta Lecture Series XXV (ALS 25), Georgia State University, Atlanta, GA, USA
Feb. 2021	Algebra and Combinatorics seminar, Texas A&M University, USA
Jan. 2021	Graph Theory Seminar, Georgia Tech, Atlanta, GA, USA
Nov. 2020	Discrete Mathematics Seminar, Shanghai University of Finance and Economics, China
Oct. 2020	AMS Fall Southeastern Sectional Meeting
Sept. 2020	Discrete Seminar, University of South Carolina, Columbia, SC, USA
June 2020	SIAM Conference on Discrete Mathematics (DM 20), Portland, OR, USA (Canceled due to COVID-19)
Mar. 2020	AMS Spring Eastern Sectional Meeting, Tufts University, Medford, MA, USA (Canceled due to COVID-19)
Dec. 2019	Combinatorics and Graph Theory Seminar, Xi'an Jiaotong University, Xi'an, Shaanxi, China
Mar. 2019	AMS Sectional Meeting, Auburn University, Auburn, AL, USA *Semi-random greedy independent set algorithm* (abstract)
June 2018	SIAM Conference on Discrete Mathematics (DM 18), Denver, CO, USA
Apr. 2018	AMS Sectional Meeting, Vanderbilt University, Nashville, TN, USA

Contributed talks

July 2021	28th British Combinatorial Conference (BCC 2021), Durham University, Durham, UK
June 2021	The 32nd International Conference on Probabilistic, Combinatorial and Asymptotic Methods for the Analysis of Algorithms (AofA2021)
Apr. 2021	Graduate Student Combinatorics Conference (GSCC), University of Minnesota, USA
Feb. 2021	CombinaTexas 2021, Texas A&M University, USA
Feb. 2021	Formal Analysis, Theory & Algorithms (FATA) Seminar, University of Glasgow, UK
Jan. 2021	The Postgraduate Combinatorial Conference (e-PCC Seminar Series 2020)
Sept. 2020	Junior Mathematician Research Archive

Aug. 2020	Bernoulli-IMS One World Symposium 2020 (Talk and Poster Presentation)
June 2020	Graduate Online Combinatorics Colloquium (GOCC)
Sept. 2019	ACO Student Seminar, Georgia Tech, Atlanta, GA, USA
May 2018	Workshop on Algorithms and Randomness, Georgia Tech, Atlanta, GA, USA
Sept. 2017	ACO Student Seminar, Georgia Tech, Atlanta, GA, USA
Aug. 2017	18th International Conference on Random Structures and Algorithms "RS&A2017", Poland
Apr. 2016	Graph Theory Seminar, Georgia Tech, Atlanta, GA, USA

Professional Activities

Professional Service

Referee for *Israel Journal of Mathematics*
Referee for *Journal of Combinatorial Theory, Series B*
Referee for *SIAM Journal on Discrete Mathematics*
Referee for *Random Algorithms & Structures*
Referee for *Combinatorics, Probability and Computing*
Referee for *Discrete Mathematics*
Referee for *Innovations in Graph Theory*

University Service

2017–2021	Organizer of ACO Student Seminar, Georgia Tech
2018, 2019	Panel Member of Math 6001 Introduction to Graduate Mathematics, Georgia Tech

Community Service

2020	Committee Member of Georgia Tech High School Math Competition
Apr. 2019	Volunteer of Georgia Tech High School Math Competition

Mentoring Experience

2020–2021	Supervise Undergraduates for Research: Kalen Patton, Chidozie Onyeze

Teaching

Teaching Assistant at Georgia Institute of Technology

Summer 2021	Math 4305 Topics in Linear Algebra
Fall 2020	Math 2603 Introduction to Discrete Mathematics
Summer 2020	Math 4305 Topics in Linear Algebra
Spring 2020	Math 2551 Multivariable Calculus
Fall 2019	Math 3012 Applied Combinatorics
Fall 2018	Math 3012 Applied Combinatorics
Fall 2017	Math 1551 Differential Calculus
Fall 2016	Math 1554 Linear Algebra
Fall 2015	Math 1553 Introduction to Linear Algebra

Grader at Georgia Institute of Technology

Fall 2016	Math 4022 Introduction to Graph Theory

Honors and Awards

2021	Top Graduate Award, School of Mathematics, Georgia Tech
2018, 2020	SIAM Student Travel Award, Society for Industrial and Applied Mathematics
2018	AMS Student Travel Award, American Mathematical Society
2017	ARC-ACO Fellowship, Georgia Tech *Supported by Algorithms & Randomness Center (ARC) for a competitive research project*

2016–2019, 2021 ACO Fellowship, Georgia Tech
This fellowship covers tuition and stipend for research assistants.

2016, 2017 Bob Price Fellowship Award, School of Mathematics, Georgia Tech
Awarded to some graduate students annually to support their travel to conferences

2015 Outstanding Graduates of Zhejiang Province, China
Awarded to some top undergraduate students in China at their graduation

2015 Outstanding Graduates of Zhejiang University Awarded on Undergraduate Period
Awarded to some top undergraduate students of Zhejiang University at their graduation

2014 Meritorious Winner in Mathematical Contest in Modeling, SIAM

2011–2014 First-Class Scholarship for Outstanding Students in Zhejiang University
Awarded to some top 3% students in Zhejiang University annually

2011–2014 First-Class Scholarship for Outstanding Merits in Zhejiang University

2013–2014 Baosteel Scholarship
Funded by Baosteel Education Foundation and awarded by Ministry of Education of China to outstanding students in China. Awarded to only 4 out of 25000 students in Zhejiang University

2013–2014 Dean Scholarship of Chu Kochen Honors College in Zhejiang University

2013–2014 First-Class Scholarship for Research and Innovation Scholarship in Zhejiang University

Workshops by Invitation

May–June 2017 Summer School on Random Graphs and Probabilistic Methods, the Fields Institute, Toronto, Ontario, Canada

Aug. 2016 Prague Summer School on Discrete Mathematics 2016, the Mathematical Institute of the Czech Academy of Sciences and Computer Science Institute of Charles University, Prague, Czech Republic

July 2016 São Paulo School of Advanced Science on Algorithms, Combinatorics and Optimization, Institute of Mathematics and Statistics of University of São Paulo, São Paulo, Brazil (with Poster Presentation)