SEPEHR HAJEBI – CV

November 26, 2025

Contact

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Appointments

- September 2024 – present: **Postdoctoral Scholar**
  Combinatorics and Optimization, University of Waterloo
  - *Funded by Sophie Spirkl*
- September 2024 – : **Junior faculty** (Instructor)
  Department of Mathematics, Princeton University
  - *Unattended amid U.S. travel restriction on all Iranian citizens*

Education

- September 2020 – August 2024: **PhD in Mathematics**
  Combinatorics and Optimization, University of Waterloo
  – Thesis: *Foreshadowing the Grid Theorem for Induced Subgraphs*
  – Advisor: Sophie Spirkl
- September 2012 – August 2019: **BSc and MSc in Mathematics**
  Isfahan University of Technology

Awards

- Graduate Research Excellence Award, 2025 ($2500 CAD)
  Faculty of Mathematics, University of Waterloo
- Mathematics Doctoral Prize: 1st place, 2025 ($1500 CAD)
  Faculty of Mathematics, University of Waterloo
- Governor General's Gold Medal, Finalist Designation, 2025
  University of Waterloo
- Sinclair Graduate Scholarship, Fall 2023 and Spring 2024 ($2000 CAD/term)
  Combinatorics and Optimization, University of Waterloo
- Outstanding TA Award, 2022
  Combinatorics and Optimization, University of Waterloo
- Math competitions:
  - Korean Mathematical Society Contest: Third Prize, 2016
    - Invited and funded by the South Korean Embassy in Iran
  - International Mathematics Competition: Third Prizes, 2015 and 2016
  - Iranian Mathematical Society Competition: Second (2015) and Third (2016) Prizes
- Elite Student Recognition, 2016 and 2018
  Isfahan University of Technology

PUBLICATIONS (with hyperlinks)

▶ JOURNAL PAPERS

1. *Induced subgraphs and tree decompositions XVI. Complete bipartite induced minors*
Journal of Combinatorial Theory, Series B 176 (2026), 287–318.
with M. Chudnovsky and S. Spirkl.
2. *Tree independence number II. Three-path-configurations*
Journal of Combinatorial Theory, Series B 176 (2026), 74–96.
with M. Chudnovsky, D. Lokshtanov and S. Spirkl.
3. *Chordal graphs, even-hole-free graphs and sparse obstructions to bounded treewidth*
Journal of Graph Theory (2025), 1–15.
4. *Induced subgraphs and tree decompositions IX. Grid theorem for perforated graphs*
Advances in Combinatorics 2025:3, 40pp.
with B. Alecu, M. Chudnovsky and S. Spirkl.
5. *Induced subgraphs and tree decompositions XII. Grid theorem for pinched graphs*
Innovations in Graph Theory 2 (2025), 1–23.
with B. Alecu, M. Chudnovsky and S. Spirkl.
6. *Induced subgraphs and tree decompositions XIV. Non-adjacent neighbors in a hole*
European Journal of Combinatorics 124 (2025), 104–074.
with M. Chudnovsky and S. Spirkl.
7. *Induced subdivisions with pinned branch vertices*
European Journal of Combinatorics 124 (2025), 104–072.
8. *Induced subgraphs and tree decompositions VI. Graphs with 2-cutsets*
Discrete Mathematics 348 (2025), 114–195.
with T. Abrishami, M. Chudnovsky and S. Spirkl.
9. *Induced subgraphs and tree decompositions XIII. Basic obstruction in $\mathcal{H}$-free graphs for finite $\mathcal{H}$*
Advances in Combinatorics 2024:6, 30pp.
with B. Alecu, M. Chudnovsky and S. Spirkl.
10. *List-k-Coloring H-free graphs for all $k \geq 4$*
Combinatorica 44 (2024). 1063–1068.
with M. Chudnovsky and S. Spirkl.
11. *Induced subgraphs and tree decompositions VIII: Excluding a forest in (theta, prism)-free graphs*
Combinatorica 44 (2024), 921–948.
with T. Abrishami, B. Alecu, M. Chudnovsky and S. Spirkl.
12. *Tree independence number I. (Even hole, diamond, pyramid)-free graphs*
Journal of Graph Theory 106 (2024), 923–943.
with T. Abrishami, B. Alecu, M. Chudnovsky. S. Spirkl and K. Vŭsković.
13. *List-3-Coloring ordered graphs with a forbidden induced subgraphs*
SIAM Journal on Discrete Mathematics 38 (2024), 1158–1190.
with Y. Li and S. Spirkl.
14. *Hitting all maximum stable sets in P_5-free graphs*
Journal of Combinatorial Theory, Series B 165 (2024), 142–163.
with Y. Li and S. Spirkl.
15. *Induced subgraphs and tree decompositions VII. Basic obstructions in H-free graphs*
Journal of Combinatorial Theory, Series B 164 (2024), 443–472.
with T. Abrishami, B. Alecu, M. Chudnovsky and S. Spirkl.
16. *Induced subgraphs and tree decompositions II. Toward walls and their line graphs in graphs of bounded degree*
Journal of Combinatorial Theory, Series B 164 (2024), 371–403.
with T. Abrishami, M. Chudnovsky, C. Dibek, P. Rzążewski, S. Spirkl and K. Vŭsković.

17. *Induced subgraphs and tree decompositions V. One neighbor in a hole*
Journal of Graph Theory 105 (2023), 542–561.
with T. Abrishami, B. Alecu, M. Chudnovsky. S. Spirkl and K. Vŭsković.
18. *Induced subgraphs and tree decompositions IV. (Even hole, diamond, pyramid)-free graphs*
Electronic Journal of Combinatorics 30 (2023)
with T. Abrishami, M. Chudnovsky and S. Spirkl.
19. *Induced subgraphs and tree decompositions III. 3-path-configurations and logarithmic treewidth*
Advances in Combinatorics 2022: 6, 29 pp.
with T. Abrishami, M. Chudnovsky and S. Spirkl.
20. *Complexity dichotomy for List-5-Coloring with a forbidden induced subgraph*
SIAM Journal on Discrete Mathematics 36 (2022), 2004–2027.
with Y. Li and S. Spirkl.
21. *Minimal induced subgraphs of two classes of 2-connected non-Hamiltonian graphs*
Discrete Mathematics 345 (2022).
with J. Cheriyan, Z. Qu and S. Spirkl.
22. *Edge clique cover of claw-free graphs*
Journal of Graph Theory 90 (2019), 311–405.
with R. Javadi.

▶ Preprints submitted for publication

23. *Induced subgraphs and tree decompositions XIX. Thetas and forests*
`arXiv:2506.05602`
with M. Chudnovsky, J. Codsi and S. Spirkl.
24. *Polynomial bounds for pathwidth*
`arXiv:2510.19120`.
25. *A simple layered-wheel-like construction*
`arXiv:2410.16495`
with M. Chudnovsky, D. Fischer, S. Spirkl and B. Walczak.
26. *Suns in triangle-free graphs of large chromatic number*
`arXiv:2506.10227`
with S. Spirkl.
27. *Halfway to induced saturation for even cycles*
`arXiv:2505.24100`
with X. Fan, Sahab Hajebi and S. Spirkl.
28. *Bull-free graphs and χ-boundedness*
`arXiv:2504.21093`.
29. *Induced subgraphs and tree decompositions XVIII. Obstructions to bounded pathwidth*
`arXiv:2412.17756`.
with M. Chudnovsky and S. Spirkl.
30. *Induced subgraphs and tree decompositions XVII. Anticomplete sets of large treewidth*
`arXiv:2411.11842`.
with M. Chudnovsky and S. Spirkl.
31. *Tree independence number IV. Even-hole-free graphs*
`arXiv:2407.08927`
• Conference version at **SODA (2025)**, 4444–4461.
with M. Chudnovsky, P. Gartland, D. Lokshtanov and S. Spirkl.

32. *Tree independence number III. Thetas, prisms and stars*
`arXiv:2406.13053`
with M. Chudnovsky and N. Trotignon.

33. M. Chudnovsky, P. Gartland, S. Hajebi, D. Lokshtanov and S. Spirkl
Induced subgraphs and tree decompositions XV. Even-hole-free graphs have logarithmic treewidth
with M. Chudnovsky, D. Lokshtanov and S. Spirkl.

34. *Induced subgraphs and tree decompositions XI. Local structure in even-hole-free graphs of large treewidth*
`arXiv:2309.04390`
with B. Alecu, M. Chudnovsky and S. Spirkl.

35. *Induced subgraphs and tree decompositions X. Towards logarithmic treewidth for even-hole-free graphs*
`arXiv:2307.13684`
with T. Abrishami, B. Alecu, M. Chudnovsky and S. Spirkl.

Talks

- *Complete bipartite induced minor (and treewidth)*
Willaim Tutte Colloquium, University of Waterloo, 2025
- *Local and global structure of non-basic obstructions to bounded treewidth*
CanaDAM (invited at the Structural Graph Theory Minisymposium), University of Ottawa, 2025.
- *"Underview" of excluded induced subgraphs for bounded pathwidth*
Barbados Graph Theory Workshop, Bellairs Research Institute, Holetown, Barbados 2025
- *The pathwidth theorem for induced subgraphs*
IBS discrete math seminar, Daejeon, South Korea, 2025
- *The pathwidth theorem for induced subgraphs*
Graphs and Matroids Seminar, University of Waterloo, 2024
- *Anticomplete sets of large treewidth*
BIRS Workshop on New Perspectives in Colouring and Structure, 2024
- *Survey on induced subgraphs of graphs with large treewidth*
Barbados Graph Theory Workshop, Bellairs Research Institute, Holetown, Barbados 2024
- *Treewidth, Erdős-Pósa and induced subgraphs* [virtual]
New York Combinatorics Seminar, 2024
- *Several Gyárfás-Sumner-type results for treewidth*
Graphs and Matroids Seminar, University of Waterloo, 2023
- *Hitting all maximum stable sets in P_5-free graphs*
Graphs and Matroids Seminar, University of Waterloo, 2023
- *Forests in even-hole-free graphs of large treewidth*
Barbados Graph Theory Workshop, Bellairs Research Institute, Holetown, Barbados 2022
- *Holes, hubs, and bounded treewidth* [virtual]
IBS Discrete Math Seminar, 2022
- *Bounded treewidth in hereditary graph classes*
Graphs and Matroids Seminar, University of Waterloo, 2022
- *Bounded treewidth in hereditary graph classes*
Seymour was 70 two years ago, ENS de Lyon, France, 2022

Teaching

- **Course taught as Postdoctoral Scholar at Waterloo**
  - MATH 116 Calculus I for Engineering (Fall 2025)
  - MATH 135 Algebra for Honours of Mathematics (Winter 2026 – Upcoming)

  - CO 380 Mathematical Discovery and Invention (Spring 2026 – Upcoming)

- **Courses TA'ed as PhD student at Waterloo**
  - CO 342 Graph theory (Spring 2023)
  - MATH 138 Calculus II for honors of mathematics (Winter 2023)
  - MATH 600 Mathematical software (Fall 2022)
  - CO 456 Game theory (Fall 2022 & 2023)
  - CO 380 Mathematical discovery and invention (Spring 2022)
  - MATH 239 Introduction to combinatorics (Winter 2022)
  - CO 255 Advanced optimization (Winter 2022)
  - CO 250 Introduction to optimization (Fall 2021 & 2023, Winter 2023 & 2024, Spring 2024)
  - CO 450/650 Graph theory (graduate) (Fall 2021)
  - CO 351 Network-flow theory (Spring 2021)
- **Courses TA'ed as BSc/MSc student at Isfahan University of Technology**
  - Computational complexity (graduate) (2019)
  - Elements of matrices and linear algebra (2018)
  - Applied linear algebra (for engineering) (2018)
  - Graph theory (2016)
  - Graph theory (graduate) (2014, 2017)
  - Elements of combinatorics (2014, 2016, 2017)

Service

- **Supervision/Mentorship**
  - Graduate students:
    - Xinyue Fan (MSc, 2024 – present, joint with Sophie Spirkl)
  - Directed Reading Program (DRP):
    - Spring 2024 project: *Non-constructive methods in combinatorics*
      Mentees: Anna Henderson and Gioia De Leonardis
    - Fall 2023 project: *Introduction to graph minor theory*
      Mentees: Xinyue Fan and Lyncy Li
  - Undergraduate Research Assistant Program (URA):
    - Spring 2023 project: *Maximum transitive set in H-free tournaments*
      Mentee: Yun Xing
- **Organizing**
  - *Themes and trends in structural graph theory* – Organizer
    Workshop at the American Institute of Mathematics (AIM), to be held in 2027.

- **Refereeing for journals and conference proceedings**: International Mathematics Research Notices, Journal of Combinatorial Theory, Series B, Combinatorica, Journal of Graph Theory, European Journal of Combinatorics, Electronic Journal of Combinatorics, ACM-SIAM Symposium on Discrete Algorithms (SODA), European Conference on Combinatorics, Graph Theory and Applications, Workshop on Graphs.