Curriculum Vitae
Swee Hong Chan

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Education/Employment

2022 –	**Assistant Professor** (tenure-track), Rutgers University
2019 – 2022	**Hedrick Assistant Professor** (postdoc), UCLA (mentor: Igor Pak)
2014 – 2019	**Ph.D** student in Mathematics, Cornell University (advisor: Lionel Levine)
2014 – 2016	**M.S.** (Special) in Mathematics, Cornell University
2012 – 2014	Research Assistant, Nanyang Techonological University (mentor: Dmitrii V. Pasechnik)
2008 – 2012	**B. Sc.** in Mathematical Sciences, Nanyang Technological University (with Honors)

Awards and Fellowships

2023 – now	**National Science Foundation** Award No. 2246845
2022	**UCLA Liggett Instructor Teaching Award**
2021 – now	**AMS Simons** Travel Grant
2017 – 2018	**Robert John Bättig Graduate Prize**, awarded to a Cornell graduate student based on excellence and promise in mathematics
2014	**Cornell Graduate Student Recruiting Fellowship**
2012	**The Singapore Mathematical Society Gold Medal and Book Prize**, Nanyang Technological University, for best overall performance in Bachelor of Science (Mathematics)
2009 – 2012	**International Mathematical Competition** for University Students, First Prize (2012), Second Prize (2010, 2011), Honorable Mention (2009)

Research interests

Combinatorics, Complexity Theory, and Probability

Preprints

26. S.H. Chan and I. Pak, Linear extensions and continued fractions, 14 pp. [arXiv:2401.09723](https://arxiv.org/abs/2401.09723)

25. S.H. Chan and I. Pak, Linear extensions of finite posets, 55 pp. [arXiv:2311.02743](https://arxiv.org/abs/2311.02743)

24. S.H. Chan and I. Pak, Equality cases of the Alexandrov–Fenchel inequality are not in the polynomial hierarchy, 35 pp. [arXiv:2309.05764](https://arxiv.org/abs/2309.05764)
Extended abstract: to appear in *Proc. 56th STOC* (June, 2024).

23. S.H. Chan and I. Pak, Computational complexity of counting coincidences, 23 pp. [arXiv:2308.10214](https://arxiv.org/abs/2308.10214)

22. S.H. Chan and I. Pak, Correlation inequalities for linear extensions, 23 pp. [arXiv:2211.16637](https://arxiv.org/abs/2211.16637)

Journal publications

21. S. H. Chan and I. Pak, Log-concave poset inequalities, 71 pp. [arXiv:2110.10740](https://arxiv.org/abs/2110.10740).
Journal of Association for Mathematical Research, vol. 2, issue 1 (2024), 53–153.
Extended abstract: *Sém. Lothar. Combin.* **86B** (2022), no. 9, 12 pp. [Link]

20. S.H. Chan, I. Pak, and G. Panova, On the cross-product conjecture for the number of linear extensions, 24 pp. To appear in *Canad. J. Math.* [arXiv:2306.09240](https://arxiv.org/abs/2306.09240)

19. S. H. Chan and I. Pak, Multivariate correlation inequalities for P-partitions,
Pacific J. Math. **323** (2023), 223–252. [arXiv:2212.11954](https://arxiv.org/abs/2212.11954).

18. S.H. Chan, I. Pak, and G. Panova, Effective poset inequalities, 36 pp,
SIAM J. Discrete Math. **37** (2023), 1842–1880. [arXiv:2205.02798](https://arxiv.org/abs/2205.02798)

17. S.H. Chan, I. Pak, and G. Panova, Extensions of the Kahn–Saks inequality for posets of width two,
    Comb. Theory **3** (2023), P1.8. arXiv:2106.07133

16. S. H. Chan, Recurrence of horizontal-vertical walks, 34 pp,
    Ann. Inst. Henri Poincaré Probab. Stat. **59** (2023), 578–605. arXiv:2012.10811

15. S. H. Chan and I. Pak, Introduction to the combinatorial atlas, 28 pp,
    Expo. Math. **40** (2022), 1014–1048. arXiv:2203.01533.

14. S.H. Chan, I. Pak, and G. Panova, Log-concavity in planar random walks, 8 pp,
    Combinatorica **42** (2022), 1011–1026. arXiv:2106.10640

13. S.H. Chan, I. Pak, and G. Panova, The cross-product conjecture for width two posets,
    Trans. Amer. Math. Soc. **375** (2022), 5923–5961. arXiv:2104.09009

12. S. H. Chan and L. Levine, Abelian networks IV. Dynamics of nonhalting networks,
    Mem. Amer. Math. Soc. **276** (2022), no. 1358, vii+89 pp. arXiv:1804.03322

11. S.H. Chan, I. Pak, and G. Panova, Sorting probability for large Young diagrams,
    Discrete Anal. (2021), no. 24, 57 pp. arXiv:2005.08390

10. S. H. Chan, L. Greco, L. Levine, and P. Li, Random walks with local memory,
    J. Stat. Phys. **84** (2021), no. 6, 28 pp. arXiv:1809.04710

9. S.H. Chan, I. Pak, and G. Panova, Sorting probability of Catalan posets,
   Adv. in Appl. Math. **129** (2021), no. 102201, 13 pp. arXiv:2005.13686

8. S. H. Chan, Infinite-step stationarity of rotor walk and the wired spanning forest,
   Proc. Amer. Math. Soc. **149** (2021), 2415–2428. arXiv:1909.13195

7. S. H. Chan, A rotor configuration with maximum escape rate,
   Electron. Commun. Probab. **25** (2020), no. 19, 5pp. arXiv:1810.12784

6. S. H. Chan, Rotor walks on transient graphs and the wired spanning forest,
   SIAM J. Discrete Math. **33** (2019), 2369–2393. arXiv:1809.09790

5. S. H. Chan, A bijection between necklaces and multisets with divisible subset sum,
   Electron. J. Combin. **26** (2019), P1.37, 18 pp. arXiv:1802.03507

4. S. H. Chan, Abelian sandpile model and Biggs-Merino polynomial for directed graphs,
   J. Combin. Theory Ser. A **154** (2018), 145–171. arXiv:1412.4837

3. M. Aguiar and S. H. Chan, Toric arrangements associated to graphs: extended abstract,
   Sém Lothar. Combin. **78B** (2017), no. 84, 12 pp. Link

2. S. H. Chan, Quasi-periodic tiling with multiplicity: a lattice enumeration approach,
   Discrete Computat. Geom. **54** (2015) 647–662. arXiv:1405.6928

1. S. H. Chan, H. Hollmann and D. Pasechnik, Sandpile groups of generalized de Bruijn and Kautz graphs and circulant matrices over finite fields,
   J. Algebra **421** (2015), 268–295. arXiv:1405.0113

Talks

2024 Apr	Integrability and Algebraic Combinatorics: Institute for Pure and Applied Mathematics (IPAM) Workshop, Los Angeles, USA, *Complexity of combinatorial log–concave inequalities*
2024 Apr	UM Combinatorics Seminar, Ann Arbor, USA, *Complexity of combinatorial log–concave inequalities*
2024 Jan	AMS Special Session on Large Random Permutations, Joint Math Meeting, San Fransisco, USA, *Log-concavity for order-preserving permutations and order-preserving functions*
2023 Nov	Seminário de Teoria dos Números, Universidade de São Paulo, São Paulo, Brazil, *Complexity of combinatorial log-concave inequalities*

2023 Nov   University of Minnesota Mathematics Colloquium, University of Minnesota, Minneapolis, USA, *Complexity of combinatorial log-concave inequalities*

2023 May   Lectures on Laplacian Growth, , Beijing Institute of Mathematical Sciences and Applications, Beijing, China, *In between random walks and rotor walks*

2023 Apr.   CUNY Probability Seminars, City University of New York, New York City, USA, *Log-concavity, cross product conjectures, and FKG inequalities in order theory*

2023 Mar.   Combinatorics and Graph Theory Seminar, Michigan State University, East Lansing, USA, *Log-concavity, cross product conjectures, and FKG inequalities in order theory*

2023 Mar.   Combinatorics, Algebra, and Geometry Seminar, Drexel University, Philadelphia, USA, *Combinatorial atlas for log-concave inequalities*

2023 Feb.   Probability Seminar, University of Wisconsin–Madison, Madison, USA, *Log-concavity and cross product inequalities in order theory*

2022 Nov.   2022–2023 Matroids – Combinatorics, Algebra and Geometry Seminar, Toronto, Canada, *Combinatorial atlas for log-concave inequalities*

2022 Nov.   2022–2023 Matroids – Combinatorics, Algebra and Geometry Seminar, Toronto, Canada, *Combinatorial atlas for log-concave inequalities*

2022 Oct.   Rutgers University, Discrete Mathematics Seminar, Piscataway, USA, *Log-concavity and cross product inequalities in Order Theory*

2022 Oct.   Rutgers University, Experimental Mathematics Seminar, Piscataway, USA, *Sorting probability for Young diagrams*

2022 Oct.   UC Davis Algebra and Discrete Mathematics Seminar, Davis, USA, *Combinatorial atlas for log-concave inequalities*

2022 Sep.   Rutgers University, Research Glimpse Talks for Graduate Students, Piscataway, USA, *Combinatorial aspects of log-concave inequalities*

2022 Jul.   The 34th International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC 2022), Bangalore, India, *Combinatorial atlas for log-concave inequalities*

2022 Jun.   University of Waterloo Tutte Colloquium, Waterloo, Canada, *Combinatorial atlas for log-concave inequalities*

2022 Jun.   Göran Gustafsson Symposium, Institut Mittag–Leffler, Sweden, *Combinatorial atlas for log-concave inequalities*

2022 Apr.   University of Massachusetts Amherst Discrete Mathematics Seminar, Amherst, USA, *Combinatorial atlas for log-concave inequalities*

2022 Mar.   UMN Combinatorics Seminar, Minneapolis, USA, *Combinatorial atlas for log-concave inequalities*

2022 Mar.   Brown Combinatorics Seminar, Providence, USA, *Combinatorial atlas for log-concave inequalities*

2022 Feb.   California Institute of Technology, Los Angeles Probability Forum, Pasadena, USA, *Combinatorial atlas for log-concave inequalities*

2021 Nov.   University of Washington, Combinatorics and Geometry Seminar, Seattle, USA, *Combinatorial atlas for log-concave inequalities*

2021 Oct.   Cornell University, Discrete Geometry and Combinatorics Seminar, Ithaca, USA, *Combinatorial atlas for log-concave inequalities*

2021 Oct.   UC Berkeley, Combinatorics Seminar, Berkeley, USA, *Combinatorial atlas for log-concave inequalities*

2021 Sep.   UCLA, Combinatorics Seminar, Los Angeles, USA, *Combinatorial atlas for log-concave inequalities*

2021 Sep.   Rutgers University, Discrete Mathematics Seminar, Piscataway, USA, *Log-concave inequality for posets*

2021	Sep.	Princeton University, Discrete Mathematics Seminar, Princeton, USA, *Log-concave inequality for posets*
2021	Sep.	Cornell University, Probability Seminar, Ithaca, USA, *Sorting probability for Young diagrams*
2021	Apr.	University of Illinois at Chicago, Combinatorics and Probability Seminar, Chicago, USA, *Sorting probability for Young diagrams*
2021	Mar.	Purdue University Probability seminar, West Lafayette, USA, *Performing random walks without any randomness*
2020	Dec.	Cornell University: Topics in Probability , Ithaca, USA, *In between random walk and rotor walk*
2020	Dec.	Southern California Probability Symposium , Los Angeles, USA, *Sorting probability for Young diagrams*
2020	Nov.	CUNY Probability Seminar, New York, USA, *Sorting probability for Young diagrams*
2020	Oct.	UCLA Combinatorics Seminar, Los Angeles, USA, *Sorting probability for Young diagrams*
2020	Jan.	UCSD Combinatorics Seminar, San Diego, USA, *Performing random walks without any randomness*
2019	Dec.	USC Combinatorics Seminar, Los Angeles, USA, *Rotor walk and escaping from prison*
2019	Oct.	UCLA Probability Seminar, Los Angeles, USA, *Random walks with local memory in the square lattice*
2018	Nov.	Duke Probability Seminar, Durham, USA, *Random walks with local memory in the square lattice*
2018	Sep.	Penn/Temple Probability Seminar, Philadelphia, USA, *In between random walk and rotor walk in the square lattice*
2018	June	Fifth IMS Asia Pacific Rim Meeting (IMS-APRM), Singapore, Singapore, *In between random walk and rotor walk in the square lattice*
2018	April	Graduate Student Combinatorics Conference, Dallas, USA. *Necklaces and subset-sums: How can they be related?*
2018	March	Princeton Topics in Probability Seminar, Princeton, USA. *In between random walk and rotor walk in the square lattice*
2017	Nov.	Binghamton Combinatorics Seminar, Binghamton, USA. *Toric arrangements that come from graphs*
2017	Nov.	2017 Northeast Probability Seminar, New York City, USA. *Random walks with local memory on the square lattice*
2017	Aug.	Pacific Rim Mathematical Association (PRIMA) Third Congress, Oaxaca, Mexico. *Toric arrangements that come from graphs*
2017	July	The 29th International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC 2017), London, UK. *Toric arrangements associated to graphs*
2017	April	Finger Lakes Probability Seminar, Syracuse, USA. *Random walks with local memory on the square lattice*
2017	April	Graduate Student Combinatorics Conference, Kansas, USA. *Toric graphic arrangements*
2015	Nov.	Banff International Research Station Workshop on Sandpile Groups, Oaxaca, Mexico. *Abelian networks and a weak version of Merino's theorem*
2015	May	Connections in Discrete Mathematics, Vancouver, BC, Canada. *Greedoid polynomial, chip-firing, and G-parking function for directed graphs*
2013	Sep.	The Seventh European Conference on Combinatorics, Graph Theory and Applications (Eurocomb 2013), Pisa, Italy. *Critical groups of generalized de Bruijn and Kautz graphs and circulant matrices over finite fields*

Outreach activities

2023 April Rutgers Day, Department of Mathematics, Rutgers University
An annual outreach program at Rutgers University focused on promoting mathematics through engaging and interactive events.

2023 Summer Research Experiences for Undergraduates (REU), Academic Mentor, Center for Discrete Mathematics and Theoretical Computer Sciences (DIMACS)

2022 – now Olga Radko Math Circle, Steering Committee, UCLA

2022 Summer CSU-UCLA Mathematics Summer Bridge Program, Co-organizer, UCLA
An annual summer program at UCLA to encourage and strengthen the PhD applications of participants from CSU Northridge, Cal State LA and CSU San Bernardino

2021 – 2022 Olga Radko Math Circle, Deputy Director, UCLA
Handling administrative duties and developing materials that aims to introduce advanced mathematics to students at all level in a fun and accessible manner.

2021 Summer Research in Industrial Projects for Students (RIPS), Academic Mentor, Institute of Pure and Applied Mathematics (IPAM)

2020 – 2021 Olga Radko Math Circle, Curriculum and Instructional Supervisor, UCLA
Supervising instructors and developing materials for the math circle's advanced group, with a focus on introducing advanced mathematics to talented high school students.

2019 May Math Explorer's Club, Instructor, Cornell University
Introducing *Markov chain and its applications* to middle and high school students through interactive and fun activities.

Organizing activities

2023 – now Rutgers Discrete Mathematics Seminar, Co-organizer (with Quentin Dubroff, Jeff Kahn, and Bhargav Narayanan)

2023 Formal Power Series and Algebraic Combinatorics 2023, Program Committee

2021 April Sixth Southern California Discrete Math Symposium, Co-organizer (with Asaf Ferber)

2019 – 2022 UCLA Combinatorics Seminar, Co-organizer (with Igor Pak and Pavel Galashin)

2017 – 2019 Cornell Probability Seminar, Co-organizer (with Lionel Levine, Philippe Sosoe, and Pierre Patie)

Other professional activities

2022 – 2023 Graduate Admission Committee, Math Department, Rutgers University

2021 – 2022 Equity Diversity Inclusion Committee, Math Department, UCLA

2020 – 2021 Course Development Teaching Committee, Math Department, UCLA

Teaching activities

2024 Spring Combinatorics II (16:642:583:01), Instructor, Rutgers University

2023 Fall Probability Theory (16:640:477:02), Instructor, Rutgers University

2023 Spring Graph Theory (16:640:428:02), Instructor, Rutgers University

2022 Fall Graph Theory (16:642:581), Instructor, Rutgers University

2022 Spring Probability Theory II (MATH 170B), Instructor, UCLA

2022 Winter Introduction to Probability and Statistics II (MATH 170S), Instructor, UCLA

2021 Spring Introduction to Probability and Statistics II (MATH 170S), Instructor, UCLA

2021 Winter Introduction to Probability and Statistics I (MATH 170E), Instructor, UCLA

2020 Fall Introduction to Probability and Statistics II (MATH 170S), Instructor, UCLA

2020 Spring Introduction to Probability and Statistics II (MATH 170S), Instructor, UCLA

2020 Winter Enumerative Combinatorics (MATH 184), instructor, UCLA

2019 Fall Introduction to Probability and Statistics I (MATH 170E), Instructor, UCLA

2019	Spring	Calculus II (MATH 1120), instructor, Cornell University
2018	Fall	Probability Theory I (MATH 6710), Teaching Assistant, Cornell University
2018	Spring	Probability Theory II (MATH 6720), teaching assistant, Cornell University
2017	Fall	Calculus II (MATH 1120), Instructor, Cornell University
2017	Spring	Applicable Algebra (MATH 3360), Teaching Assistant, Cornell University
2016	Spring	Probability Theory II (MATH 6720), Teaching Assistant, Cornell University
2015	Fall	Linear Algebra for Engineers (MATH 2940), Teaching Assistant, Cornell University
2014	Spring	Mathematical Problem Solving (MH9000), Instructor, Nanyang Technological University
2013	Fall	Calculus III (MH2100), Teaching Assistant, Nanyang Technological University
2013	Spring	Calculus II (MH1101), Teaching Assistant, Nanyang Technological University
2012	Fall	Calculus for the Science I (MH1800), Teaching Assistant, Nanyang Technological University

Journals refereed

Advances in Mathematics

Advances in Applied Mathematics

Combinatorial Theory

Discrete and Computational Geometry

Discrete Applied Mathematics

Discrete Mathematics

Electronic Journal of Combinatoris

European Journal of Combinatoris

Journal of Theoretical Probability

Journal of Combinatorial Theory, Series A

Linear Algebra and its Applications

Probability Theory and Related Fields

Proceedings of the National Academy of Sciences

Random Structures & Algorithms

SIAM Journal of Discrete Mathematics

The Australasian Journal of Combinatorics

Transactions of the American Mathematical Society