

Dun Qiu

Contact Information

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Center for Combinatorics, LPMC

Nankai University

Tianjin, P. R. China

Education

University of California San Diego, La Jolla, CA

Ph.D. in Mathematics

Advisor: Jeffrey Remmel and Brendon Rhoades

Sept. 2014–June 2019

GPA: 4.00

Zhejiang University, Hangzhou, China

B.S. in Mathematics & Applied Mathematics (Honor)

Sept. 2010–June 2014

GPA: 3.82

Employment

Nankai University, Tianjin, P. R. China

Associate Professor, Center for Combinatorics, LPMC

Feb. 2023–present

Beijing Jiaotong University, Beijing, P. R. China

Lecturer, Department of Mathematics

Sept. 2019–Dec. 2022

Awards

NSFC Grant (12001037): Combinatorial Problems Derived from the Shuffle Conjecture.
240,000RMB. 2021–2023.

Research Interests

My research area is algebraic and enumerative combinatorics.

My primary interest in algebraic combinatorics is the combinatorics of symmetric functions and Macdonald polynomials, with a focus on the Rational Shuffle Conjecture and the Delta Conjecture, which build relations between combinatorial objects such as parking functions and the Frobenius Characteristic of some algebraic structures such as diagonal harmonics.

My primary interests in enumerative combinatorics are permutation patterns and ordered set partition enumerations.

Papers

1. **Pattern-Avoidance and Fuss–Catalan Numbers** [with P. Alexandersson, F. Kebede and S. Fufa] *Journal of Integer Sequences*, **26** (2023), #23.4.2.
2. **Schur function expansions and the Rational Shuffle Theorem** [with J. Remmel] *Journal of Combinatorial Theory, Series A*, **175** (2020), #105272.
3. **The valley version of the Extended Delta Conjecture** [with A. Wilson] *Journal of Combinatorial Theory, Series A*, **175** (2020), #105271.
4. **Classical pattern distributions in $\mathcal{S}_n(132)$ and $\mathcal{S}_n(123)$** [with J. Remmel] *Discrete Mathematics & Theoretical Computer Science*, **21** (2) (2019), #2.

5. **Patterns in words of ordered set partitions** [with J. Remmel]
Journal of Combinatorics, **10 (3)** (2019), 433–490.
6. **Counting consecutive pattern matches in $\mathcal{S}_n(132)$ and $\mathcal{S}_n(123)$**
[with R. Pan and J. Remmel] *Advances in Applied Mathematics*, **105** (2019), 130–167.
7. **Schur function expansions and the Rational Shuffle Conjecture** [with J. Remmel]
Extended abstract: *Séminaire Lotharingien de Combinatoire*, **78B** (2017), #83.
8. **On the Schur positivity of $\Delta_{e_2} e_n[X]$** [with J. Remmel, E. Sergel and G. Xin]
Electronic Journal of Combinatorics, **25 (4)** (2018), 4–20.
9. **Quadrant marked mesh patterns in 123-avoiding permutations** [with J. Remmel]
Discrete Mathematics & Theoretical Computer Science, **19 (2)** (2018), #12.

Preprints and Papers in Preparation

1. **Reciprocity method applications in ordered set partitions**, Completed.
2. **e -positivity results and conjectures** [with A. Garsia, J. Haglund and M. Romero]
arXiv preprint:1904.07912 (2019).

Talks and Posters

1. **Peak distributions and peak maps in lattice paths** (talk) Apr. 2023
Seminar on Combinatorics, Chinese Academy of Sciences, Beijing, China
2. **Mod k -alternating permutations and pattern avoidance** (talk) Sep. 2021
Combinatorics Seminar, KTH Royal Institute of Technology, online
3. **Exploring a combinatorial model of Stanley’s e -positive conjecture** (talk) Apr. 2021
Workshop on Combinatorics, Algebra and Geometry, Center for Combinatorics Seminar, Nankai University, Tianjin, China
4. **q -unimodality of parking function polynomials** (talk) Nov 2020
5th Conference on Combinatorics and Symbolic Computation, Zhejiang Normal University, Jinhua, Zhejiang, China
5. **Bijjectivity Problems in Parking Functions** (talk) July 2020
2020 Workshop on Algebraic Combinatorics, Sichuan University, Chengdu, Sichuan, China
6. **Mod k -alternating permutations in $\mathcal{S}_n(132)$** (talk) Jun. 2020
Permutation Patterns Virtual Workshop 2020, Valparaiso University, online
7. **Some conjectures about column LLT polynomials** (talk) May. 2019
UC Davis Algebraic Geometry Seminar, UC Davis, Davis, CA, USA
8. **Counting classical patterns in $\mathcal{S}_n(132)$ and $\mathcal{S}_n(123)$** (talk) Jan. 2019
UCLA Combinatorics Seminar, UCLA, Los Angeles, CA, USA
9. **Classical permutation distribution in $\mathcal{S}_n(132)$ and $\mathcal{S}_n(123)$** (talk) July 2018
16th International Conference on Permutation Patterns, Hanover, NH, USA
10. **Combinatorial problems in Dyck paths and parking functions** (talk) July 2018
Center for Combinatorics Seminar, Nankai University, Tianjin, China
11. **Conjectures for the delta operator expression $\Delta'_{e_k} \Delta_{h_r} e_n$** (talk) Mar. 2018
The CAGE Seminar, University of Pennsylvania, Philadelphia, PA, USA
12. **Conjectures for $\Delta'_{e_k} \Delta_{h_r} e_n$** (talk) Jan. 2018
LaCIM, Université du Québec à Montréal, Montréal, Canada

13. **Special cases in the combinatorics of Rational Shuffle Conjecture** (talk) Aug. 2017
Center for Combinatorics Seminar, Nankai University, Tianjin, China
14. **Schur function expansions and the Rational Shuffle Conjecture** (poster) July 2017
The 29th International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC 2017), Queen Mary University of London, London, UK
15. **Quadrant marked mesh patterns in 123-avoiding permutations** (poster) June 2017
15th International Conference on Permutation Patterns, Reykjavik, Iceland
16. **Patterns in ordered set partitions and parking functions** (talk) June 2016
14th International Conference on Permutation Patterns, Washington D.C., USA
17. **Rational Shuffle Conjecture when $n = 3$ or $m = 3$** (talk) May 2016
Combinatorics Colloquium, UC San Diego, La Jolla, CA, USA

Teaching

Primary instructor: Graph Theory, Discrete Mathematics, Combinatorics, Calculus, Linear Algebra, Pre-calculus.

Teaching assistant: Combinatorics, Game Theory, Topology, Applied Algebra, Calculus, Linear Algebra, Differential Equations, Mathematical Reasoning, Topics in Data Science (2014-2019).

Undergraduate tutor: Graph Theory, Real Analysis, Mathematical Reasoning, Abstract Algebra, Numerical Analysis (2015-2018).

Honors

James B. Ax Fellowship (UC San Diego)

Meritorious Prize in Mathematical Contest in Modeling 2014 (COMAP)

First Prize (16th in the nation) in China Undergraduate Mathematical Contest Finals (Chinese Mathematical Society)

First-Class Scholarship for Outstanding Students (Zhejiang University)

Oulin Scholarship 2013 (Oulin Company)

First Prize in National Mathematical Olympiad in Senior (Chinese Mathematical Society)

Miscellanea

Softwares: proficient in SageMath, Maple, Mathematica and L^AT_EX;
familiar with C/C++, Python, Matlab, Html, Java, Ruby, etc.

Languages: native in Chinese, fluent in English and Japanese.

Hobby: music composing and arranging.