

Dun Qiu

Contact Information

Telephone: (+86) 187-6811-9237

Email: qiudun123@163.com

Website: <http://www.math.ucsd.edu/~duqiu>

Department of Mathematics

Beijing Jiaotong University

Beijing, 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

Beijing Jiaotong University, Beijing, P. R. China

Lecturer, Department of Mathematics

Sept. 2019–present

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 in Preparation

1. **Mod k alternating permutations in $S_n(132)$** , Completed.
2. **Reciprocity method applications in ordered set partitions**, Completed.
3. **e -positivity results and conjectures** [with A. Garsia, J. Haglund and M. Romero]
arXiv preprint:1904.07912 (2019).

Papers

1. **Schur function expansions and the Rational Shuffle Theorem** [with J. Remmel]
Journal of Combinatorial Theory, Series A, **175** (2020), 105272.
2. **The valley version of the Extended Delta Conjecture** [with A. Wilson]
Journal of Combinatorial Theory, Series A, **175** (2020), 105271.

3. **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.
4. **Patterns in words of ordered set partitions** [with J. Remmel]
Journal of Combinatorics, **10 (3)** (2019), 433–490.
5. **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.
6. **Schur function expansions and the Rational Shuffle Conjecture** [with J. Remmel]
Extended abstract: *Séminaire Lotharingien de Combinatoire*, **78B** (2017), #83.
7. **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.
8. **Quadrant marked mesh patterns in 123-avoiding permutations** [with J. Remmel]
Discrete Mathematics & Theoretical Computer Science, **19 (2)** (2018), #12.

Talks and Posters

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|---|-----------|
| 1. Bijectivity Problems in Parking Functions (talk)
<i>2020 Workshop on Algebraic Combinatorics</i> , Sichuan University, Sichuan, China | July 2020 |
| 2. Mod k-alternating permutations in $\mathcal{S}_n(132)$ (talk)
<i>Permutation Patterns Virtual Workshop 2020</i> , Valparaiso University, IN, USA | Jun. 2020 |
| 3. Some conjectures about column LLT polynomials (talk)
<i>UC Davis Algebraic Geometry Seminar</i> , UC Davis, Davis, CA, USA | May. 2019 |
| 4. Counting classical patterns in $\mathcal{S}_n(132)$ and $\mathcal{S}_n(123)$ (talk)
<i>UCLA Combinatorics Seminar</i> , UCLA, Los Angeles, CA, USA | Jan. 2019 |
| 5. Classical permutation distribution in $\mathcal{S}_n(132)$ and $\mathcal{S}_n(123)$ (talk)
<i>16th International Conference on Permutation Patterns</i> , Hanover, NH, USA | July 2018 |
| 6. Combinatorial problems in Dyck paths and parking functions (talk)
<i>Center for Combinatorics Seminar</i> , Nankai University, Tianjin, China | July 2018 |
| 7. Conjectures for the delta operator expression $\Delta'_{e_k} \Delta_{h_r} e_n$ (talk)
<i>The CAGE Seminar</i> , University of Pennsylvania, Philadelphia, PA, USA | Mar. 2018 |
| 8. Conjectures for $\Delta'_{e_k} \Delta_{h_r} e_n$ (talk)
<i>LaCIM</i> , Université du Québec à Montréal, Montréal, Canada | Jan. 2018 |
| 9. Special cases in the combinatorics of Rational Shuffle Conjecture (talk)
<i>Center for Combinatorics Seminar</i> , Nankai University, Tianjin, China | Aug. 2017 |
| 10. Schur function expansions and the Rational Shuffle Conjecture (poster)
<i>The 29th International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC 2017)</i> , Queen Mary University of London, London, UK | July 2017 |
| 11. Quadrant marked mesh patterns in 123-avoiding permutations (poster)
<i>15th International Conference on Permutation Patterns</i> , Reykjavik, Iceland | June 2017 |
| 12. Patterns in ordered set partitions and parking functions (talk)
<i>14th International Conference on Permutation Patterns</i> , Washington D.C., USA | June 2016 |
| 13. Rational Shuffle Conjecture when $n = 3$ or $m = 3$ (talk)
<i>Combinatorics Colloquium</i> , UC San Diego, La Jolla, CA, USA | May 2016 |

Teaching

Primary instructor: Combinatorics (Fall 2020), Linear Algebra (Fall 2019), Pre-calculus (Fall 2017).

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 MAPLE, Mathematica and \LaTeX ;
familiar with C/C++, Java, Python, MATLAB and Sage.

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

Hobby: music compositing and arranging.