Chenwei Ruan

Beijing Institute of Mathematical Sciences and Applications
No. 544, Hefangkou Village Huaibei Town,
Huairou District Beijing 101408, China
email: ruanchenwei@bimsa.cn; cwruan@outlook.com

Professional experience

- **Chern Instructor**, Beijing Institute of Mathematical Sciences and Applications, Beijing, China, July 2024 – now
  Mentors: Bart Vlaar, Yu Qiu

Education

- **Ph.D. in Mathematics**, University of Wisconsin-Madison, Madison, United States, 2024
  Advisor: Paul Terwilliger
- **M.S. in Mathematics**, University of Wisconsin-Madison, Madison, United States, 2018
- **B.S. in Mathematics**, Nanjing University, Nanjing, China, 2017

Research Interests

- Algebraic combinatorics: distance-regular graph, Terwilliger algebra, association scheme;
- Representation theory: quantum algebra, shuffle algebra, Lie algebra;
- Mathematical physics: quantum integrable system, Yang-Baxter equation, reflection equation.

Publications

Refereed Journal Articles

- **C. Ruan**, Doubly alternating words in the positive part of $U_q(\widehat{\mathfrak{sl}}_2)$, *J. Algebra* 664A (2025) 288-311, arXiv:2408.02633.
- **C. Ruan**, A generating function associated with the alternating elements in the positive part of $U_q(\widehat{\mathfrak{sl}}_2)$, *Commun. Algebra* 51 (2023) 1707-1720, arXiv:2204.10223.

Accepted Journal Articles

- **C. Ruan**, A uniform approach to the Damiani, Beck, and alternating PBW bases for the positive part of $U_q(\widehat{\mathfrak{sl}}_2)$, accepted by *J. Algebra Appl.*, arXiv:2305.11152.

Preprints

- **C. Ruan**, Freidel-Maillet type equations on fused K-matrices over the positive part of $U_q(\widehat{\mathfrak{sl}}_2)$, Preprint, arXiv:2512.00819.

Grants

- National Natural Science Foundation of China Youth Science Fund Project (C Class); title: Using the Rosso embedding to study the quantized enveloping algebras; funding period: Jan 1, 2026 – Dec 31, 2028.

Invited Conference Presentations

- *Freidel–Maillet type equations on fused K-matrices over the positive part of $U_q(\widehat{\mathfrak{sl}}_2)$ (60 minutes)*, 2026 Beijing Workshop on Non-associative Algebras, Beijing, China, Aug 06–08, 2026
- *A uniform approach to the positive part of $U_q(\widehat{\mathfrak{sl}}_2)$ and generalized reflection equations (30 minutes)*, TerwilligerFest–Combinatorics around the q-Onsager algebra, Kranjska Gora, Slovenia, June 22–27, 2025
- *A uniform approach to the Damiani, Beck, and alternating PBW bases for the positive part of $U_q(\widehat{\mathfrak{sl}}_2)$ (25 minutes)*, the 10th Slovenian Conference on Graph Theory, Kranjska Gora, Slovenia, June 18–24, 2023
- *A generating function associated with the alternating elements in the positive part of $U_q(\widehat{\mathfrak{sl}}_2)$ (45 minutes)*, the CRM workshop on Graph Theory, Algebraic Combinatorics and Mathematical Physics, Centre de Recherches Mathématiques, Montreal, Canada, July 25–August 19, 2022 (Online)
- *A generating function associated with the alternating elements in the positive part of $U_q(\widehat{\mathfrak{sl}}_2)$ (30 minutes)*, the 16th International Symposium on Orthogonal Polynomials, Special Functions and Applications, Centre de Recherches Mathématiques, Montreal, Canada, June 13–17, 2022 (Online)

Seminar Talks

- *Freidel–Maillet type equations on fused K-matrices over the positive part of $U_q(\widehat{\mathfrak{sl}}_2)$ (60 minutes)*, Séminaire SPACE Tours, Tours, France, Mar 20, 2026
- *Freidel-Maillet type equations on fused K-matrices over the positive part of $U_q(\widehat{\mathfrak{sl}}_2)$ (30 minutes)*, Beijing Institute of Mathematical Sciences and Applications, Beijing, China, Dec 23, 2025
- *Doubly alternating words in the positive part of the q-deformed enveloping algebra for affine $\mathfrak{sl}_2$ (25 minutes)*, YMSC Postdoc Workshop I 2025, Tsinghua University, Beijing, China, Apr 06, 2025
- *A q-shuffle algebra approach to the positive part of $U_q(\widehat{\mathfrak{sl}}_2)$ (20 minutes)*, BIMSA Postdoc Seminar, Beijing Institute of Mathematical Sciences and Applications, Beijing, China, Dec 24, 2024
- *The positive part of $U_q(\widehat{\mathfrak{sl}}_2)$ and its embedding into a q-shuffle algebra (90 minutes)*, BIMSA Representation Theory Seminar, Beijing Institute of Mathematical Sciences and Applications, Beijing, China, Oct 18, 2024
- *The positive part of $U_q(\widehat{\mathfrak{sl}}_2)$ and its embedding into a q-shuffle algebra (25 minutes)*, YMSC Postdoc Workshop III 2024, Tsinghua University, Beijing, China, Sep 07, 2024
- *A uniform approach to the Damiani, Beck, and alternating PBW bases for U_q^+ (60 minutes)*, BIMSA Integrable Systems Seminar, Beijing Institute of Mathematical Sciences and Applications, Beijing, China, Dec 22, 2023

- *Distance-regular graphs and the positive part U_q^+ of the q-deformed enveloping algebra for affine $\mathfrak{sl}_2$ (60 minutes)*, Tohoku University Combinatorics Seminar, Tohoku University, Sendai, Japan, Dec 12, 2023 (Online)
- *Distance-regular graphs and the positive part U_q^+ of the q-deformed enveloping algebra for affine $\mathfrak{sl}_2$ (60 minutes)*, Wu Wen-Tsun Key Laboratory of Mathematics Combinatorics Seminar, University of Science and Technology of China, Hefei, China, Sep 27, 2023
- *A uniform approach to the Damiani, Beck, and alternating PBW bases for U_q^+ (50 minutes)*, UW-Madison Combinatorics Seminar, University of Wisconsin-Madison, Madison, United States, Dec 5, 2022 (Online)
- *Some elements in the quantum affine $\mathfrak{sl}_2$ algebra (50 minutes)*, UW-Madison Combinatorics Seminar, University of Wisconsin-Madison, Madison, United States, Feb 7, 2022 (Online)

Courses Taught

- **Beijing Institute of Mathematical Sciences and Applications**
  Lecturer
  - Introduction to Kac-Moody algebras — Spring 2026
  - Introduction to Lie algebras II — Fall 2025
  - Introduction to Lie algebras — Spring 2025
- **University of Wisconsin-Madison**
  Teaching Assistant
  - Math 221: Calculus and Analytic Geometry 1 — Fall 2018, Fall 2021
  - Math 320: Linear Algebra and Differential Equations — Summer 2021
  - Math 112: Algebra — Spring 2021
  - Math 211: Calculus — Spring 2020, Fall 2020
  - Math 213: Calculus and Introduction to Differential Equations — Fall 2019
  - Math 240: Introduction to Discrete Mathematics — Spring 2019

  Grader
  - Math 475: Introduction to Combinatorics — Summer 2021

Service

Conferences Co-organized

- Representation Theory, Integrable Systems, and Related Topics, BIMSA, Beijing, China, June 2–6, 2025
- Representation Theory, Integrable Systems, and Related Topics, BIMSA, Beijing, China, July 8–12, 2024

Sessions Chaired

- July 18 Morning Session on Lie Theory and Representation Theory, International Congress of Basic Science, BIMSA, Beijing, China, 2025

- July 19 Morning Session on Lie Theory and Representation Theory, International Congress of Basic Science, BIMSA, Beijing, China, 2024

Others

- Section manager for Lie Theory and Representation Theory, Frontiers of Science Award, International Congress of Basic Science 2025
- Administrator for the research group Number Theory and Representation Theory at BIMSA, Sep 2024–Dec 2025