Woo-Seok Jung

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Ph.D. in Mathematics

Employment

- **Postdoctoral Researcher**, Natural Science Research Institute, University of Seoul, 2024.03–present. (Mentor: Prof. Euiyong Park)

Education

- **Ph.D. in Mathematics**, Sogang University, 2024.02 (Advisor: Prof. Young-Tak Oh)
- **M.S. in Mathematics**, Seoul National University, 2019.02 (Advisor: Prof. Woong Kook)
- **B.S. in Mathematics**, Sogang University, 2014.08

Research Interests

- **Representation theory** and **Algebraic combinatorics**, with particular focus on:
  - Cluster algebras
  - Quantum groups and crystal bases
  - Symmetric and quasisymmetric functions

Preprints

- *Folding of cluster algebras* (with Se-jin Oh), 2026. arXiv:2611.17677.
- *A Comparison of cluster algebra structures arising from i-boxes and Demazure weaves* (with JiSun Huh, Myungho Kim, and Euiyong Park), 2026. arXiv:2606.07493.
- *Thrall's problem for two rows* (with JiSun Huh, Jang Soo Kim, and Meesue Yoo), 2026. Submitted. arXiv:2605.17880.
- *Crystals and quantum twist automorphisms* (with Euiyong Park), 2025. Submitted. arXiv:2507.01306.
- *Discovering product and coproduct rules for bases of* QSym_F *through supercharacters* (with Young-Tak Oh), 2023. Submitted (Ph.D. thesis). arXiv:2311.08917.
- *Induction and restriction of two-variable Hecke algebras* (with Young-Tak Oh), 2022. Submitted. arXiv:2211.00211.

In preparation

- *Similarity maps and quantum twists on localized crystals*, 2026.

Published/Accepted Papers

- *Representation theory of* 0*-Schur algebras and related categories* (with Young-Tak Oh), *Journal of Algebra*, accepted for publication. arXiv:2509.26194 (2025).
- *Weak Bruhat interval modules of the* 0*-Hecke algebra* (with Young-Hun Kim, So-Yeon Lee, and Young-Tak Oh), *Mathematische Zeitschrift* **301** (2022), 3755–3786.
- *Dualities and reciprocities on graphs on surfaces* (with Jaeseong Oh), *Discrete Mathematics* **345** (2022), no. 12.
- *Acyclic orientation polynomials and the sink theorem for chromatic symmetric functions* (with Byung-Hak Hwang, Kang-Ju Lee, Jaeseong Oh, and Sang-Hoon Yu), *Journal of Combinatorial Theory, Series B* **149** (2021), 52–75.
- *The dimension of magic squares over fields of characteristics two and three* (with Jon-Lark Kim, Yeonho Kim, and Kisun Lee), *Linear Algebra and its Applications* **472** (2015), 118–134.

Conference Proceedings

- *Acyclic orientation polynomials and the sink theorem for chromatic symmetric functions* (with Byung-Hak Hwang, Kang-Ju Lee, Jaeseong Oh, and Sang-Hoon Yu), in: *Proceedings of FPSAC 2020* (Extended abstract).

Talks

- *A Comparison of Cluster Algebra Structures Arising from i-Boxes and Demazure Weaves*, CART 2026, Okinawa Institute of Science and Technology, Okinawa, Japan, 2026.12.04 (scheduled).
- *Comparing cluster structures on subalgebras of bosonic extensions and double Bott–Samelson varieties*, The 37th KIAS Combinatorics Workshop, Jeju Uni hotel, 2026.05.29.
- Lecture and mentor, *Thrall's problem and higher Lie modules 1, 2*, KRIMS Winter School On Symmetric Functions and Group Representations, Kangwon National University, Chuncheon, 2026.02.23–27.
- *Comparing cluster structures on subalgebras of bosonic extensions and half decorated double Bott-Samelson varieties*, 2026 Algebra Camp, 2026. 01. 27.
- *Crystals and twist automorphisms*, 2025 KMS Spring Meeting, KAIST, 2025.04.26.
- *Introduction to cluster algebras*, 3rd Combinatorics Seminar for Young Researchers, Inha University, 2025.01.23.
- *Twist automorphism of quantum unipotent coordinate ring and their period*, A mini-workshop on Representation Theory at Sogang, 2024.12.19.
- *Twist automorphism of quantum unipotent coordinate ring and their period*, Rookies Workshop 2024, Konjiam Resort, 2024.11.08.
- *The representation theory of* 0*-Schur algebras and its relation to degenerate quantum groups*, 2024 KMS Annual Meeting, SKKU Natural Science Campus, 2024.10.25.
- *Quasisymmetric functions and supercharacters*, Topology and Combinatorics Seminar, Ajou University (Zoom), 2024.04.04.

- *Brion's formula and polynomials*, Workshop for Young Representation Theorists in Korea, 2023.12.10–11.
- *Product and coproduct rules for quasisymmetric functions via supercharacter theories*, 2023 KMS Annual Meeting, SNU, 2023.10.26–28.
- *Combinatorial Hopf algebra and Aguiar–Bergeron–Sottile Theorem*, Miniworkshop on Representation Theory of 0-Hecke Algebras and Related Topics, 2023.02.
- *Categorification of* QSym *using supercharacter theories and a new basis for* $\mathsf{NSym}_{\mathbb{C}(q,t)}$, QSMS 2022 Summer Workshop on Representation Theory.
- *Supercharacter theories and categorification of quasisymmetric functions*, 2022 KMS Spring Meeting.
- *Dualities and reciprocities on graphs on surfaces*, Graduate Student Workshop on Representation Theory and Combinatorics, 2020.

Posters

- *Acyclic orientation polynomials and the sink theorem for chromatic symmetric functions*, FPSAC 2020 (Poster).

Grants and Awards

- *Post-Doctoral Domestic and Overseas Training Program*, National Research Foundation of Korea (NRF), 2024.09–present.
- *Outstanding Paper Award*, Sogang University Graduate Student Paper Contest 2023, 2024.01.22.
- *Dean's Award for Graduate Students*, Sogang University, 2023.02.17.
- *Global Ph.D. Fellowship*, National Research Foundation of Korea (NRF), 2015.04–2017.03.
- *Dean's List*, School of Natural Sciences, Sogang University, 2014.04.07.

Activities

- Member, Sogang Math Honor Club, 2013.05–2014.08

Teaching

- *Basic Linear Algebra*, University of Seoul, 2024.09–12
- *Calculus for Humanities and Social Sciences (Single Variable)*, University of Seoul, 2025.03–06
- *Basic Linear Algebra*, University of Seoul, 2025.09–12
- *Basic Linear Algebra*, University of Seoul, 2026.03–06