Robert J. Won

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Employment

The George Washington University — Washington, DC
Assistant Professor — August 2021–present

University of Washington — Seattle, WA
Postdoctoral Scholar/Acting Assistant Professor — September 2018–August 2021

Wake Forest University — Winston-Salem, NC
Teacher-Scholar Postdoctoral Fellow — July 2016–June 2018

Education

University of California San Diego — La Jolla, CA
Ph.D. Mathematics — June 2016
Advisor: Daniel Rogalski
M.A. Pure mathematics — June 2013

Duke University — Durham, NC
B.S. Mathematics, *magna cum laude* — May 2011

Publications & Preprints

Refereed Publications[1]

1. **Ozone groups and centers of skew polynomial rings** with Kenneth Chan, Jason Gaddis, and James J. Zhang. *International Mathematics Research Notices*, Volume 2024, Issue 7, 5689–5727 (2024).
2. **Weight modules over Bell–Rogalski algebras** with Jason Gaddis and Daniele Rosso. *Journal of Algebra*, Volume 633, 270–297, (2023).
3. **Weighted homological regularities** with Ellen Kirkman and James J. Zhang. *Transactions of the American Mathematical Society*, **376**, 7407–7445, (2023).
4. **Universal quantum semigroupoids** with Hongdi Huang, Chelsea Walton, and Elizabeth Wicks. *Journal of Pure and Applied Algebra*, Volume 227, Issue 2 (2023).
5. **Reflexive hull discriminants and applications** with Kenneth Chan, Jason Gaddis, and James J. Zhang. *Selecta Mathematica, New Series*, **28**, 40 (2022).
6. **Pointed Hopf actions on quantum generalized Weyl algebras** with Jason Gaddis. *Journal of Algebra*, Volume 601, 312–331 (2022).
7. **Degree bounds for Hopf actions on Artin–Schelter regular algebras** with Ellen Kirkman and James J. Zhang. *Advances in Mathematics*, Vol. 397, Article 108197 (2022).
8. **Algebraic structures in comodule categories over weak bialgebras** with Chelsea Walton and Elizabeth Wicks. *Communications in Algebra*, 50:7, 2877–2910 (2022).

[1] *In mathematics, authors on joint papers are traditionally listed in alphabetical order, reflecting the fact that joint work in mathematics almost always involves equal contribution from all authors. The American Mathematical Society has a statement on joint research here:* `https://www.ams.org/profession/leaders/culture/JointResearchandItsPublicationfinal.pdf`.

9. **Semisimple reflection Hopf algebras of dimension sixteen** with Luigi Ferraro, Ellen Kirkman, and W. Frank Moore. *Algebras and Representation Theory*, 25, 615–647 (2022).
10. **A proof of the Brown–Goodearl conjecture for module-finite weak Hopf algebras** with Daniel Rogalski and James J. Zhang. *Algebra & Number Theory*, Vol. 15, No. 4, 971–997 (2021).
11. **Improved bounds on sizes of generalized caps in $AG(n, q)$** with Michael Tait. *SIAM Journal on Discrete Mathematics*, Volume 35, Issue 1, 521–531 (2021).
12. **Simple $\mathbb{Z}$-graded domains of Gelfand–Kirillov dimension two** with Luigi Ferraro and Jason Gaddis. *Journal of Algebra*, Volume 562, 433–465 (2020).
13. **Three infinite families of reflection Hopf algebras** with Luigi Ferraro, Ellen Kirkman, and W. Frank Moore. *Journal of Pure and Applied Algebra*, Volume 224, Issue 8 (2020).
14. **Sidon sets and 2-caps in $\mathbb{F}_3^n$** with Yixuan (Alice) Huang and Michael Tait. *Involve, a Journal of Mathematics*, Vol. 12, No. 6, 995–1003 (2019).
15. **Fixed rings of group actions on generalized Weyl algebras** with Jason Gaddis. *Journal of Algebra*, Volume 536, 149–169 (2019).
16. **Auslander's Theorem for permutation actions on noncommutative algebras** with Jason Gaddis, Ellen Kirkman, and W. Frank Moore. *Proceedings of the American Mathematical Society*, 147, no. 5, 1881–1896 (2019).
17. **Discriminants of Taft algebra smash products and applications** with Jason Gaddis and Daniel Yee. *Algebras and Representation Theory*, Volume 22, Issue 4, 785–799 (2019).
18. **The noncommutative schemes of generalized Weyl algebras**. *Journal of Algebra*, Volume 506, 322–349 (2018).
19. **A structure theorem for product sets in extra special groups** with Thang Pham, Michael Tait, and Le Anh Vinh. *Journal of Number Theory*, Volume 184, 461–472 (2018).
20. **The Picard group of the graded module category of a generalized Weyl algebra**. *Journal of Algebra*, Volume 493, 89–134 (2018).
21. **Partitions of $AG(4, 3)$ into maximal caps** with Michael Follett, Kyle Kalail, Elizabeth McMahon, and Catherine Pelland. *Discrete Mathematics*, Volume 337, 1–8 (2014).

Submitted Preprints

22. **Ozone groups of Artin–Schelter regular algebras satisfying a polynomial identity** with Kenneth Chan, Jason Gaddis, and James J. Zhang. `arXiv:2312.13014`.
23. **Symmetries of algebras captured by actions of weak Hopf algebras** with Fabio Calderón, Hongdi Huang, and Elizabeth Wicks. `arXiv:2209.11903`.
24. **Homological regularities and concavities** with Ellen Kirkman and James J. Zhang. `arXiv:2107.07474`.

Teaching Experience

The George Washington University

Fall 2023 Linear Algebra (MATH 2184), Introduction to Abstract Algebra I (MATH 4121)

Spring 2024 Introduction to Abstract Algebra II (MATH 4122)

Fall 2023 Single-Variable Calculus II (MATH 1232), Introduction to Abstract Algebra I (MATH 4121)

Spring 2023 Linear Algebra I for Math Majors (MATH 2185), Linear Algebra II (MATH 3125)

Fall 2022 Single-Variable Calculus I (MATH 1231), Graduate Algebra I (MATH 6101)

Spring 2022 Linear Algebra I for Math Majors (MATH 2185)

Fall 2021 Introduction to Abstract Algebra I (MATH 4121), Graduate Algebra I (MATH 6101)

University of Washington

Spring 2021 Advanced Linear Algebra: Tools and Applications (MATH 318, online)

Winter 2021 Introduction to Mathematical Reasoning (MATH 300, online)

Autumn 2020 Introduction to Mathematical Reasoning (MATH 300, two sections, online)

Summer 2020 Abstract Linear Algebra (MATH 340, online)

Winter 2020 Introduction to Mathematical Reasoning (MATH 300, two sections)

Autumn 2019 Matrix Algebra with Applications (MATH 308, two sections)

Summer 2019 Introduction to Modern Algebra for Teachers (MATH 412)
Advanced Multivariable Calculus (MATH 324, co-instructed with Jonathan Beardsley)

Spring 2019 Matrix Algebra with Applications (MATH 308)

Winter 2019 Matrix Algebra with Applications (MATH 308, two sections)

Autumn 2018 Matrix Algebra with Applications (MATH 308)

Wake Forest University

Spring 2018 Discrete Mathematics (MST 117), Graduate Algebra (MST 722)

Fall 2017 Linear Algebra (MST 121), Graduate Algebra (MST 721)

Spring 2017 Elementary Probability and Statitistics (MTH 109, two sections)

Fall 2016 Calculus with Analytic Geometry I (MTH 111, two sections)

University of California San Diego

Summer 2015 Precalculus (Math 3C)

2011–2016 Teaching Assistant for 27 recitation sections over a span of 15 quarters. Courses included: Calculus I (Math 10A), Calculus II (Math 20B), Calculus III (Math 20C), Differential Equations (Math 20D), Linear Algebra (Math 20F), Honors Linear Algebra (Math 31AH), Mathematical Reasoning (Math 109), Real Analysis (Math 140), Introduction to Analysis I and II (Math 142A–B), Graduate Algebra (Math 200A–C)

Grants and Awards

The George Washington University

2022–2027 Simons Foundation Collaboration Grant #961085 ($42,000)
"Quantum symmetries of noncommutative algebras"

University of Washington

2019–2023 AMS–Simons Travel Grant ($4000)

University of California San Diego

2016-2017 AMS graduate student travel grant ($250)

2011–2013 Graduate Assistance in Areas of National Need (GAANN) Fellowship

Student Mentoring

George Washington University

2023–2024 I am advising Tim Neumann's senior thesis.

2023–present Together with Xingting Wang (Howard University), I am co-advising Charlene Houchins's PhD thesis.

Fall 2022 I mentored a reading course (MATH 6995) on Hopf algebras for GWU PhD student Charlene Houchins in which we worked through *Hopf Algebras* by David E. Radford.

Summer 2022 Together with Xingting Wang (Howard University), we held a reading course with Howard University PhD student Awn Alqahtani in which we worked through *Hopf Algebras* by David E. Radford.

University of Washington

Winter 2020 I advised a group of undergraduates (Ivy Guo, Jocelin Liteanu, Avery Milandin, and Zoey Shi) and a graduate TA (Peter Gylys-Colwell) on a project in finite affine geometry through the Washington Experimental Mathematics Lab (WXML).

Autumn 2019 I advised a group of undergraduates (Jocelin Liteanu, Jaron Wang, and Alexander Waugh) and a graduate TA (Peter Gylys-Colwell) on a project in finite affine geometry through the Washington Experimental Mathematics Lab (WXML).

Wake Forest University

Summer 2018 I advised undergraduate student Yixuan (Alice) Huang, who was awarded a $4000 Wake Forest Research Fellowship to work with me for the summer. Our paper with Michael Tait, "Sidon sets and 2-caps in $\mathbb{F}_3^n$", appeared in *Involve*.

Fall 2016 I held an informal reading course with four graduate students (Mike Annunziata, Katie Greene, Rebecca Kotsonis, and Rob McConkey) in which we read "On large subsets of $\mathbb{F}_q^n$ with no three-term arithmetic progression" by Ellenberg and Gijswijt. Rob gave a talk in the Wake Forest Combinatorics Seminar.

University of California San Diego

Winter 2015 I co-advised (with Michael Tait) three undergraduate students (Yuhui Jin, Kyle Lee, and Esther Wang) on a project on finite affine geometries and their connections to the card game SET. This was organized through UC San Diego AWM's Graduate-Undergraduate Learning Program. The students gave a presentation at the end of the quarter.

Service

Departmental Committees

2023–2024 Undergraduate Committee, Diversity, Equity, Inclusion Committee chair, Calc Lab co-coordinator, Algebra qualifying exam writer and grader (Aug 2023), Algebra qualifying exam grader (Jan 2024)

2022–2023 Undergraduate Committee, Diversity, Equity, Inclusion Committee, Calc Lab co-coordinator, Algebra qualifying exam writer and grader (Aug 2022), Algebra qualifying exam grader (Jan 2023)

2021–2022 Undergraduate Committee, Diversity, Equity, Inclusion Committee, Calc Lab co-coordinator, Algebra qualifying exam grader (Jan 2022)

Dissertation/Specialty Exam Committees

- Fabio Calderón Mateus (Universidad Nacional de Colombia, dissertation committee, 2023)
- Huizheng Guo (specialty exam committee, 2023)
- Kevin Long (dissertation committee examiner, 2022)
- Gabriel Montoya Vega (dissertation committee examiner, 2022)

- Jiayuan Wang (dissertation committee reader, 2022)
- Yingfeng Hu (specialty exam committee, 2022)

Conferences/Seminars Organized

2022–present	Combinatorics and Algebra Seminar, The George Washington University
April 2024	AMS Eastern Sectional Meeting, Howard University
	"Special Session on Recent Developments in Noncommutative Algebra and Tensor Categories"
January 2024	AMS Joint Mathematics Meetings, San Francisco, CA
	"Special Session on Homological Techniques in Noncommutative Algebra"
April 2023	AMS Central Sectional Meeting, University of Cincinnati
	"Special Session on Interactions Between Noncommutative Ring Theory and Algebraic Geometry"
March 2022	Seattle Noncommutative Algebra Day, Online
March 2022	AMS Southeastern Sectional Meeting, University of Virginia (Canceled due to Omicron)
	"Special Session on Interactions Between Noncommutative Ring Theory and Algebraic Geometry"
January 2022	AMS Joint Mathematics Meetings, Seattle, WA (Canceled due to Omicron)
	"Special Session on Noncommutative algebra and noncommutative invariant theory"
March 2018	AMS Central Sectional Meeting, The Ohio State University
	"Special Session on Noncommutative Algebra and Noncommutative Algebraic Geometry"
2015–2016	Food For Thought Seminar, University of California San Diego
Spring 2016	GradSWANTAG III, University of California San Diego
Winter 2016	GradSWANTAG II, University of California San Diego
Fall 2015	GradSWANTAG I, University of California San Diego

Referee Work

Refereed for *Journal of Algebra*, *Mathematical Reviews*, *Communications in Algebra*, and *Science China Mathematics*, as well as a dissertation proposal from Universidad Nacional de Colombia.

University of Washington

2020–2021	Lead Postdoctoral Scholar, Graduate Admissions Committee

Wake Forest University

2016–2018	Graduate committee, Math club/PME committee
2016 & 2017	GRE Math Subject Test review

University of California San Diego

2014–2016	WebWork TA
2012–2016	Graduate Student Association department representative

Invited Talks

1. AMS Western Sectional Meeting, California State University, Fresno — Fresno, CA
   Symmetries captured by weak Hopf algebra actions — May 2023
2. Seattle Noncommutative Algebra Day — Seattle, WA
   Symmetries captured by weak Hopf algebra actions — March 2023

3. Combinatorics, Algebra, and Topology Seminar, US Naval Academy — Annapolis, MD
   The card game SET, finite affine geometry, and combinatorial number theory — October 2022
4. Workshop on Noncommutative Geometry and Noncommutative Invariant Theory, BIRS — Online
   PI skew polynomial rings and their centers — September 2022
5. Joint Mathematics Meetings (Canceled due to Omicron) — Seattle, WA
   Pointed Hopf actions on generalized Weyl algebras — January 2022
6. AMS Central Sectional Meeting — Online
   Algebraic structures in comodule categories over weak bialgebras — April 2021
7. AMS Eastern Sectional Meeting — Online
   Degree bounds for Hopf actions on Artin–Schelter regular algebras — March 2021
8. AMS–MAA Joint Mathematics Meetings — Online
   Degree bounds for Hopf actions on Artin–Schelter regular algebras — January 2021
9. AMS Western Sectional Meeting, University of Utah — Online
   Algebraic structures in comodule categories over weak bialgebras — October 2020
10. AMS Western Sectional Meeting, California State University, Fresno (Postponed due to COVID-19) — Fresno, CA
    Algebraic structures in comodule categories over weak bialgebras — May 2020
11. AMS Western Sectional Meeting, University of California, Riverside — Riverside, CA
    A proof of the Brown–Goodearl conjecture for module-finite weak Hopf algebras — November 2019
12. Conference on Operad Theory and Related Topics, Qufu Normal University — Qufu, Shandong, China
    A proof of the Brown–Goodearl conjecture for module-finite weak Hopf algebras — October 2019
13. AMS Central Sectional Meeting, University of Wisconsin — Madison, WI
    A translation principle for generalized Weyl algebras — September 2019
14. Colloquium, Portland State University — Portland, OR
    The card game SET, finite affine geometry, and combinatorial number theory — May 2019
15. AMS Central/Western Sectional Meeting, University of Hawaii — Honolulu, HI
    A translation principle for generalized Weyl algebras — March 2019
16. Algebra and Algebraic Geometry Seminar, University of Washington — Seattle, WA
    $\mathbb{Z}$-graded noncommutative algebraic geometry — February 2018
17. AMS–MAA Joint Mathematics Meetings — San Diego, CA
    Simple $\mathbb{Z}$-graded domains of Gelfand–Kirillov dimension 2 — January 2018
18. Colloquium, Miami University — Oxford, OH
    $\mathbb{Z}$-graded noncommutative algebraic geometry — November 2017
19. AMS Central Sectional Meeting, University of North Texas — Denton, TX
    Discriminants of Taft algebra smash products and applications — September 2017
20. AMS Western Sectional Meeting, Washington State University — Pullman, WA
    Auslander's Theorem for permutation actions on noncommutative algebras — April 2017
21. AMS Western Sectional Meeting, University of Denver — Denver, CO
    The noncommutative schemes of generalized Weyl algebras — October 2016
22. AMS Eastern Sectional Meeting, Bowdoin College — Brunswick, ME
    The noncommutative schemes of generalized Weyl algebras — September 2016
23. AMS Central Sectional Meeting, Michigan State University — East Lansing, MI
    The category of graded modules of a generalized Weyl algebra — March 2015

Other Talks

1. Graduate Student Seminar, The George Washington University — Washington, DC
   Symmetries and quantum symmetries in noncommutative algebra — March 2024
2. Combinatorics and Algebra Seminar, The George Washington University — Washington, DC
   The card game SET, finite affine geometry, and combinatorial number theory — November 2022
3. Graduate Student Seminar, The George Washington University — Washington, DC
   Quantum symmetry and noncommutative algebra — December 2021
4. Seattle Noncommutative Algebra Day, University of Washington — Online
   Universal quantum semigroupoids — May 2021
5. Math Club, Loyola Marymount University — Los Angeles, CA
   The geometry of the card game SET — September 2019
6. Seattle Noncommutative Algebra Day, University of Washington — Seattle, WA
   Algebraic structures in comodule categories over weak Hopf algebras — July 2019
7. Combinatorics Seminar, Wake Forest University — Winston-Salem, NC
   SET and $AG(4,3)$ — October 2016
8. GradSWANTAG III, University of California San Diego — La Jolla, CA
   Categories of graded modules: What they are and what you can do with them — May 2016
9. AMS-MAA Joint Mathematics Meetings — Seattle, WA
   The category of graded modules of a generalized Weyl algebra — January 2016
10. Algebra Seminar, University of California San Diego — La Jolla, CA
    $\mathbb{Z}$-graded noncommutative geometry — November 2015
11. Graduate Algebraic Geometry Seminar, University of California San Diego — La Jolla, CA
    What is noncommutative algebraic geometry? — August 2015
12. Informal Noncommutative Algebra Seminar, University of California San Diego — La Jolla, CA
    An introduction to Hopf algebras — June 2015
13. Food For Thought Seminar, University of California San Diego — La Jolla, CA
    SET and $AG(4,3)$ — February 2015
14. AMS–MAA Joint Mathematics Meetings — New Orleans, LA
    SET and disjoint complete caps in $AG(4,3)$ — January 2011

Non-Math Publications

1. **The dynamics of proactive and reactive cognitive control processes in the human brain**
   Appelbaum, L.G., Boehler, C.N., Davis, L.A., **Won, R.J.**, Woldorff, M.G.
   Journal of Cognitive Neuroscience. 26(5), 1021–1038. (2014).
2. **Strategic allocation of attention reduces temporally predictable stimulus conflict**
   Appelbaum, L.G., Boehler, C.N., **Won, R.J.**, Davis, L.A., Woldorff, M.G.
   Journal of Cognitive Neuroscience. 24(9), 1834–1848. (2012).