Maria Monks Gillespie

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EMPLOYMENT

Assistant Professor, Colorado State University   August 2019–Present

NSF Postdoctoral Fellow, UC Davis   August 2017–June 2019
Krener Assistant Professor, UC Davis   August 2017–June 2019

EDUCATION

Ph.D., Mathematics
UC Berkeley, Berkeley, CA   May 2016

Master of Advanced Study, Mathematics
Cambridge University, Cambridge, UK   June 2011

Bachelor of Science, Mathematics
Massachusetts Institute of Technology, Cambridge, MA   May 2010

HONORS AND AWARDS

Outstanding Professor in Graduate Instruction, CSU math department	2024
Colorado Math Award for Outstanding Service to Students (CSU Putnam coach)	2021
FPSAC Best Graduate Student Paper	2016
Morgan Prize	2011
Churchill Scholar	2010–2011
NCAA Academic All-American	2010
Morgan Prize Honorable Mention	2010
Alice T. Schafer Prize for Women in Mathematics	2009
Goldwater Scholar	2009
Putnam Honorable Mention	2006

GRANTS

Banff International Research Station (BIRS) Workshop: "Combinatorics of Moduli Spaces of Curves", to be held July 2024, co-organizers Jake Levinson, Sean Griffin, Vance Blankers, Diane Maclagan

NSF Conference Grant, DMS 2130627, "Algebraic Combinatorics Virtual Expedition", 2022-2025, $49,857
      – Co-PIs: Laura Colmenarejo, Oliver Pechenik, Liam Solus.
      – Continuing as a virtual conference for long-term sustainability and accessibility
      – Pushing the boundaries of virtual technology to replicate in-person networking

NSF Grant, DMS 2054391, "Representation Theory and Moduli Spaces via Young Tableaux and Parking Functions", 2021–2024, $186,403.14.
      – Personal research grant
      – Built a virtual conferencing room at CSU for long-term sustainability in mathematics

Simons Foundation Collaboration Grants for Mathematicians, "Combinatorial interpretations of structure constants arising in geometry", 2021–2026, $42,000. *(Declined due to receiving the NSF grant above.)*

NSF Conference Grant, DMS 2130627, "Algebraic Combinatorics Virtual Expedition", 2021, $5394.00.
      Co-PIs: Laura Colmenarejo, Oliver Pechenik, Liam Solus.

Open Educational Resources Grant, CSU Libraries, 2020–2021, $4,000.
      Co-PIs: Maria Gillespie, Henry Adams, Rachel Pries.

NSF Mathematics Postdoctoral Research Fellowship, 2016–2019.

Hertz Graduate Research Fellowship, 2011–2016.

NSF Graduate Student Research Fellowship, 2011–2016.

RESEARCH PUBLICATIONS AND PREPRINTS

33. M. Gillespie and J. Levinson, Products of boundary classes on $\overline{M}_{0,n}$ via balanced weights, *Expositiones Mathematicae*, Volume 42, Issue 4, July 2024, 125587.

32. M. Gillespie and S. T. Griffin, Cocharge and skewing formulas for Δ-Springer modules and the Delta Conjecture, *International Math Research Notices*, Volume 2024, Issue 14, July 2024, Pages 10895–10917.

31. M. Gillespie, Higher Specht polynomials under the diagonal action, *Algebraic combinatorics*, to appear (2024).

30. M. Gillespie, S. T. Griffin, J. Levinson, A proof of a conjecture of Monin and Rana on equations defining $\overline{M}_{0,n}$, submitted to *Journal of Combinatorial Algebra* (2023).

29. M. Gillespie and S. T. Griffin, A cocharge formula for the Δ-Springer modules, *Séminaire Lotharingien Combinatoire*, 89B.65, FPSAC 2023, 12 pp.

28. M. Gillespie and A. Reimer-Berg, A generalized RSK for enumerating linear series on n-pointed curves, *Séminaire Lotharingien Combinatoire*, 89B.71, FPSAC 2023, 12 pp.

27. M. Gillespie, A. Reimer-Berg, A generalized RSK for enumerating linear series on n-pointed curves, *Algebraic combinatorics* Volume 6 (2023) no. 1, pp. 1–16.

26. M. Gillespie, S. T. Griffin, J. Levinson, Degenerations and multiplicity-free formulas for products of ψ and ω classes on $\overline{M}_{0,n}$, Math Zeitschrift (2023) 304:56.

25. M. Gillespie, K. Salois, Inequality of a class of near-ribbon skew Schur Q functions, *Séminaire Lotharingien Combinatoire*, 86B.28, FPSAC 2022, 12 pp.

24. M. Gillespie, S. T. Griffin, J. Levinson, Tournaments and slide rules for products of ψ and ω classes on $\overline{M}_{0,n}$, *Séminaire Lotharingien Combinatoire*, 86B.50, FPSAC 2022, 12 pp.

23. M. Gillespie, J. Levinson, K. Purbhoo. Schubert curves in the orthogonal Grassmannian. *Discrete and Computational Geometry*, Volume 69, Issue 4, Jun 2023, pp. 981–1039.

22. M. Gillespie, S. T. Griffin, J. Levinson, Lazy tournaments and multidegrees of a projective embedding of $\overline{M}_{0,n}$, *Combinatorial Theory*, **3** (1) (2023), #3.

21. M. Gillespie, K. Salois, Inequality of a class of near-ribbon skew Schur Q functions, *Journal of Combinatorics*, to appear (2024).

20. M. Gillespie, B. Rhoades, Higher Specht bases for generalizations of the coinvariant ring, *Annals of Combinatorics* (2021). https://doi.org/10.1007/s00026-020-00516-1

19. M. Gillespie, J. Hocevar, A. Kulshrestha, K. Upadhyay, Iterating the RSK Bijection, *Involve* Vol 14, No 3 (2021).

18. R. Cavalieri, M. Gillespie, L. Monin, Projective embeddings of $\overline{M}_{0,n}$ and parking functions, *J. Comb. Theory Ser. A* Vol. 182, 105471 (2021).

17. R. Cavalieri, M. Gillespie, L. Monin, Projective embeddings of $\overline{M}_{0,n}$ and parking functions, Extended abstract (FPSAC 2020 proceedings), *Séminaire Lotharingien de Combinatoire*, **84B.32** (2020), 12 pp.

16. M. Monks Gillespie, K. M. Monks, K. G. Monks. Enumerating anchored permutations with bounded gaps. *Discrete Mathematics*, Vol. 343, Issue 9 (2020), Article 111957.

15. M. Monks Gillespie, G. Hawkes, W. Poh, A. Schilling, Characterization of queer supercrystals, *Advances in Mathematical Sciences, Association for Women in Mathematics Series* **21**, AWM Research Symposium Proceedings, April 2019.

14. M. Monks Gillespie, G. Hawkes, W. Poh, A. Schilling. Characterization of queer supercrystals. *Journal of Combinatorial Theory, Ser. A*, Vol. 173 (2020), Article 105235.

13. M. Monks Gillespie, J. Levinson. Axioms for shifted tableau crystals. *Electronic Journal of Combinatorics*, Vol. 26, Issue 2 (2019).

12. M. Monks Gillespie, J. Levinson, K. Purbhoo. A crystal-like structure on shifted tableaux. *DMTCS proc.*, **80B.71**, FPSAC 2018.

11. M. Monks Gillespie, J. Levinson, K. Purbhoo. A crystal-like structure on shifted tableaux. *Algebraic Combinatorics*, Volume 3 (2020) no. 3, pp. 693-725.

10. M. Monks Gillespie and J. Levinson. Monodromy and K-theory of Schubert curves via generalized Jeu de taquin. *Journal of Algebraic Combinatorics*, Vol 45, Issue 1, February 2017, 191–243.

9. M. Monks Gillespie and J. Levinson. Monodromy and K-theory of Schubert curves via generalized Jeu de taquin. *DMTCS proc. BC*, FPSAC 2016, 551–562.

8. M. Monks Gillespie, A combinatorial approach to Macdonald q, t-symmetry via the Carlitz bijection, *DMTCS Proceedings*, 28th International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC 2016), pp. 563–574.

7. M. Monks Gillespie. A combinatorial approach to the q, t-symmetry relation in Macdonald polynomials. *Electronic Journal of Combinatorics*, Vol. 23, Issue 2 (2016).

6. K. Monks, K. G. Monks, K. M. Monks, and M. Monks. Strongly sufficient sets and the distribution of arithmetic sequences in the $3x + 1$ graph. *Discrete Mathematics*, Volume 313, Issue 4, 28 February 2013, Pages 468-489.

5. M. Monks and K. Ono. Modular forms arising from $Q(n)$ and Dyson's rank. *Advances in Applied Mathematics*, Dennis Stanton issue 46 (2011), 457-466.

4. M. Monks. Number theoretic properties of generating functions related to Dyson's rank for partitions into distinct parts. *Proceedings of the American Mathematical Society*, **138** (2010), 481-494.

3. M. Monks. Reconstructing permutations from cycle minors. *Electronic Journal of Combinatorics*, **16** (2009), #R19.

2. M. Monks. The Solution to the Partition Reconstruction Problem, *Journal of Combinatorial Theory, Series A*, Volume 116, Issue 1 (2009).

1. M. Monks. Endomorphisms of the 2-adic shift map, discrete derivatives, and applications. *Discrete Mathematics*, Vol. 309, Issue 16 (2009), 5196-5205.

OTHER PUBLICATIONS

3. H. Adams, K. Emmrich, M. Gillespie, S. Golden, and R. Pries. *Counting Rocks! An Introduction to Combinatorics at Colorado State University*, Open Educational Resources (OER) Textbook, UMN Open Textbook Library (Nov 2023), https://open.umn.edu/opentextbooks/textbooks/1535.

2. M. Gillespie, Review of "Professor Mommy: Finding Work-Family Balance in Academia", Book review, *Notices of the American Math Society*, May 2022.

1. M. Monks Gillespie. Variations on a theme of Schubert calculus. *Recent Trends in Algebraic Combinatorics*, edited by Hélène Barcelo, Gizem Karaali, and Rosa Orellana (AWM Springer Series), Vol 16, 2019.

PROFESSIONAL ACTIVITIES

Conference/Seminar Organization

- COMOC (Combinatorics Of Moduli Of Curves), 5-day workshop at Banff International Research Station (BIRS), July 2024.
- AlCoVR (Algebraic Combinatorics in Virtual Reality) graduate workshop using Oculus VR, on Dynamical Algebraic Combinatorics (co-organizer), June 2024.
- AlCoVE (Algebraic Combinatorics Virtual Expedition) Co-Founder, June 2020–Present
- Rocky Mountain Algebraic Combinatorics Seminar, Colorado State University, Fall 2019–Present
- FRAGMENT seminar (co-organizer), Colorado State University, Fall 2020–Present
- Western Algebraic Geometry Symposium (WAGS), CSU, Spring 2022
- Special Session on Combinatorics of Moduli of Curves, Canadian Math Society (CMS) Winter meeting, Dec 3-6, 2021
- AMS Special Session on Combinatorial Representation Theory, Fall Western Sectional Meeting, Riverside, CA, Fall 2017
- Macdonald Polynomials Seminar, UC Berkeley, Spring 2013
- Berkeley/Davis Combinatorics Gatherings, UC Berkeley/UC Davis, 2015, 2016

- Student Combinatorics Seminar, UC Berkeley, 2015, 2016

Committees/Service
- FPSAC 2024 Program Committee (2023–2024)
- NSF Panelist, Spring 2023
- Executive Committee, Department of Mathematics, CSU, 2022–2023
- CSU Qualifying Exam Committee, 2019–2020, 2021–2022, Fall 2022, Fall 2023.
- NSF Panelist, Fall 2019
- UC Berkeley Mathematics Graduate Student Association, 2012–2014 (2013 President)
- MIT Undergraduate Math Association, 2007–2010

Research mentorship
- Current postdocs: Joseph Pappe (Fall 2023–present)
- Current Ph.D. students:
    1. Kyle Salois (to graduate spring 2025)
    2. Andrew Reimer-Berg (fifth year)
    3. Kelsey Brown (third year)
- Students past masters degree:
    1. Jacob McCann (Spring 2024)
    2. Andrew Reimer-Berg (Fall 2022)
    3. Kyle Salois (Fall 2021)
- Prove it! Math Academy Research Team Leader (High school level), Summer 2021
- Duluth REU Visitor/Mentor, Summer 2016
- Duluth REU Advisor, Summer 2010

Math Competition Organization and Coaching
- CSU Putnam Team Coach, Fall 2019–Present
    - Second place team in Rocky Mountain MAA region in 2023
    - Highest team score in the state of Colorado in 2021
- USA Math Olympiad Problem Selection Committee, 2017–Present
- USA Math Olympiad Problem Writer and Reviewer, 2015–Present
- Bay Area Math Olympiad Grader, 2017
- Prove it! Math Academy (Co-founder and Instructor), 2015–2020
- Math Olympiad Summer Program (Instructor), 2008-2015, 2021
- USA Math Olympiad Grader, 2008, 2013
- IdeaMath Summer Program (Instructor), 2013
- Cambridge Trinity Training Program (Instructor), 2011
- IdeaMath Lexington High School Weekend Program (Instructor), 2010-2011
- USA China Girls' Math Olympiad Team (Coach), 2008, 2011
- Art of Problem Solving Online School (Instructor, Grader, or Class Assistant), 2006–2017
- Harvard-MIT Mathematics Tournament Head Problem Writer, 2009

- Harvard-MIT Mathematics Tournament Registration Director, 2008
- American Regions Math League grader, 2007, 2008
- USA Mathematical Talent Search Grader, 2006–2008

Community Outreach

- Founder of NoCo Math Buddies, a disability-inclusive math enrichment program for young kids in the region, 2023–present
- AWM Motherhood in Academia Panel, CSU, 2024
- AWM Women in Math Panelist, CSU, 2023
- CSU Math Day Volunteer, 2023
- CSU Sonia Kovalevsky Day Volunteer, 2022
- MAA "Mugs to Donuts" newsletter interview, 2021
    - Interview available at https://www.youtube.com/watch?v=6JbaphAgZr8
- Panelist on "What is Research, and How do I do it?" panel, Who is/What is seminar, CSU, 2021
- Presentation on "What is Algebraic Combinatorics?" at InteGIRLS Bay Area chapter online math competition (high school level), 2020
- CSU Math Day Volunteer, 2019
- AWM Women in Math Panelist, CSU, 2019
- MathCamp (Visitor/Instructor) 2018
- UC Davis Math Department Picnic Day (Volunteer), 2017
- Berkeley Math Circle guest instruction, 2011–2017
- Stanford Math Circle guest instruction, 2011–present
- Julia Robinson Math Festival (Volunteer), 2014
- Girls' Angle (Mentor), 2010–2011

Professional Development

- Jan 2023: Completed a TILT course on *Best Practices in Teaching at CSU: Accessible and Inclusive Electronic Content*
- Feb 2020: Attended the TILT Master Teaching Initiative Luncheon, *Communicating student potential and promoting a sense of belonging in your syllabus*
- Aug 2019: Fall Faculty Ramp-up TILT workshops on *Building a Course in Canvas* and *Teaching SQUARES*

Journals Refereed: Electronic Journal of Combinatorics, Journal of Combinatorics, SIAM Journal on Discrete Mathematics, Australasian Journal of Combinatorics, Annals of Combinatorics, Séminaire Lotharingien de Combinatoire, Contributions to Discrete Mathematics, ALCO (Algebraic Combinatorics)

Other

- Creator/Author of Mathematical Gemstones (mathematicalgemstones.com), 2012–Present
- SageMath open source software development, 2013–2014

INVITED TALKS

56. *UC Davis Algebra and Discrete Math Seminar*, UC Davis, Davis, CA, April 2024.

55. *LaCIM Combinatorics Seminar*, Montreal, Quebec, Canada, April 2024.

54. *AMS Special Session on Combinatorial Insights into Algebraic Geometry*, Joint Math Meetings, San Francisco, CA, January 2024.

53. *Cascade Lectures in Combinatorics (CALICO)*, University of Oregon, online, November 2023.

52. *Formal Power Series and Algebraic Combinatorics – Poster Session*, FPSAC 2023, Davis, CA, July 2023.

51. *Rocky Mountain Algebraic Combinatorics Seminar*, Colorado State University, Fort Collins, CO, November 2023.

50. *CALICO (Cascade Lectures In Combinatorics)*, University of Oregon (Online), October 2023.

49. *Combinatorics and Graph Theory Seminar*, Michigan State University, October 2023.

48. *Topology, Algebra, Combinatorics, and Optimization seminar*, Loyola University Chicago, April 2023.

47. *AMS Special Session on Macdonald Theory at the Intersection of Combinatorics, Algebra, and Geometry, IV*, 2023 Spring Southeastern Sectional Meeting, Atlanta, GA, March 2023.

46. *AMS Special Session on Presenting Research Mathematics through Visual Storytelling: Slides Without Words or Equations*, Joint Mathematics Meetings, Online, April 2022.

45. *Algebraic Geometry Seminar*, Washington University at St. Louis, Online, March 2022

44. *Math Department Colloquium*, University of Regina, Saskatchewan, CAN (Online), October 2021

43. *Rocky Mountain Algebraic Combinatorics Seminar*, Colorado State University, Fort Collins, CO, September 2021.

42. *NTAG Seminar*, Simon Fraser University, Vancouver, BC, CAN (Online), August 2021.

41. *Algebra, Geometry and Combinatorics (AGC) Online Seminar*, online, August 2021.

40. *Math Department Colloquium*, University of Ljubljana, Slovenia, online, April 2021.

39. *LaCIM Combinatorics Seminar*, UQAM, Online, April 2021.

38. *CMS Special Session on Enumerative Combinatorics*, Canadian Math Society Winter Meetings, Online, December 2020.

37. *Formal Power Series and Algebraic Combinatorics - Poster Session*, FPSAC 2020 Online, July 2020.

36. *Rocky Mountain Algebraic Combinatorics Seminar*, Colorado State University, Fort Collins, CO, June 2020.

35. *Math Department Colloquium*, University of Colorado Boulder, Boulder, CO, February 2020.

34. *Rocky Mountain Algebraic Combinatorics Seminar*, Colorado State University, Fort Collins, CO, November 2019.

33. *CanaDAM (Canadian Discrete and Algorithmic Mathematics conference)*, Simon Fraser University, Vancouver, BC, May 2019.

32. *AWM Research Symposium*, Rice University, Houston, TX, April 2019.

31. *Formal Power Series and Algebraic Combinatorics (FPSAC)*, Dartmouth University, Hanover, NH, July 2018.

30. *Rocky Mountain Algebraic Combinatorics Seminar (RMAC)*, Colorado State University, Fort Collins, CO, April 2018.

29. *Combinatorics Seminar*, University of California, Berkeley, March 2018.

28. *AMS Special Session on Comb. Comm. Alg. and Polytopes*, Joint Math Meetings, San Diego, January 2018.

27. *AMS Special Session on Combinatorial Aspects of the Polynomial Ring*, UC Riverside, October 2017.

26. *5-day Graduate Mini-Course*, Equivariant Combinatorics Workshop, Center for Mathematics Research (CRM), Montreal, June 2017.

25. *AMS Special Session on Cohomologies and Combinatorics*, Hunter College, NY, May 2017.

24. *Combinatorics Seminar*, University of Illinois Urbana-Champagne, March 2017.

23. *Combinatorics Seminar*, University of Washington, March 2017.

22. *Combinatorics Seminar*, University of California, San Diego, Jan. 2017.

21. *AMS Special Session on Combinatorial Representation Theory*, St. Thomas Univ., Minneapolis, Oct. 2016.

20. *Algebra Seminar*, University of Virginia, October 2016.

19. *Combinatorics Seminar*, University of Southern California, Los Angeles, September 2016.

18. *Combinatorics Seminar*, University of California, Los Angeles, May 2016.

17. *Rocky Mountain Algebraic Combinatorics Seminar*, Colorado State University, Fort Collins, CO, May 2016.

16. *Algebra and Discrete Math Seminar*, University of California Davis, November 2016.

15. *Formal Power Series and Algebraic Combinatorics (FPSAC) Conference*, Vancouver, CAN, July 2016.

14. *Combinatorics Seminar*, University of Michigan, April 2015.

13. *Student Algebraic Geometry Seminar*, University of Michigan, April 2015.

12. *Combinatorics Seminar*, University of California Berkeley, April 2015.

11. *Berkeley/Davis Combinatorics Gatherings*, UC Davis, March 2015.

10. *Graduate Student Combinatorics Conference*, University of Minnesota, March 2013.

9. *AMS Session on Combinatorics and Graph Theory, Joint Mathematics Meetings*, January 2012.

8. *Combinatorics Seminar*, University of California Berkeley, October 2011.

7. *AMS Special Session for Undergraduate Research*, Joint Mathematics Meetings, January 2011.

6. *Rocky Mountain Algebraic Combinatorics Seminar*, Colorado State University, Fort Collins, CO, March 2010.

5. *Combinatorics Seminar*, University of Michigan, March 2010.

4. *AMS Special Session for Undergraduate Research, Joint Mathematics Meetings*, January 2010.

3. *Colloquium*, Colorado State University, Fort Collins, March 2009.

2. *AMS Special Session on q-series and partitions*, March 2009. *AMS Special Session on Automorphic and Modular Forms in Number Theory, Joint Mathematics Meetings*, January 2009.

1. *AMS Session on Combinatorics*, Joint Mathematics Meetings, January 2008.

TEACHING

Graduate Courses

- Fall 2024 (upcoming), Advanced Combinatorics (Math 601), Colorado State University
- Spring 2024, Combinatorics II (Math 502), Colorado State University
- Fall 2023, Combinatorics I (Math 501), Colorado State University
- Spring 2023, Combinatorics II (Math 502), Colorado State University
- Fall 2022, Combinatorics I (Math 501), Colorado State University
- Spring 2022, Abstract Algebra II (Math 567), Colorado State University
- Fall 2021, Abstract Algebra I (Math 566), Colorado State University
- Summer 2021, Schubert Calculus Workshop, Summer School in Algebraic Combinatorics, Online.
- Fall 2020, Advanced Combinatorics I (Math 601), Colorado State University
- Spring 2020, Delta Conjecture Reading Group, Colorado State University
- Spring 2020, Combinatorics II (Math 502), Colorado State University
- Fall 2019, Combinatorics I (Math 501), Colorado State University
- Summer 2017, Graduate Mini-Course on Schubert Calculus, Equivariant Combinatorics Workshop, Center for Mathematics Research, Montreal

Undergraduate Courses

- Spring 2025 (upcoming), Introduction to Abstract Algebra (Math 366), Colorado State University
- Spring 2022, Introduction to Combinatorial Theory (Math 301), Colorado State University
- Fall 2020, Introduction to Combinatorial Theory (Math 301), Colorado State University
- Spring 2019, Introduction to Abstract Mathematics (Math 108), UC Davis
- Fall 2017, Introduction to Abstract Mathematics (Math 108), UC Davis
- Spring 2014, Calculus (Math 1A), Graduate Student Instructor, UC Berkeley
- Fall 2014, Multivariable Calculus (Math 53), Graduate Student Instructor, UC Berkeley