

Contact Information

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Harvard University
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Education

- Exchange Scholar at Harvard University (current)
- Ph.D. in Mathematics at UC Berkeley (in progress)
 - Advisor: Lauren K. Williams
 - Area: Algebraic Combinatorics
- B.S. in Mathematics at University of Florida 2010–2014
 - Major GPA: 4.0 (with Summa Cum Laude)
 - Minor in Computer Sciences

Research Interest: Algebra and Combinatorics. In algebra, I am mostly interested in the study of the phenomenon of non-uniqueness of factorizations into irreducibles in commutative cancellative monoids and integral domains using techniques of number theory, combinatorics, and convex geometry. My research in combinatorics focuses on matroids, in particular, positroids and tiling matroids. I am also interested in cluster algebras, finite groups, lattices, and graphs.

Manuscripts Submitted to Peer-Reviewed Journals

1. *Atomic and antimatter semigroup algebras with rational exponents*
arXiv link: <https://arxiv.org/pdf/1801.06779.pdf>
2. *On the system of sets of lengths and the elasticity of submonoids of \mathbb{N}^d*
arXiv link: <https://arxiv.org/pdf/1806.11273.pdf>
3. *Tilings and matroids on the lattice points of a regular simplex* (with H. Polo)
arXiv link: <https://arxiv.org/pdf/1802.05633.pdf>
4. *Positroids induced by rational Dyck paths*
arXiv link: <https://arxiv.org/pdf/1706.09921.pdf>
5. *On the molecules of Puiseux monoids* (with M. Gotti)
arXiv link: <https://arxiv.org/pdf/1702.08270.pdf>

Scientific Publications

1. *Systems of sets of lengths of Puiseux monoids*, Journal of Pure and Applied Algebra. DOI: <https://doi.org/10.1016/j.jpaa.2018.08.004>
2. *The elasticity of Puiseux monoids* (with C. O'Neill), Journal of Commutative Algebra. DOI: <https://projecteuclid.org/euclid.jca/1523433696>
3. *How do elements really factor in $\mathbb{Z}[\sqrt{-5}]$?* (with S. Chapman and M. Gotti), Recent Developments in Commutative Ring Theory, Springer Proceedings in Mathematics (A. Badawi and J. Coykendall, eds.) (to appear)
arXiv link: <https://arxiv.org/pdf/1711.10842.pdf>
4. *Increasing positive monoids of ordered fields are FF-monoids.* Journal of Algebra, Vol. **518** (2019) 40–56.
5. *Puiseux monoids and transfer homomorphisms*, Journal of Algebra, Vol. **516** (2018) 95–114.
6. *Extended Abstract: On positroids induced by rational Dyck paths*, Séminaire Lotharingien de Combinatoire, Vol. **80B** (2018) 12pp.
7. *Minimal presentations of shifted numerical semigroups.* (with R. Conaway, J. Horton, C. O'Neill, R. Pelayo, M. Williams, and B. Wissman), International Journal of Algebra and Computation, Vol. **28** (2018) 53–68.
8. *Dyck paths and positroids from unit interval orders* (with A. Chavez), Journal of Combinatorics Theory Series A, Vol. **154** (2018) 507–532.
9. *Atomicity and boundedness of monotone Puiseux monoids* (with M. Gotti), Semigroup Forum, Vol. **96** (2018) 536–552.
10. *Extended Abstract: Dyck paths and positroids from unit interval orders* (with A. Chavez), Séminaire Lotharingien de Combinatoire, Vol. **78B** (2017) 12pp.
11. *On the atomic structure of Puiseux monoids.* Journal of Algebra and Its Applications Vol. **16** (2017) 20pp.
12. *On delta sets and their realizable subsets in Krull monoids with cyclic class groups.* (with S. Chapman and R. Pelayo) Colloquium Mathematicum, Vol. **137** (2014) 137–146.

Research Experience

- Exchange Scholar (Ph.D. Dissertation Preparation), Harvard University (in progress).
- Research Assistant PURE Math (Factorization Theory), University of Hawaii (2015).
- Undergrad Thesis: *On Sub-deltas of Block Monoids with Cyclic Class Group* (2014).
- PURE Math (Factorization Theory), University of Hawaii at Hilo (2013).

- Princeton Summer Program (Analysis and Geometry), Princeton University (2012).
- Student Researcher (REUT in Semigroup Theory), CSU at Chico (2012).

Invited Talks and Conferences

1. *On Monoid Algebras with Rational Exponents*. Algebra Seminar, University of Florida (Nov 16, 2018).
2. *On a None-finitely Generated Generalization of Semigroup Algebras*. International Meeting on Numerical Semigroups (IMNS) at Cortona, Italy (Fall 2018).
3. *Positroids Induced by Rational Dyck Paths*. Formal Power Series and Algebraic Combinatorics (FPSAC), Dartmouth College (Summer 2018).
4. *Generalized Affine Semigroups: Their Sets of Lengths and Elasticity*. Algebra and Discrete Mathematics Seminar, UC Davis (Spring 2018).
5. *Tilings and Matroids on the Lattice Points of a Two-dimensional Simplex*. California Alliance Conference, UC Berkeley (Spring 2018).
6. *Systems of Sets of Lengths of Puiseux Monoids*. Conference of Rings and Factorizations at Graz, Austria (Spring 2018).
7. *On Tilings and Matroids on the Lattice Points of a Regular Simplex*. Combinatorics Seminar, University of Miami (Spring 2018).
8. *Dyck Paths and Positroids from Unit Interval Orders*. Formal Power Series and Algebraic Combinatorics (FPSAC) at London, United Kingdom (Summer 2017).
9. *Positroids Induced by Unit Interval Orders*. Combinatorics Seminar, University of Miami (Spring 2017).
10. *Dyck Paths and Positroids from Unit Interval Orders*. Combinatorics Seminar, UC Berkeley (Spring 2017).
11. *Toric Algebra: Semigroup Rings*. Combinatorial Commutative Algebra Seminar, UC Berkeley (Spring 2017).
12. *Monomial Ideals: Stanley-Reisner Ideals*. Combinatorial Commutative Algebra Seminar, UC Berkeley (Spring 2017).
13. *Puiseux Monoids and Their Atomic Structure*. International Meeting on Numerical Semigroups (IMNS) at Levico Terme, Italy (Summer 2016).
14. *Algebra of Symmetric Functions*. Student Combinatorics Seminar, UC Berkeley (Spring 2016).
15. *Incidence Algebras and Möbius Inversion Formula*. Student Combinatorics Seminar, UC Berkeley (Spring 2016).

16. *A Friendly Introduction to Numerical Semigroups*. PURE Math 2015 Symposium, University of Hawaii at Hilo (Summer 2015).
17. *On Realizable Delta Sets of Block Monoids of Cyclic Class Groups*. PURE Math 2013 Symposium, University of Hawaii at Hilo (Summer 2013).
18. *An Isomorphism Theorem of Completely Semisimple Inverse Semigroup* REUT 2012, California State University at Chico (Summer 2012).

Referee and Review Services

- The American Mathematical Monthly
- Lecturas Matemáticas, Sociedad Colombiana de Matemáticas

Undergraduate Mentoring Activities

- UC Berkeley Directed Reading Program (Spring 2016)
 - Mentored student Robbie Housden through the basics of smooth manifolds
 - Final presentation titled: *An overview to the Level Set Theorem for manifolds*
- Berkeley City College Mentor Program (Fall 2015)
 - Co-adviced student Harold Polo in factorization theory.
 - Project: *Three families of dense Puiseux monoids*
 - arXiv link: <https://arxiv.org/pdf/1701.00058.pdf>
- PURE Math (Summer 2015)
 - Co-advice Rebecca Conaway, Jesse Horton, and Mesa Pracht in factorization theory
 - Project: *Shifting Numerical Semigroups and the Catenary Degree*
 - arXiv link: <https://arxiv.org/pdf/1701.08555.pdf>
- UC Berkeley Directed Reading Program (Spring 2014)
 - Mentored student Stephan Cho through the basics of algebraic topology
 - Final presentation titled *On the Universal Coefficient Theorem for Homology*.

Teaching Experience

- As a Graduate Student Instructor (GSI) at UC Berkeley:
 - Math 53W: Multivariable Calculus (Summer 2018)
 - Math 1A: Single Variable Calculus I (Spring 2017)
 - Math 1B: Single Variable Calculus I (Fall 2016)
- As a Teacher Assistant (TA) at University of Florida:

- MAC 1105: College Algebra (Spring 2014)
- MAC 1105: College Algebra (Fall 2013)
- As a Student Assistant at University of Havana:
 - Complex Variable (Fall 2008)
 - Complex Variable (Fall 2007)
 - Mathematics for Biological Sciences (Fall 2006)

Honors and Awards

- UC Dissertation-Year Fellowship
- NSF-AGEP Fellowship
- UC Berkeley Chancellor Fellowship
- UC Berkeley Department of Mathematics Fellowship

Other Professional Experiences & Skills

- Organizer of the Graduate Student Seminar in Combinatorial Commutative Algebra at UC Berkeley (Spring 2017)
- Software Developer at Ultimate Software (Summer 2014)
- Participant in the Summer Program in Analysis and Geometry at Princeton University (Summer 2012)
- Programming/Computer Languages: C#, Java, JavaScripts, HTML, Latex, Sage

Professional Societies

- American Mathematical Society (AMS)
- Mathematical Association of America (MAA)
- Berkeley Science Network (BSN)
- Alliances for Graduate Education and the Professoriate (NSF-AGEP)
- Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS)

References

- Scott Chapman (stc008@shsu.edu)
- Alfred Geroldinger (alfred.geroldinger@uni-graz.at)
- Lauren Williams (williams@math.harvard.edu)