Franquiz Arturo Caraballo Alba

PhD Student · Pure Mathematics

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Education

Florida State University   *Tallahassee, Florida, U.S.A.*
PhD, Pure Mathematics (Expected May 2025)   *August 2019 - present*
- Advisor: Dr. Paolo Aluffi
- Thesis: Topics on Intersection Theory: Algebraic and Tropical Perspectives

State University of New York at Plattsburgh   *Plattsburgh, New York, U.S.A.*
BS, Mathematics; BA, Physics   *August 2015 - May 2019*
- Advisor: Dr. David Kenoyer

Research

Research Interests

My interests lie broadly in applications of intersection theory to combinatorial algebraic geometry, with a particular focus on characteristic classes in both algebraic geometry and tropical geometry.

Research Experience

Florida State University - Dept. of Mathematics   *Tallahassee, FL*
Advisor: Dr. Paolo Aluffi   *May 2020 - Present*
- Chern-Schwartz-MacPherson (CSM) cycles of matroids
  - Developing a formula for the Poincarè dual of the CSM cycle of a matroid; joint work with Jeffery Liu.
- Linear orbits of smooth quadrics in projective space
  - Defining the predegree polynomial of a hypersurface.
  - Studying obstructions to the computation of this invariant in the general case and developing tools to address these obstructions.
  - Computing this invariant in the case of smooth quadrics in $\mathbb{P}^3$.

Professional Experience

2019-present	**Graduate Teaching Assistant**, Mathematics Department, Florida State University
2016-2019	**Mathematics Tutor**, Learning Center, State University of New York at Plattsburgh
2016-2018	**Mathematics Tutor**, Student Support Services, State University of New York at Plattsburgh

Publications

Preprints

Linear orbits of smooth quadric surfaces, 2023. Avaliable on arXiv, 2303.09496

A "staircase" formula for the Chern-Schwartz-MacPherson cycle of a matroid, 2024. Joint work with Jeffery Liu. Available on arXiv, 2409.03641

Presentations

A "staircase" formula for the Chern-Schwartz-MacPherson cycles of a matroid. Upcoming (December 2024). Schubert Seminar, online.

Chern-Schwartz-MacPherson cycles of matroids. Summer school on tropical linear spaces. September 2024. Summer school on tropical linear spaces, Eberhard Karls University of Tübingen, Tübingen, Germany.

Chern-Schwartz-MacPherson classes. February 2024. Algebra Seminar, Florida State University, Tallahassee, Florida.

Matroids: from linear independence to hyperplane arrangements. January 2024. Algebra Seminar, Florida State University, Tallahassee, Florida.

Lecture series on the geometry of matroids (4 lectures). September-October 2023. Aluffi's Seminar, Florida State University, Tallahassee, Florida.

Tropical Geometry: intrinsic and toric perspectives. November, 2022. Algebra Seminar, Florida State University, Tallahassee, Florida.

The adjusted predegree polynomial of a smooth quadric in $\mathbb{P}^3$. December 2021. Algebra Seminar, Florida State University, Tallahassee, Florida.

The adjusted predegree polynomial of a hypersurface in $\mathbb{P}^n$. November 2021. Algebra Seminar, Florida State University, Tallahassee, Florida.

Teaching Experience

Fall 2024	**MAC2313: Calculus III**, Instructor
Summer 2024	**MAS3105: Applied Linear Algebra I**, Instructor
Spring 2024	**MAC2313: Calculus III**, Instructor
Fall 2023	**MAC2313: Calculus III**, Instructor
Summer 2023	**MAC2312: Calculus II**, Instructor
Spring 2023	**MAC2312: Calculus II**, Instructor
Fall 2022	**MAC2311: Calculus I**, Instructor
Spring 2022	**MAC2311: Calculus I**, Recitation Instructor
Fall 2020	**MAC1140: Precalculus Algebra**, Instructor

Mentoring

2023-2024	**Graduate Student Mentor for Ayotuntosimi Loye**, part of the Directed Reading Program at Florida State University

- Project: A directed study of algebraic geometry, covering scheme theory as presented in Vakil's "Foundations of algebraic geometry".

Fellowships and Awards

2024	**Dwight B. Goodner Mathematics Fellowship**, Department of Mathematics, Florida State University
	Distinguished Teaching Assistant Award, Department of Mathematics, Florida State University
2023	**Dean's Award for Doctoral Excellence**, College of Arts and Sciences, Florida State University

2018	**Hudson Science Scholarship**, State University of New York at Plattsburgh
	Semmler Math Scholarship, State University of New York at Plattsburgh
2017	**Redcay Honor Scholarship**, State University of New York at Plattsburgh
	Semmler Math Scholarship, State University of New York at Plattsburgh

Schools and Conferences Attended

SCHOOLS

Summer school on tropical linear spaces. September 2024. Eberhard Karls University of Tübingen, Tübingen, Germany. Lecturers: Felipe Rincón, Benjamin Schröter and Victoria Schleis. Organizers: Parisa Ebrahimian, Loujean Cobigo and Victoria Schleis.

AGNES Summer school on intersection theory on moduli spaces. July 2023. Lecturers: Andrea di Lorenzo, Eric Larson, Hannah Larson and Angelo Vistoli. Organizers: Dan Abramovic, Melody Chan and Isabel Vogt.

MSRI Summer school on tropical geometry. August 2022. Lecturers/Organizers: Renzo Cavalieri, Hannah Markwig and Dhruv Ranganathan.

CONFERENCES

AMS Spring Southestern Sectional Meeting. March 2024. Florida State University.

Western Algebraic Geometry Seminar (WAGS). November 2022. University of California, Riverside.

AMS Fall Northeastern Sectional Meeting. October 2023. University of Massachussetts-Amherst.

AMS Spring Southestern Sectional Meeting. March 2023. Georgia Institute of Technology.

SERVICE AND OUTREACH

2020, 2023	**FSU Math Fun Day**, Volunteer, helped set-up rooms and ran activities directed at children in the local community.	*Florida State University*