

Alexander Ruys de Perez

EDUCATION

Texas A&M University

Ph.D. in Mathematics

College Station, TX

May 2021

Vanderbilt University

M.A. in Mathematics

Nashville, TN

May 2015

Vanderbilt University

B.A. in Mathematics and Economics

– Minor in Computer Science

Nashville, TN

December 2013

EXPERIENCE

Georgia Institute of Technology

Visiting Assistant Professor

Atlanta, GA

August 2021-present

PUBLICATIONS

- [1] A. Ruys de Perez, L. F. Matusevich, and A. Shiu, “Wheels: A new criterion for non-convexity of neural codes”, *In preparation*,
- [2] P. Chan, K. Johnston, J. Lent, A. R. de Perez, and A. Shiu, “Nondegenerate neural codes and obstructions to closed-convexity”, *arXiv preprint arXiv:2011.04565*, 2020.
- [3] A. R. de Perez, L. F. Matusevich, and A. Shiu, “Neural codes and the factor complex”, *Advances in Applied Mathematics*, vol. 114, p. 101977, 2020.
- [4] J. D. Johnson, L. Kong, M. G. Ruddy, and A. M. R. de Perez, “Positive periodic solutions for a higher order functional difference equation”, *Differential Equations and Dynamical Systems*, vol. 23, no. 2, pp. 195–208, 2015.
- [5] J. Johnson, L. Kong, M. Ruddy, and A. RuysDePerez, “Existence of positive periodic solutions for higher order singular functional difference equations”, *Electronic Journal of Qualitative Theory of Differential Equations*, vol. 2014, no. 3, pp. 1–8, 2014.

RESEARCH PRESENTATIONS

Machine Learning and Topological Data Analysis in Stem Cell Pattern (Poster)

2022 Workshop on Discrete and Topological Models in Biology

Tampa, FL

May 10, 2022

ML and TDA for Det. Patt. Form. in Plur. Stem Cells (20-Minute Virt. Conf. Talk)

Joint Mathematics Meetings

n/a

April 8, 2022

Machine Learning and Topological Data Analysis in Early Tissue Layers (Poster)

NSF-Simons MathBioSys Annual Meeting

New York, NY

April 7-8, 2022

Machine Learning and Topological Data Analysis in Early Tissue Layers (Poster)

SCMB Annual Advisory Board Meeting

Atlanta, GA

March 1, 2022

Predicting Pluripotent Stem Cell Diff. from Cell. Pos. Data (Poster)	Atlanta, GA
Southeast Center for Mathematics and Biology Annual Symposium	December 13-16, 2021
Rigid Structures in Closed Nonconvex Codes (20-Min Virtual Conference Talk)	n/a
AMS Fall Southeastern Sectional Meeting	November 20, 2021
Combinatorics of Neural Codes (50-Minute Seminar Talk)	Atlanta, GA
Georgia Tech Research Horizons Seminar	October 20, 2021
Assess. Neur. Codes for Nonconv. Bey. Loc. Obstr. (20-Min Virtual Conf. Talk)	n/a
SIAM Conference on Applied Algebraic Geometry	August 19, 2021
Wheels: A New Criterion for Nonconvexity (50-Minute Online Seminar Talk)	n/a
Curto Lab Meeting	October 1, 2020
Neural Codes and the Factor Complex (50-Minute Online Seminar Talk)	n/a
University of Washington Combinatorics and Geometry Seminar	April 8, 2020
Neural Codes and the Factor Complex (50-Minute Conference Talk)	Toronto, ON
Fields Centre Research Activity: "New Mathematical Methods for Neuroscience"	March 3, 2020
A New Criterion for Nonconvexity in Neural Codes (Poster)	Atlanta, GA
Southeast Center for Mathematics and Biology Symposium	February 17-18, 2020
Checking for Max Intersection Complete Neural Codes (20-Min Conf. Talk)	Dallas, TX
SIAM Texas-Louisiana Annual Meeting	November 2, 2019
Max Int. Complete Codes and the Factor Complex (20-Min Conf. Talk)	College Station, TX
Graduate Algebra Symposium	October 19, 2019
Max Int. Complete Codes and the Factor Complex (50-Min Sem. Talk)	College Station, TX
Texas A&M Algebra and Combinatorics Seminar	September 13, 2019
Max Intersection Completeness in the Neural Ideal (Poster)	Atlanta, GA
Meeting on Applied Algebraic Geometry	April 13-14, 2019
Max Intersection Completeness in the Neural Ideal (20-Min Conf Talk)	Auburn, AL
AMS Spring Southeastern Sectional Meeting	March 17, 2019
Max Intersection Completeness in the Neural Ideal (20-Minute Talk)	College Station, TX
Graduate Students Organization Seminar at Texas A&M University	March 7, 2019
Max Intersection Completeness in the Neural Ideal (Poster)	El Paso, TX
Southwest Local Algebra Meeting	February 23-24, 2019
Neural Codes and Convexity (20-Minute Talk)	College Station, TX
Gathering in Graduate Expository Mathematics	February 16, 2019
A Canonical Form for Neural Codes (Poster)	Fort Worth, TX
NSF/CBMS Regional Conference on Applications of Polynomial systems	June 4-8, 2018
Standard form for Neural Codes (50-Minute Seminar Talk)	College Station, TX
Graduate Students Organization Seminar at Texas A&M University	April 26, 2018
A Canonical Form for Neural Codes (Poster)	College Station, TX
Texas Algebraic Geometry Symposium	April 6-8 2018

A Canonical Form for Neural Codes (Poster)
Southwest Local Algebra Meeting

Fayetteville, AR
February 24-25, 2018

Existence of Positive Periodic Solutions for Higher Order... (20-Min Conf Talk)
Southeastern-Atlantic Regional Conference on Differential Equations

Knoxville, TN
September 22, 2013

TEACHING

- **Instructor** at Georgia Institute of Technology Spring 2022
Applied Combinatorics (MATH 3012)
- **Instructor** at Texas A&M University Spring 2021
Mathematics for Business and Social Sciences (MATH 140)
- **Grader** at Texas A&M University Spring 2020
Seminar in Algebra: Commutative Algebra (MATH 662)
- **Teaching Assistant, Recitation and Lab** at Texas A&M University Fall 2019
Functions, Trigonometry, and Linear Systems (MATH 150)
- **Instructor** at Texas A&M University Summer 2019
Business Calculus (MATH 142)
- **Teaching Assistant, Recitation and Lab** at Texas A&M University Spring 2019
Engineering Mathematics II (MATH 152)
- **Teaching Assistant, Recitation and Lab** at Texas A&M University Fall 2018
Engineering Mathematics I (MATH 151)
- **Teaching Assistant, Lecture** at Texas A&M University Summer 2018
Algebra Departmental Qualifying Exam Prep Course (listed as MATH 663)
- **Teaching Assistant, Recitation and Lab** at Texas A&M University Spring 2018
Engineering Mathematics II (MATH 152)
- **Grader** at Texas A&M University Fall 2017
Structures and Methods of Combinatorics (MATH 431)
- **Grader** at Texas A&M University Summer 2017
Differential Equations (MATH 308)
- **Teaching Assistant, Lab** at Texas A&M University Spring 2017
Engineering Mathematics II (MATH 152)
- **Help Session** at Texas A&M University Spring 2017
Engineering Mathematics III (MATH 251)
- **Teaching Assistant, Recitation and Lab** at Texas A&M University Fall 2016
Engineering Mathematics II (MATH 152)
- **Help Session** at Texas A&M University Summer 2016
Explorations in Mathematics (MATH 167)
- **Help Session** at Texas A&M University Spring 2016
Differential Equations (MATH 308)
- **Grader** at Texas A&M University Fall 2015
Foundations of Mathematics (MATH 220)

MENTORING

Mentor Directed Reading Program in Georgia Tech School of Mathematics	Atlanta, GA Spring 2022
Graduate Mentor Directed Reading Program in Texas A&M Math Department	College Station, TX Spring 2021
Graduate Mentor Directed Reading Program in Texas A&M Math Department	College Station, TX Fall 2020
Peer Mentor Peer Mentoring Program – Give advice to incoming graduate students at Texas A&M’s math department.	College Station, TX Fall 2019-present
Teaching Assistant Research Experience for Undergraduates at Texas A&M University – Mentored undergraduate researchers on the topic of neural codes. – Presented on using SageMath software. – Presented on how to give a presentation on mathematical research. – Organized panel discussion on life in graduate school. – Provided feedback and guidance on undergraduate researchers’ projects.	College Station, TX Summer 2020

SERVICE

Panelist Georgia Tech Math 8801-BUR	Atlanta, GA October 19, 2021
Mini-Symposium Co-Organizer SIAM TX-LA Annual Meeting	College Station, TX October 16-18, 2020
Referee Journal of Algebra and its Applications	2019
Algebra Qualifying Exam Preparation Texas A&M Math Department – Went through all algebra qualifying exam problems given between January 2013 and January 2018 and wrote up solutions. – Compiled answer key for algebra qualifying exams given between January 2013 and January 2018. (Prior to my work, students studying for the algebra qualifying exam could practice on previous qualifying exams posted online, but there was no answer key to check for correctness.)	College Station, TX Summer 2018-Spring 2019
Liaison Chair SIAM Chapter at Texas A&M University	College Station, TX Fall 2016-Summer 2017

SKILLS

- **Programming Languages:** Python, SageMath, MatLab, LaTeX, Java, C++

PROFESSIONAL MEMBERSHIPS

Society for Industrial and Applied Mathematics

Texas A&M University Chapter

Fall 2015-present

College Station, TX

American Mathematical Society

Texas A&M University Chapter

Fall 2015-present

College Station, TX