Eric J. Pabón Cancel

Curriculum Vitae

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Education

Doctor of Philosophy in Mathematics — Starting August 2023
Purdue University, West Lafayette, Indiana

Bachelor of Science in Pure Mathematics (*Magna Cum Laude*) — June 2023
Curricular Sequence in Applied Mathematics for Science and Engineering
University of Puerto Rico, Mayagüez Campus (UPRM), Mayagüez, Puerto Rico

High School Diploma (*Highest Honors*) — June 2019
Juan Quirindongo Morell High School, Vega Baja, Puerto Rico

Research Experience

Research in Machine Learning — May 2023–August 2023
Program: GEM Fellowship Employer Sponsor Internship
Group 39, Division 3, MIT Lincoln Laboratory, Massachusetts Institute of Technology
Supervised by: Dr. Sam Polk & Dr. Mabel Ramírez, MIT Lincoln Laboratory
Title: *Unsupervised Machine Learning through Autoencoders with LSTM architecture*

- Research focused on Long Short-Term Memory Autoencoders and mathematical algorithms, with the aim to minimize the loss function of the optimal autoencoder.

Research in Number Theory — August 2019–December 2022
Program: Puerto Rico Louis Stokes Alliance for Minority Participation
University of Puerto Rico, Mayagüez Campus, Department of Mathematical Sciences
Supervised by: Prof. Reyes M. Ortiz Albino, University of Puerto Rico at Mayagüez
Title: *Properties of $\tau_{(n)}$-primes*

- Research project based on the theory of generalized factorizations. Generalized the notion of complete residue systems for $\tau_{(2)}$-primes, $\tau_{(3)}$-primes and $\tau_{(6)}$-primes. Developed an extension of Euler's totient function.

Research in Combinatorics — June 2022–August 2022
Program: Summer@ICERM 2022: Computational Combinatorics
Institute for Computational and Experimental Research in Mathematics, Brown University
Supervised by: Prof. Pamela E. Harris, University of Wisconsin-Milwaukee
Title: *Permutation Invariant Parking Assortments*

- Research project focused on the study of Permutation Invariant Parking Sequences. Characterized when the car length vector $\vec{y}$ is minimally invariant (when (1^n) is the only invariant parking sequence), and characterized the form of the 2-tuple and 3-tuple parking sequences.

Research in Algebraic Coding Theory — June 2021–August 2021
Program: NSF REU in Combinatorics, Probability and Algebraic Coding Theory
East Tennessee State University & University of Puerto Rico at Ponce
Supervised by: Prof. Fernando Piñero González, University of Puerto Rico at Ponce
Title: *Improving the Dimension Bound of Hermitian-Lifted Codes*

- Algebraic Geometry project focused on locally recoverable codes from elements that arise from regions of the normal basis of the Hermitian Curve. Developed a formula that improved the counting of good recoverable functions. Improved the bound rate of the code from 0.7% to 10%.

Title: *Improving the Minimum Distance Bound of Trace Goppa Codes*

- Finite Fields project focused on the development of codes using Goppa matrices by using quadratic extensions and cubic extensions over finite fields. Improved the minimum distance bound of trace Goppa Polynomials.

Scholarships and Fellowships

2023 National GEM Consortium PhD Science Fellowship, $16,000 — August 2023–May 2024
- Purdue University Department of Mathematics Sponsorship, $11,700 — August 2023–May 2024
- MIT Lincoln Laboratory Employer Sponsorship

2022 Evertec Inc. Scholarship, $1,000.00 — October 2022
Puerto Rico-LSAMP Scholarship, $4,800.00 — August 2019–December 2022
UPRM Musical Talent Scholarship, $800.00 — February 2020

Travel Funding

2023 Emerging Researchers National Conference in STEM Travel Grant — February 2023
2022 Field of Dreams Math Alliance Conference Travel Scholarship — November 2022
2022 Puerto Rico-LSAMP Travel Grant — October 2022

Awards and Merits

2023 Ford Foundation Predoctoral Fellowship Honorable Mention — March 2023
2022 Hispanic Scholarship Fund Scholar — June 2022
National Math Alliance Predoctoral Scholar — November 2021-May 2023
UPRM Faculty of Arts and Sciences Honor Roll — August 2018–May 2023
National Trig-Star Math Competition, 16th Overall Finalist — June 2017
Eagle Scout Rank, with 2 Silver Palms — May 2017

Preprints and Papers

[1] E.J. Pabon-Cancel and R.M. Ortiz-Albino.
Properties of $\tau_{(n)}$-primes. (In progress).

[2] A. Allen, E.J. Pabon-Cancel, L. Polanco and F. Piñero-Gonzalez.
Improving the Dimension Bound of Hermitian-Lifted Codes.
Submitted to Designs, Codes and Cryptography.
arXiv: https://arxiv.org/abs/2302.01557.

[3] D. Chen, P.E. Harris, J. Carlos Martinez Mori, E.J. Pabon-Cancel and G. Sargent.
Permutation Invariant Parking Assortments.
Submitted to Enumerative Combinatorics and Applications.
arXiv: https://arxiv.org/abs/2211.01063.

[4] I. Byrne, N. Dodson, R. Lynch, E.J. Pabon-Cancel and F. Piñero-Gonzalez.
Improving the minimum Distance bound of Trace Goppa codes.
Designs, Codes and Cryptography. (2023).
DOI: https://doi.org/10.1007/s10623-023-01216-6.
arXiv: https://arxiv.org/abs/2201.03741.

Contributions to the Profession

[1] P.E. Harris, Z. Markman, L. Martinez, A. Mock, E.J. Pabón-Cancel, A. Verga, and S. Wang.
A Model for a One-Hour Workshop on Mentoring.
MAA Focus, 43(1):18-21, 2023.

Presentations

- **2023 JTM-PRISM** — **Bayamón, PR**
  Properties of $\tau_{(n)}$-primes — April 2023
- **38th Interuniversity Mathematical Sciences Research Seminar** — **Mayagüez, PR**
  Permutation Invariant Parking Assortments Presentation — February 2023
- **2023 AAAS Emerging Researchers National Conference in STEM** — **Washington, DC**
  Permutation Invariant Parking Functions with cars of assorted lengths Poster — February 2023
- **Joint Mathematics Meetings 2023** — **Boston, MA**
  Permutation Invariant Parking Functions with cars of assorted lengths Poster — January 2023
  Permutation Invariant Parking Functions with Cars of Arbitrary Lengths Presentation
- **2022 SACNAS National Diversity in STEM Conference** — **San Juan, PR**
  The Study of $\tau_{(n)}$-primes Poster — October 2022

- **2022 Gulf Coast Undergraduate Research Symposium** — **Houston, TX**
  Properties of $\tau_{(n)}$-primes Presentation — October 2022
- **Summer@ICERM 2022: Computational Combinatorics** — **Providence, RI**
  On Permutation-Invariant Parking Sequences Presentation — August 2022
- **2022 JTM-PRISM** — **Humacao, PR**
  The Study of $\tau_{(n)}$-primes Presentation — April 2022
- **Joint Mathematics Meetings 2022** — **Virtual Presentation**
  Improving Bounds of Hermitian-Lifted Codes Poster — April 2022
- **37th Interuniversity Mathematical Sciences Research Seminar** — **Virtual Presentation**
  Improving Bounds of Hermitian-Lifted Codes Presentation — February 2022
  The Study of $\tau_{(n)}$-primes Poster
- **2021 Math REU Conference@Clemson University** — **Virtual Presentation**
  Improved Hermitian-Lifted Codes Presentation — July 2021
- **2021 JTM-PRISM** — **Virtual Presentation**
  The Study of $\tau_{(n)}$-atoms Presentation — April 2021
- **35th Interuniversity Mathematical Sciences Research Seminar** — **Cayey, PR**
  The Study of $\tau_{(n)}$-atoms Poster — March 2020

CONFERENCES

- 2023 Junior Technical Meeting-PR Interdisciplinary Scientific Meeting — 29 April, 2023
  University of Puerto Rico at Bayamón — Bayamón, Puerto Rico
- 38th Interuniversity Mathematical Sciences Research Seminar — 24-25 February, 2023
  University of Puerto Rico, Mayagüez Campus — Mayagüez, Puerto Rico
- 2023 AAAS Emerging Researchers National Conference in STEM — 9-11 February, 2023
  Omni Shoreham Hotel — Washington, District of Columbia
- Joint Mathematics Meetings 2023 — 4-7 January, 2023
  John B. Hynes Veterans Memorial Convention Center — Boston, Massachusetts
- 2022 Field of Dreams Conference of The National Math Alliance — 4-6 November, 2022
  The University of Minnesota-Twin Cities — Minneapolis, Minnesota
- 2022 SACNAS National Diversity in STEM Conference — 27-29 October, 2022
  Pedro Roselló Convention Center, San Juan, Puerto Rico
- 2022 Gulf Coast Undergraduate Research Symposium — 8-9 October, 2022
  William Marsh Rice University — Houston, Texas
- 2022 Junior Technical Meeting-PR Interdisciplinary Scientific Meeting — 9 April, 2022
  University of Puerto Rico at Humacao — Humacao, Puerto Rico
- Joint Mathematics Meetings 2022 — 6-9 April, 2022
  Zoom Conference
- 37th Interuniversity Mathematical Sciences Research Seminar — 25-26 February, 2022
  Zoom Conference

- 2021 Math REU Conference@Clemson University — 19 July, 2021
  Zoom Conference. Participating Institutions:
  Clemson University, East Tennessee State University, North Carolina A&T, Elon University

- 2021 Junior Technical Meeting-PR Interdisciplinary Scientific Meeting — 23-24 April, 2021
  Virtual Conference, sponsored by Puerto Rico Louis Stokes Alliance for Minority Participation

- 35th Interuniversity Mathematical Sciences Research Seminar — 6-7 March, 2020
  University of Puerto Rico at Cayey — Cayey, Puerto Rico

Workshops and Mini-Courses

Preliminary Arizona Winter School 2022: Heights and Model Theory — **Virtual Course**
Topics: Heights in Diophantine geometry — October 2022–November 2022
Organizers: Southwest Center for Arithmetic Geometry, University of Arizona

MSRI Modern Math Workshop 2022 — **San Juan, PR**
Topics: Mathematical Modeling and Data Science — October 2022
Organizers: Hélène Barcelo (MSRI), Christian Ratsch (IPAM), Ulrica Wilson (ICERM)

Thematic Program in p-adic L-functions and Eigenvarieties — **Notre Dame, IN**
Topics: Modular Forms and Elliptic Curves (Undergraduate Summer School) — May 2022–June 2022
Organizers: A. Jorza, C. Raicu, E. O'Dorney (Center for Mathematics, University of Notre Dame)

2022 NSF/STEM: Fellowships Application Workshop — **Rio Piedras, PR**
Topics: Grants and Fellowships Workshop — May 2022
Organizers: Mike Westrate (Villanova University)

Algebraic Coding Theory Workshop — **Johnson City, TN**
Topics: Finite Fields and Projective Geometry — June 2021
Organizer: Fernando Piñero González (University of Puerto Rico at Ponce)

Skills

Programming: Python, SAGEMath, Julia, C++
Software: MATLAB, Git, LaTeX
Languages: English (fluent) and Spanish (native)

Graduate Coursework

University of Puerto Rico, Mayagüez Campus
MATE 6101: Number Theory I
MATE 5150: Linear Algebra

Student Associations

PythagoRUM — **Mayagüez, PR**
Co-founder & Vice-President — August 2022–December 2022
- Served as co-founder and Vice-President for the mathematics and computer science student association. This association has the purpose to promote research in mathematics, as well as related fields of STEM, through professional development workshops and research colloquia.

Society of Physics Students, UPRM Chapter — **Mayagüez, PR**
Committee Assistant — August 2018–May 2023
- Served as a Demonstration Committee assistant in 2 physics phenomena presentations. The presentations were for an audience of 20+ elementary school students to motivate them to study science. Served as a Sales Committee assistant in chapter food sales event to improve the chapter's office.

Hermandad Colegial de Avivamiento — August 2018–December 2022
Committee Assistant
- Served as percussion musician for Hermandad Colegial de Avivamiento. Went on a mission to the municipality of Vieques, Puerto Rico in the winter of 2019, and helped distribute donated food, clothing and gifts for people in need.

Acting and Music **Mayagüez, PR**

Acting: Theater Presentations and Roles March 2019–May 2023

- The Physics Movie (Nicholas Flamel, secondary character) (In Development)
- El Muerto (Sabás Honoré, secondary character) (August 2019)
- The Physics Show (Michael Faraday, secondary character) (March 2019)

Music: Alma Latina UPRM February 2020–March 2020

- Worked as percussion musician and staff for the Latin jazz and salsa music group Alma Latina at UPRM.