

Luis A. Medina

Personal Information	Department of Mathematics University of Puerto Rico San Juan, PR 00925 url: http://emmy.uprrp.edu/lmedina/	Office: NCN II A-109 Email: luis.medina17@upr.edu Phone: (787) 764-0000 x 88249 Citizenship: USA
Employment	University of Puerto Rico, Río Piedras San Juan, PR	Associate Professor July 2014 - Present
	University of Puerto Rico, Río Piedras San Juan, PR	Assistant Professor January 2010 - June 2014
	Rutgers University New Brunswick, NJ	Assistant Professor (NTT) August 2008 - December 2009
Education	Tulane University Ph.D. in Mathematics	2008 Advisor: Victor H. Moll
	University of California, Los Angeles (UCLA) Visiting Graduate Student	Fall 2005
	University of Puerto Rico at Humacao B.S. in Computational Mathematics	2003 <i>magna cum laude</i>
Grants	Scholarship fund for excellence in Computer Science and Mathematics <i>NSF DUE-1356474</i> (Co-PI) Amount: \$630,217.00	2014 - 2019
	Computerized Pure Mathematics: Exponential Sums of Symmetric Boolean Functions <i>Fondo Institucional para la Investigación</i> (PI) Amount: \$36,130.00	2014 - 2016
Honors and Awards	Latin@s and Hispanics in Mathematical Sciences (Lathisms 17) Lathisms showcases the contributions of 31 Hispanic and Latino/a mathematicians, one each day from September 15th to October 15th. Showcased on September 25, 2017.	Fall 2017
	Project NExT Fellowship A professional development program for new or recent Ph.D.s in the mathematical sciences. Color: Red'08	2008 - 2009
	IBM Fellowship	Fall 2007 - Spring 2008
	VIGRE Fellowship	Fall 2004 - Spring 2006
	Mathematics Department Awards (Tulane) <ol style="list-style-type: none">1. Outstanding Performance in Oral Examination.2. Outstanding Performance in Teaching Assistance.3. Outstanding Performance in Written Examinations.	
	The Graduate Alliance for Education in Louisiana Fellowship	Fall 2003
	National Physical Science Consortium Fellowship Sponsor by NSA	Fall 2003 - Spring 2004
	NASA Puerto Rico Space Grant Consortium Fellowship	Fall 2002 - Spring 2003
	CSEMS Computer Science, Engineering, and Mathematics Scholarships	Fall 2002 - Spring 2003

Published or
accepted papers**Generalized Walsh transforms of symmetric and rotation symmetric Boolean functions are linear recurrent**

Authors: Francis N. Castro, Luis A. Medina and Pantelimon Stanica

To appear in *Applicable Algebra in Engineering, Communication and Computing*.**Recursions associated to trapezoid, symmetric and rotation symmetric functions over Galois fields**

Authors: F. N. Castro, R. Chapman, L. A. Medina and L. B Sepúlveda

Discrete Mathematics, **341(7)**, 2018, 1915–1931.**Hadamard matrices and the spectrum of quadratic symmetric polynomials over finite fields**

Authors: Francis N. Castro and Luis A. Medina

Linear Algebra and its Applications, **549**, 2018, 153–175.**Exact 2-Divisibility of Exponential Sums Associated to Boolean Functions**

Authors: Francis N. Castro, Luis A. Medina and Ivelisse Rubio

Cryptography and Communications, **10(4)**, 2018, 655–666.**New families of balanced symmetric functions and a generalization of Cusick, Li and Stănică's conjecture**

Authors: R. Arce-Nazario, F. N. Castro, O. E. González, L. A. Medina, and I. Rubio

Designs, Codes and Cryptography, **86**, 2018, 693–701.**Diophantine equations with binomial coefficients and perturbations of symmetric Boolean functions**

Authors: Francis N. Castro, Oscar E. González and Luis A. Medina

IEEE Trans. Inf. Theory, **64(2)**, 2018, 1347–1360.**Generalized exponential sums and the power of computers**

Authors: Francis N. Castro, Oscar E. González and Luis A. Medina

Involve, **11(1)**, 2018, 127–142.**Periodicity in the p -adic valuation of a polynomial**

Authors: Luis A. Medina, Victor H. Moll and Eric S. Rowland

The Journal of Number Theory, **180**, 2017, 139–153.**Modular periodicity of exponential sums of symmetric Boolean functions**

Authors: Luis A. Medina and Armin Straub

Discrete Appl. Math., **217**, 2017, 455–473.**On multiple and infinite log-concavity**

Authors: Luis A. Medina and Armin Straub

Annals of Combinatorics, **20(1)**, 2016, 125–138.**The integrals in Gradshteyn and Ryzhik. Part 27: More logarithmic examples**

Authors: Luis A. Medina and Victor H. Moll

Scientia, **26**, 2015, 49–61. **p -regularity of the p -adic valuation of the Fibonacci sequence**

Authors: Luis A. Medina and Eric S. Rowland

The Fibonacci Quarterly, **53 (3)**, 2015, 265–271.**A divisibility approach to the open boundary cases of Cusick-Li-Stănică's Conjecture**

Authors: Francis Castro, Oscar E. González and Luis A. Medina

Cryptography and Communications, **7 (4)**, 2015, 379–402.**The p -adic valuation of Eulerian numbers: trees and Bernoulli numbers**

Authors: Francis Castro, Oscar E. González and Luis A. Medina

Experimental Mathematics, **24 (2)**, 2015, 183–195.

Asymptotic Behavior of Perturbations of Symmetric Functions

Authors: Francis Castro and Luis A. Medina

Annals of Combinatorics, 18, 397-417, 2014.

The integrals in Gradshteyn and Ryzhik. Part 23: Combination of logarithms and rational functions

Authors: Luis A. Medina and Victor H. Moll

Scientia, Series A: Math. Sciences **23**, 2012, 1-18.

Exact Divisibility of Exponential Sums and Some Consequences

Authors: Francis N. Castro, Luis A. Medina, and Raúl Figueroa

Theory and Applications of Finite Fields, AMS Contemporary Math., **579**, 2012, 55-66.

Iterated primitives of logarithmic powers

Authors: Luis A. Medina, Victor H. Moll and Eric S. Rowland

International Journal of Number Theory, **7**, Num. 3, 2011.

Linear Recurrences and Asymptotic Behavior of Exponential Sums of Symmetric Boolean Functions

Authors: Francis N. Castro and Luis A. Medina

Elec. J. Combinatorics, **18(2)**, 2011, #P8.

Exact Divisibility of Exponential Sums over the Binary Field via the Covering Method

Authors: Francis N. Castro, Luis A. Medina and Ivelisse Rubio

Groups, Algebras and Applications, AMS Contemporary Math., **537**, 2011, 129-136.

The p -adic valuation of Stirling numbers

Authors: A. Berrizbeitia, L. Medina, A. Moll, V. Moll, and L. Noble

Journal for Algebra and Number Theory Academia, **1**, 2010, 1-30.

An Experimental Mathematics Perspective on the Old, and still Open, Question of When To Stop?

Authors: Luis A. Medina and Doron Zeilberger

Gems in Experimental Mathematics, AMS Contemporary Math. **517**, 2010, 265-274.

A fast numerical algorithm for the integration of rational functions

Authors: Dante Manna, Luis A. Medina, Victor H. Moll, and Armin Straub

Numerische Mathematik **115**, 2010, 289-307.

A Class of Logarithmic Integrals

Authors: Luis A. Medina and Victor H. Moll

The Ramanujan Journal **20**, 2009, 91-126.

Asymptotic valuations of sequences satisfying first order recurrences

Authors: Tewodros Amdeberhan, Luis A. Medina, and Victor H. Moll

Proc. Amer. Math. Soc. **137**, 2009, 885-890.

The integrals in Gradshteyn and Ryzhik. Part 11: The incomplete beta function

Authors: Khristo N. Boyadzhiev, Luis A. Medina, and Victor H. Moll

Scientia, Series A: Math. Sciences **18**, 2009, 61-75.

The integrals in Gradshteyn and Ryzhik. Part 10: The digamma function

Authors: Luis A. Medina and Victor H. Moll

Scientia, Series A: Math. Sciences **17**, 2009, 45-66.

Arithmetical properties of a sequence arising from an arctangent sum

Authors: Tewodros Amdeberhan, Luis A. Medina, and Victor H. Moll

Journal of Number Theory **128**, 2008, 1808-1847

The integrals in Gradshteyn and Ryzhik. Part 5: Some trigonometric integrals

Authors: Tewodros Amdeberhan, Luis A. Medina, and Victor H. Moll

Scientia, Series A: Math. Sciences **15**, 2007, 47-60.

Books

Gems in Experimental Mathematics

Contemporary Mathematics, AMS **517** (2010)

Editors: Tewodros Amdeberhan, Luis A. Medina, and Victor H. Moll

Graduate Students

University of Puerto Rico, Río Piedras Campus

PhD Students:

1. César Serna (current).
2. Leonid Sepúlveda (current).

Articles:

- (a) F. Castro, L. A. Medina, R. Chapman, and L. B. Sepúlveda. Recursions associated to trapezoid, symmetric and rotation symmetric functions over Galois fields. *Discrete Mathematics*, **341(7)**, 2018, 1915–1931.
- (b) F. Castro, L. A. Medina and L. B. Sepúlveda. Closed formulas for exponential sums of symmetric polynomials over Galois fields. *Submitted*.

Masters Students:

1. Juana Vásquez (current).
2. Stephany Nieves.
 - (a) Successfully defended her MS Thesis on Feb. 2018.

Undergraduate Research Efforts

Articles

Articles with undergraduate students

1. A. Byrnes, J. Fink, G. Lavigne, I. Nogues, S. Rajasekaran, A. Yuan, L. Almodovar, X. Guan, A. Kesarwani, E. Rowland, and V. Moll. A closed-form solution might be given by a tree. Valuations of quadratic polynomials. *Submitted*.
2. F. Castro, O. E. González and L. A. Medina. Diophantine equations with binomial coefficients and perturbations of symmetric Boolean functions. *IEEE Trans. Inf. Theory*, **64(2)**, 2018, 1347–1360.
3. R. Arce-Nazario, F. Castro, O. González, L. A. Medina, and I. Rubio. New families of balanced symmetric functions and a generalization of Cusick, Li and Stanica’s conjecture. *Designs, Codes and Cryptography*, **86**, 2018, 693–701.
4. F. Castro, O. E. González and L. A. Medina. Generalized exponential sums and the power of computers. *Involve*, **11(1)**, 2018, 127–142.
5. F. Castro, O. E. González and L. A. Medina. The p -adic valuation of Eulerian numbers: trees and Bernoulli numbers. *Experimental Mathematics* **24 (2)** (2015), 183-195.
6. F. Castro, O. E. González and L. A. Medina. A divisibility approach to the open boundary cases of Cusick-Li-Stanica’s conjecture. *Cryptography and Communications* **7 (4)** (2015), 379-402.
7. A. Berrizbeitia, L. A. Medina, A. C. Moll, V. H. Moll, and L. Noble. The p -adic valuation of Stirling numbers. *J. Algebra and Num. Th. Academia* **1** (2010), 1-30.

Undergraduate Research Mentor

Research mentor of undergraduate students.

1. Oscar E. González (now at U. Illinois, Urbana-Champaign)
2. Stefan R. Klajbor (now at U. Illinois, Urbana-Champaign)

Claude Shannon Scholarship Mentor

Mentor Claude Shannon Scholarship.

1. Jasiel F. Rodríguez Acevedo (2017 - Present).
2. Luis Quiñones (2016 - Present).
3. Raúl Negrón (2014 - March 2018; now works at the industry).
4. Samuel Pérez (2014 - 2015; now at U. of Notre Dame).
5. José Pastrana (2014 - 2015; now at U. of Notre Dame).
6. Carlos Buxó (2015 - 2016; now at Michigan State University [Physics]).

REU Mentor

Research leader of a student at the REU sponsored by the Rutgers Mathematics Department and DIMACS, the Center of Discrete Mathematics and Theoretical Computer Science.

MSRI - UP

PostDoc. Research sub-leader in the REU MSRI-UP.

Invited talks and presentations

Closed formulas for exponential sums of symmetric polynomials over Galois fields

SIDIM 2018

March 2018

University of Puerto Rico, Río Piedras Campus; presented by the graduate student L. B. Sepúlveda

Diophantine equations with binomial coefficients and perturbations of symmetric Boolean functions

Number Theory Seminar

July 2017

University of Illinois, Urbana-Champaign

Linear recurrences for generalized Walsh transforms of symmetric Boolean functions

Computer and Education Conference

May 2017

Inter American University, San Germán, Puerto Rico

Linear recurrences for trapezoid and rotation symmetric Boolean functions

SIDIM 2017

March 2017

University of Puerto Rico at Ponce.

Modular periodicity of exponential sums of symmetric Boolean functions

SIDIM 2016

February 2016

University of Puerto Rico at Humacao

Exact divisibility of exponential sums associated to elementary symmetric Boolean functions

SIDIM 2015

February 2015

University of Puerto Rico, Mayagüez Campus; presented by the undergraduate students O. González and R. Negrón.

The p -adic valuation of Eulerian numbers: trees and Bernoulli numbers

UMaRch Puerto Rico 2015

February 2015

Mayagüez, PR; presented by the undergraduate student O. González.

The p -adic valuation of Eulerian numbers: trees and Bernoulli numbers

AMS Fall Southeastern Sectional Meeting

November 2014

Greensboro, NC

Open boundary cases of Cusick-Li-Stănică's conjecture

SACNAS 2014, Special Session: On the Discrete Side of Mathematics

October 2014

Los Angeles, CA

A divisibility approach to the open boundary cases of Cusick-Li-Stănică's conjecture

Department of Mathematics

April 2014

UPR, Humacao

Generalized exponential sums and holonomic sequences

SIDIM 2014

February 2014

Ponce, PR

On multiple and infinite log-concavity

REGS Program

July 2013

University of Illinois, Urbana-Champaign

Exponential sums of symmetric Boolean functions, II

REGS Program

July 2013

University of Illinois, Urbana-Champaign

- Exponential sums of symmetric Boolean functions, I**
REGS Program July 2013
 University of Illinois, Urbana-Champaign
- Asymptotic behavior of the exponential sum of perturbations of symmetric polynomials**
Department Colloquium March 2013
 University of Puerto Rico, Río Piedras
- Asymptotic behavior of the exponential sum of perturbations of symmetric polynomials**
SIDIM 2013 March 2013
 San Juan, PR
- Asymptotic behavior of the exponential sum of distortions of symmetric polynomials**
Department Colloquium September 2012
 University of Puerto Rico, Mayagüez
- Linear Recurrences and Asymptotic Behavior of Exponential Sums of Symmetric Boolean Functions**
Fq10 The 10th International Conference on Finite Fields and their Applications July 2011
 Ghent, Belgium
- Linear recurrences of exponential sums of symmetric boolean functions**
 New Influences in Mathematical Research in Puerto Rico by Young Researchers February 2011
 Mini Simposia. Main Talk. SIDIM 2011. UPR-H/Palmas del Mar, Humacao.
- Valuaciones p -ádicas de secuencias de números enteros**
 Department of Mathematics October 2010
 UPR-Humacao.
- Experiments with Exponential Sums over the Binary Field**
 From $A = B$ to $Z = 60$: Conference in Honor of Doron Zeilberger's 60th Birthday May 2010
 DIMACS, Rutgers University
- When to stop throwing the coin?**
 SACNAS Conference October 2009
 Dallas, TX
- Case studies of Experimental Mathematics: p -adic valuations of recurrences.**
 Department of Mathematics July 2009
 University of Puerto Rico, Río Piedras Campus
- Arithmetic properties of sequences satisfying first order recurrences**
 ACA 2009: Applications of Computer Algebra June 2009
 Montréal, Québec, Canada
- Risch and Parallel Risch Algorithms**
 Experimental Mathematics Seminar March 2009
 Rutgers University
- Asymptotic valuations of sequences satisfying first order recurrences**
 Analysis and Its Applications Seminar November 2008
 The University of Arizona
- A World of Irresistible Integrals**
 Mathematical Careers and Ideas November 2008
 Rutgers University
- Asymptotic valuations of sequences satisfying first order recurrences**
 Collaborative Number Theory Seminar October 2008
 CUNY Graduate Center

Asymptotic valuations of sequences satisfying first order recurrences
Experimental Mathematics Seminar September 2008
Rutgers University

Arithmetic properties of sequences satisfying first order recurrences
Experimental Mathematics Day March 2008
Tulane University

Asymptotic valuations of sequences satisfying first order recurrences
Joint Mathematics Meetings January 2008
San Diego, CA

Projects **Symbolic Integration** Summer 2007
Implementation of the transcendental Risch and Parallel Risch algorithms in Mathematica.
Authors: Luis A. Medina and Sasha Pavlyk

Service to the University and/or Department **Interim Chair of the Department of Mathematics**
UPR-Río Piedras
March 14, 2018 - Present.

Site Administrator of Mathematica License
UPR-Río Piedras Spring 2015-Spring 2018
Site administrator of the Mathematica License of the Faculty of Natural Science of the University of Puerto Rico, Río Piedras Campus.

College of Natural Science Graduate Assembly
UPR-Río Piedras Fall 2012-March 14, 2018
Member. The Natural Science Graduate Assembly is the regulatory entity of all graduate programs in the College of Natural Science.

Graduate Program Coordinator
UPR-Río Piedras Spring 2012-March 14, 2018
Administrative duties of the graduate program.

Curriculum Committee
UPR-Río Piedras Spring 2011-Fall 2013
Member.

Seminar Coordinator
UPR-Río Piedras Spring 2011
Discrete Mathematics Research Seminar.

Course Coordinator
UPR-Río Piedras Fall 2010-Fall 2011
Calculus.

Course Coordinator
Rutgers University Spring 2009
Calculus 1 for the Mathematical and Physical Sciences.

Professional Activities **Seminario Interuniversitario de Investigación Ciencias Matemáticas (SIDIM 2018)**
San Juan, PR March 2018
Co-Organizer

Project NExT Consultant
Mathematical Association of America September 2017 - Present
A professional development program for new or recent Ph.D.s in the mathematical sciences.

Wolfram Mathematica Site License Administrator
College of Natural Sciences, UPR-Río Piedras May 2015 - Spring 2018
Responsibilities include: assignment of single user and lab licenses, approve or reject requested activation keys, etc.

Referee

Research journals
 Referee for various research journals.

Judge

Saint John's School, Condado, PR
 Judge of Mathematics Competition.

March 2018

Judge

Colegio Espíritu Santo, Hato Rey, PR
 Judge of Mathematics Competition. Over 50 schools participated.

November 2016

AMS Special Session on Experimental Mathematics

Washington, DC
 Co-Organizer

January 2009

**Teaching
Experience****As Professor**

1. Modern Algebra 2 [Graduate] (UPR-Río Piedras)
2. Modern Algebra 1 [Graduate] (UPR-Río Piedras)
3. Linear Algebra [Graduate] (UPR-Río Piedras)
4. Graduate Seminar [Graduate] (UPR-Río Piedras)
5. Theory of Numbers (UPR-Río Piedras, Rutgers University)
6. Experimental Mathematics (UPR-Río Piedras)
7. Abstract Algebra 2 (UPR-Río Piedras)
8. Abstract Algebra (UPR-Río Piedras)
9. Advanced Calculus (UPR-Río Piedras, Rutgers University)
10. Linear Algebra [Undergraduate] (UPR-Río Piedras)
11. Intro. Discrete Mathematics (UPR-Río Piedras)
12. Intro. Linear Algebra (Rutgers University)
13. Inmersión Program (UPR-Río Piedras)
14. Calculus 2 (Rutgers University, Tulane University)
15. Calculus 1 (UPR-Río Piedras, Rutgers University, Tulane University)
16. Pre-Calculus 2 (UPR-Río Piedras)
17. Undergraduate Seminar (UPR-Río Piedras)

As Graduate Teaching Assistant

1. Real Analysis (Tulane University)
2. Applied Math (Tulane University)
3. Statistics (Tulane University)

**Conferences,
Schools, and
Internships**

Seminario Interuniversitario de Investigación en Ciencias Matemáticas (SIDIM)
 2002-2003, 2010-2018

ALGECOM 13

University of Notre Dame, Notre Dame, IN
 Algebra, Geometry and Combinatorics Day

March 2016

USTARS 2016

Sam Houston State University, Huntsville, Texas
 Underrepresented Students in Topology and Algebra Research Symposium

March 2016

Joint Mathematics Meeting (AMS)

2003, 2006, 2007, 2008, 2009, 2016

Society for Advancement of Chicanos and Native Americans in Science (SACNAS)

National Conference 2002, 2003, 2004, 2006, 2009, 2012, 2014, 2015

AMS Fall Southeastern Sectional Meeting
Greensboro, NC November 2014

Fq10 The 10th International Conference on Finite Fields and their Applications
Ghent, Belgium July 11-15, 2011

From $A = B$ to $Z = 60$: Conference in Honor of Doron Zeilberger's 60th Birthday
DIMACS, Rutgers University May 27 - 28, 2010

MathFest
2008, 2009

ACA 2009: Applications of Computer Algebra
Montréal, Québec, Canada June 25-28, 2009

100th Statistical Mechanics Conference
Rutgers University, New Brunswick, NJ Dec 13 - Dec 18, 2008

Promoting Diversity at the Graduate Level in Mathematics: a National Forum
MSRI, Berkeley, CA Oct 15 - Oct 17, 2008
Panelist. Professional Development: "Am I Ready for Life after Graduate School?"

Experimental Mathematics Day
Tulane University, New Orleans, LA March 6 and 7, 2008

Wolfram Technology Conference
Champaign, IL October 10 -13, 2007

Wolfram Research, Inc (Internship)
Champaign, IL Summer 2007

Modern Mathematics: An Introduction to 2007-08 Programs at MSRI
Tampa, FL October 25-26, 2006

Number Theory and Random Matrix Theory School
University of Rochester, Rochester, NY May 30 - June 3, 2006

Computing the Continuous Discretely: Integer-point enumeration in polyhedra
Banff International Research Station, Canada August 6 - 20, 2005

Summer Institute in Mathematics for Undergraduate
Humacao, Puerto Rico Summer 2002

Puerto Rico Louis Stokes-Alliance For Minority Participation (PRLS AMP)
Junior Technical Meeting 2002, 2003

Computer Skills **Computer Languages**
Experience with C++ and JAVA.

Other Programming Tools
Experience with Maple. Extensive programming experience in Mathematica.

Other Job Experiences **Wolfram Research, Inc**
Champaign, IL September 2007- December 2007

Languages **Spanish, English**

Professional Memberships **American Mathematical Society (AMS)**
Mathematical Association of America (MAA)