

IVELISSE M. RUBIO

Department of Computer Science
University of Puerto Rico, Río Piedras, PR 00925
iverubio@gmail.com

EDUCATION

University of Puerto Rico, Mathematics B. A., May 1984
University of Puerto Rico, Mathematics M. S., Jan 1988
Cornell University, Applied Mathematics Ph. D., Jan 1998

APPOINTMENTS

2007 - Professor, Computer Science Department, University of Puerto Rico, Río Piedras
2010 - 2012 Interim Chair, Computer Science Department, University of Puerto Rico, Río Piedras
2006 - 2007 Professor, Mathematics Department, University of Puerto Rico, Humacao
July 2003, 2004 Invited Faculty, Summer Prog. for Women in Math., The George Washington University
2001 - 2006 Associate Professor, Mathematics Department, University of Puerto Rico, Humacao
1998 - 2001 Assistant Professor, Mathematics Department, University of Puerto Rico, Humacao
1989 - 1991 Instructor, Mathematics Department, University of Puerto Rico, Río Piedras

PUBLICATIONS

I. Rubio, The covering method for exponential sums and some applications, featured article in the Notices of the American Mathematical Society, May 2020.

F. Castro, O. Moreno, I. Rubio, A refinement of a theorem of Carlitz. *Journal of Pure and Applied Algebra* 224 (2020) <https://doi.org/10.1016/j.jpaa.2019.106246>.

R. Arce-Nazario, F. Castro, D. Gómez-Pérez, O. Moreno, J. Ortiz-Ubarri, I. Rubio, A. Tirkel, Multidimensional linear complexity analysis of periodic arrays. *Applicable Algebra in Engineering, Communication and Computing*, 1-21, doi: 10.1007/s00200-019-00393-z, 2019.

F. Castro, L. Medina and I. Rubio, Exact Divisibility of Exponential Sums Associated to Boolean Functions. *Cryptography and Communications*, 10(4), 655-666, 2018

R. Arce-Nazario, F. Castro, O. González, L. Medina, I. Rubio, New families of balanced symmetric functions and a generalization of Cusick, Li and Stanica's conjecture, *Designs, Codes and Cryptography*, 86(3), 693-701, DOI 10.1007/s10623-017-0351-7, 2018.

F. Castro, C. Corrada, N. Pacheco, I. Rubio, Explicit formulas for monomial involutions over finite fields, *Advances in Mathematics of Communications* (AMC) (pp. 301-306), Volume: 11, Number: 2, doi:10.3934/amc.2017022, 2017.

R. Arce, J. Ortiz, I. Rubio, Laboratory Experiences for the Introduction to Computer Programming Course, http://eip.ccom.uprrp.edu/book_en/; http://eip.ccom.uprrp.edu/book_es/, EnFUSE Symposium, 2016.

J. Ortiz, R. Arce, I. Rubio, C. Lucena, EIP: Engaging Laboratory Experiences for the Introduction to Programming Course, *Envisioning the Future of Undergraduate STEM Education: Research and Practice*, 2016.

I. Rubio, M. Sweedler, C. Heegard, Finding a Gröbner Basis for the Ideal of Recurrence Relations on m -Dimensional Periodic Arrays, *Contemporary Developments in Finite Fields and Applications* (pp.296-320). World Scientific, June, 2016.

F. Castro, H. Janwa, G. Mullen, I. Rubio, e-Perfect codes, *Bull. of the Institute of Combinatorics and its Applications*, Vol. 75, Sept. 2015, 83-90.

D. Gómez, T. Hoholdt, O. Moreno, I. Rubio, Linear Complexity for Multidimensional Arrays – A Numerical Invariant, Proceedings of the IEEE International Symposium on Information Theory (ISIT 2015). IEEE, 2015. p. 2697-2701.

F. Castro, I. Rubio, Exact p -Divisibility of Exponential Sums via the Covering Method, Proceedings of the American Mathematical Society **143** (2015) 1043-1056.

F. Castro, J. Córdova, K. Hicks, G. Mullen, R. Arce, I. Rubio, Some Computational Results Concerning the Spectrum of Sets of Latin Squares, Quasigroups and Related Systems **22** (2014), 159-164.

F. Castro, I. Rubio, Construction of systems of polynomial equations with exact p -divisibility via the covering method, Journal of Algebra and its Applications, Vol. 13, No. 6 (2014) 1450013 (15 pages). This paper was selected as one of the best papers published in the JAA journal in 2014.

F. Castro, I. Rubio, Diagonal Equations, Section in the Handbook of Finite Fields, G. Mullen and D. Panario (editors), CRC Press, June 2013.

F. Castro, G. Mullen and I. Rubio, Some Enumerational Results Relating the Number of Latin and Frequency Squares of Order n , Quasigroups and Related Systems, vol.20 (2012), no. 1 (May 2012).

F. Castro, L. Medina and I. Rubio, Exact Divisibility of Exponential Sums over the Binary Field via the Covering Method, AMS Contemporary Math, Volume **537** (2011), pp. 129-136.

F. Castro, H. Randriam, I. Rubio and H.F. Mattson, Jr., Divisibility of Exponential Sums via Elementary Methods, in Journal of Number Theory **130** (2010), pp. 1520-1536.

F. Castro, I. Rubio, Solvability of Systems of Polynomial Equations with Some Prescribed Monomials, in Finite Fields: Theory and Applications, Contemporary Mathematics, vol. **518** (2010), Amer. Math. Soc., Providence, RI, pp. 73-81.

I. Rubio, G. Mullen, C. Corrada and F. Castro, Dickson permutation polynomials that decompose in cycles of the same length, in Finite Fields: Theory and Applications, Contemporary Mathematics, vol. **461** (2008), Amer. Math. Soc., Providence, RI, pp. 229-239.

F. Castro, I. Rubio, P. Guan, R. Figueroa, On Systems of Linear and Diagonal Equation of Degree p^i+1 Over Finite Fields of Characteristic p , *Finite Fields Appl.*, **14** (2008), 648-657.

F. Castro, I. Rubio and J. Vega, Divisibility of Exponential Sums and Solvability of Certain Equations Over Finite Fields, Quart. J. Math. **00** (2007), 1–13; doi:10.1093/qmath/han013.

F. Castro, I. Rubio, H. Randriam, O. Moreno, H.F. Mattson, Jr., An Elementary Approach to Ax-Katz, McEliece's Divisibility and Applications to Quasi-Perfect Binary 2-Error Correcting Codes, IEEE, ISIT 2006.

R. Cortez and I. Rubio, "The positive Slope of Mathematics at SACNAS", SACNAS News, Fall 2005.

C. Corrada-Bravo and I. Rubio, Algebraic Construction of Interleavers Using Permutation Polynomials, Proceedings of the 2004 IEEE International Conference on Communications, 2004.

C. Corrada-Bravo and I. Rubio, Deterministic Interleavers for Turbo Codes with Random-like Performance, Proceedings of the 3rd International Symposium on Turbo Codes and Related Topics, September 1-5, 2003, Brest, France.

I. Rubio and C. Corrada, Cyclic Decomposition of Permutations of Finite Fields Obtained Using Monomials and Applications to Turbo Codes, Finite Fields and Applications, Lecture Notes in Computer Science 2948, Springer, 2003.

H. Medina, I. Rubio, The Summer Institute in Mathematics for Undergraduates (SIMU) at the University of Puerto Rico - Humacao, Proceedings of the Working Conference on Summer Mathematics Programs for Undergraduates; AMS, 2000.

H. Medina, I. Rubio, The Summer Institute in Mathematics for Undergraduates (SIMU): Aiming to Increase the Representation of Latinos and Native Americans in Mathematics, Council of Undergraduate Research Quarterly; December, 1999.

I. Rubio, Groebner Bases for 0-Dimensional Ideals and Applications to Decoding, PhD Thesis, Cornell University, January 1998.

I. Rubio, M. Sweedler, C. Heegard, Groebner Bases for Linear Recursion Relations on m-D Arrays and Applications to Decoding, Proceedings of the IEEE International Symposium on Information Theory (ISIT-97), 1997.

K. Saints, I. Rubio and C. Heegard, Decoding Algebraic-Geometric Codes Using Groebner Basis, Proceedings of the IEEE International Symposium on Information Theory (ISIT-94), 1994.

I. Rubio and P. Pennance, Laboratorios de Precálculo utilizando DERIVE, WCB Publisher International Inc., 1992.

O. Moreno and I. Rubio, Cyclic Decomposition of Monomial Permutations, Congressus Numerantium 73(1990), pp. 147-158.

O. Moreno, I. Rubio and I. Velázquez, On the Number of Information Symbols of Binary Separable Goppa Codes, Congressus Numerantium 73(1990), pp. 171-174.

I.J. Dejter and I. Rubio, Monomial Permutations with Uniform Cycle Decomposition, Congressus Numerantium 69(1989) pp. 245-252.

RECENT INVITED TALKS

Arreglos Periódicos Multidimensionales, talk at the Cibercoloquio Latinoamericano de Matemáticas, <https://sites.google.com/view/cibercoloquio/sesiones-pasadas?authuser=0#h.kqrzqsspn7vt>, October 2020.

Polynomials over Finite Fields and Applications, talk for the PR-LSAMP, University of Puerto Rico, Río Piedras, Oct 25, 2019.

The covering method: an intuitive approach to the computation of p -divisibility of exponential sums, seminar talk at the Department of Mathematics, University of Alabama, Oct 8, 2019.

Análisis de la complejidad lineal de arreglos multidimensionales periódicos, seminar talk at the Interamerican University, Puerto Rico, Sept 20, 2019

An Improvement of a theorem of Carlitz, Plenary talk at the Carleton Finite Fields Workshop, May 21, 2019, Ottawa, Canada.

El método de cobertura: un acercamiento intuitivo al cómputo de p -divisibilidad de sumas exponenciales, Plenary talk at the XIII Coloquio Nacional de Codigos, Criptografía y áreas Relacionadas, April 25, 2019, Palacio de Minería, Ciudad de México, México.

Análisis de la complejidad lineal de arreglos multidimensionales periódicos, Plenary talk at the XIII Coloquio Nacional de Codigos, Criptografía y áreas Relacionadas, April 25, 2019, Palacio de Minería, Ciudad de México.

Exploring, generalizing and applying the covering method, Plenary Talk at the Latinx in the Mathematical Sciences Conference 2018, March 8, 2018, UCLA.

Exploring, generalizing and applying the covering method, plenary talk at the Seminario de Investigación Matemática (SIDIM), UPR-Ponce, Puerto Rico, March 4, 2017.

I have problems!, talk for the "Women Doing Math (WDM)" program at Texas State University, San Marcos, Texas, October 21, 2016.

The covering method: an intuitive approach to computing p -divisibility of exponential sums, Mathematics Department Colloquium, University of Central Florida, March 22, 2016.

An elementary method to compute exact p -divisibility of exponential sums, invited talk at the session "Algebra: Much More Than Arithmetic!", 2015 SACNAS Conference, Maryland, Oct 30, 2015.

Construction and analysis of multidimensional periodic arrays, invited talk at the Algebraic Number Theory Seminar of Pennsylvania State University, Oct 9, 2015.

Applications of the covering method for computing p -divisibility of exponential sums, invited talk at the Mathematics Seminar, UPR-Mayaguez, March 26, 2015.

Applications of exponential sums to solvability of equations, cryptography and coding, Plenary Talk at the Young Mathematicians Conference, The Ohio State University, August 23, 2014.

Construction of systems of polynomial equations with exact p -divisibility via the covering method, The Fields Institute Ottawa-Carleton Discrete Mathematics Days, Carleton University, Canada; May 1-2, 2014.

Applications of the covering method for computing p -divisibility of exponential sums, invited talk at the Workshop on Polynomials over Finite Fields: Functional and Algebraic Properties, Centro de Investigación Matemática, Barcelona, España, May 19-24, 2014.

Message without a bottle: coding to send and receive information safely, Public Lecture at the Frontiers in Science Spring 2014 Public Lectures Series, Boca Raton, FL, March 28, 2014.

Exact p -Divisibility of Exponential Sums Using the Covering Method, plenary talk at the 44th Southeastern International Conference on Combinatorics, Graph Theory, and Computing, Boca Raton, FL, March 3-7, 2013.

The Covering Method and the Number of Solutions of Equations over Finite Fields, invited talk at the Blackwell-Tapia Conference, ICERM, November 10, 2012.

Using the covering method to compute the p -divisibility of exponential sums and applications to coding theory, plenary talk at Combina-Texas, Southwestern University, Texas, April 21-22, 2012.

RECENT WORKSHOPS AND PANELS

Introducción al programado Latex, workshop for the Computer Science Students Association, Nov 13, 2019.

Uso e interpretación de diagramas de Venn, Seminario de Desarrollo Profesional para maestros del Programa de Nivel Avanzado, San Juan, PR, septiembre y octubre, 2018.

Divide y conquistarás (Divisibilidad y conceptos básicos de teoría de números), Seminario de Desarrollo Profesional para maestros del Programa de Nivel Avanzado, San Juan, PR, noviembre, 2016.

¡Resolvamos las desigualdades! (Solución de desigualdades polinomiales y racionales), Seminario de Desarrollo Profesional para maestros del Programa de Nivel Avanzado, San Juan, PR, noviembre, 2016; marzo, 2018.

H. Medina, **I. Rubio**, S. Wirkus, *Everything you wanted to know about undergraduate summer programs in mathematics (but were afraid to ask)*, Panel at the Latinos in the Mathematical Sciences Conference, UCLA, April 10, 2015

A. Alvarado, E. Goins, H. Medina, **I. Rubio**, S. Wirkus, *Workshop on applying to graduate school, fellowships and summer programs in mathematics*, Latinos in the Mathematical Sciences Conference, UCLA, April 10, 2015

Women in Computing Academic Programs in Puerto Rico (panelist), Caribbean Celebration of Women in Computing (CCWiC), Aguadilla, PR, February 26-27, 2014.

The New Generation of Puerto Rican Women in Computing (panel organizer and moderator), Caribbean Celebration of Women in Computing (CCWiC), Aguadilla, PR, February 26-27, 2014.

SYNERGISTIC ACTIVITIES

Director of the research of over 35 undergraduate mathematics and computer science students over the last 20 years. Many of the results of these students have been presented and reported in undergraduate journals. Some of the students have won awards for their work at the national (USA) level.

Member of the Editorial Board of *La Matemática*, Official Journal of the Association of Women in Mathematics, 2021-.

Study Director, Natural Sciences, Honors Studies Program, University of Puerto Rico, Río Piedras, 2018-present.

Member of the Pre-Calculus Committee of The College Board, 2017-present.

Video "Meet a Mathematician", <https://www.meetamathematician.com/#h.ctp25mslb0g6>. November 2020.

Member-at-Large of the Executive Committee of the Association for Women in Mathematics, 2017-2020.

Member of the Review Panel for the prize for children's books related to mathematics *Mathical: Books for Kids from Tots to Teens*, organized by the Mathematical Sciences Research Institute and the Children's Book Council, 2015-2020.

Member of the Interdisciplinary Committee of the Women and Gender Studies Program at the UPR-Río Piedras, 2011-2020.

Member, National Committee of "IAU100-NameExoWorlds Puerto Rico", 2019.

Member of the Editorial Board of (In)(Genios) an undergraduate research digital journal of the UPR-Río Piedras, 2013-2018.

Member, US National Committee for Mathematics, National Research Council, National Academies, 2010-2018.

Invited editor for the Special issue dedicated to the conference WMC2016 (Workshop on Mathematics in Communications), Volume 11, Number 2, May 2017.

Co-Organizer, Theory and Applications of Finite Fields session, Mathematical Congress of the Americas, Montreal, Canada, July 24-27, 2017.

Panelist, NSF-IDEAS, 2017.

Co-Organizer, Workshop on Mathematics in Communications, Santander, Spain, July 6-8, 2016.

Co-Organizer, Special session on Finite Fields, Forty-Seventh Southeastern International Conference on Combinatorics, Graph Theory and Computing, Boca Raton, FL, March 7-11, 2016.

Member of the Editorial Board of the American Mathematical Monthly (2012-2016)

Member of the organizing committee of the Caribbean Celebration of Women in Computing (CCWiC), 2013-present.

Co-PI, Co-Director of the REU - Mathematical Sciences Research Institute Undergraduate Program (MSRI-UP), Berkeley, 2007-2015.

AMS Representative to the AMS-MAA-SIAM Joint Committee on Employment Opportunities, 2012-2015.

Member of the Association of Women in Mathematics (AWM)/NSF Travel Grant Selection Committee 2014-15.

Co-Organizer of the MSRI-SACNAS Workshop on Modern Mathematics (2006-2015).

Member, SACNAS' Board Nomination Committee, 2013-2014.

Member, Advisory Board for The EDGE Program at Bryn Mawr College and Spelman College, 2008-2014

Member, Advisory Board for Advisory Board for NREUP, 2011-2014.

Co-Organizer, Finite Fields and their Applications, Special Session at the 2013 Mathematical Congress of the Americas, Guanajuato, Mexico.

Co-Organizer, several of the mathematics activities of the SACNAS Conference. Wrote grants, organized minicourses, plenary talks, mathematics sessions, workshops on career and development opportunities in mathematics. 2003-2013.

Member, Organizing Committee of the Transforming Undergraduate Research in the Mathematical Science Conference, Chicago, Oct. 2012.

Member, Mathematical Sciences Research Institute (MSRI) Human Resources Advisory Committee, 2007- 2012.

Liason UPR-Río Piedras – PR-LSAMP, 2008-2011.

Workshop, Balancing Life and Graduate School, PROMISE Success Institute, University of Maryland Baltimore County (August, 2009)

Workshop on Careers Using Mathematics, Nebraska Conference for Undergraduate Women in Mathematics (January, 2009)

Panel, Random Bits of Advice, Nebraska Conference for Undergraduate Women in Mathematics (January, 2009)

Workshop, Being A Woman Mathematician From An Underrepresented Minority Group, Nebraska Conference for Undergraduate Women in Mathematics (January, 2009)

Member, Organizing Committee of the workshop Promoting Diversity at the Graduate Level in Math: a National Forum, MSRI, Berkeley, CA, Oct 14-17, 2008.

Referee, Finite Fields and Applications; IEEE Transactions on Information Theory; 2007 IEEE Wireless Communications and Networking Conference.

Member of the Program Committee of the 2003-2006 SACNAS Conferences.

Member, Organizing Committee of the Promoting Undergraduate Research in Mathematics Conference, Chicago, Sept., 2006

Member of the Advisory Committee of the "Applied Mathematical Sciences Summer Institute (AMSSI)" at Cal Poly Pomona University, 2005-2007.

Co P.I. and Co-Director of the CSEMS program Humacao Research Scholarships: Increasing Student Achievement in Computational Mathematics (HRS); 2002-2005.

Invited Faculty Member, Summer Program for Women in Mathematics at The George Washington University; July 2003 and July 2004.

Panelist, NSF-Computer Science, Engineering and Mathematics Scholarships Program; April, 2002-2003

PI and Co-Director, REU-Summer Institute in Mathematics for Undergraduates (SIMU), 1998-2002.

Panelist, NSF-Course, Curriculum and Laboratory Improvement Program; July 2001

Panelist, NSF-NATO Postdoctoral Fellowships; February, 2000.

SELECTED GRANTS

Co-PI, "Scholar COMPASS: Scholarships, Community, and Peer Academic Support for Success", NSF-DUE, (\$992,789), Awarded 2020.

Co-PI, Scholarship fund for excellence in Computer Science and Mathematics. NSF-DUE. (\$630,217), 2014-2019.

Co-PI, Mathematical Sciences Research Institute Undergraduate Program (MSRI-UP), NSA (\$294,194), 2013-2015.

PI, Center for Undergraduate Research in Mathematics, (CURM) Mini grant, \$25,800, 2013-2014

Co-PI, Development of engaging and readily transferable laboratory experiences for the introductory programming course, NSF, TUES, (\$193,997 2013-2016)

Co-PI, Mathematical Sciences Research Institute Undergraduate Program (MSRI-UP), NSA (\$360,000, 2007-08).

Co-PI, MSRI Modern Mathematics Workshop, NSA (\$125,000 2006-08).

Co-PI, Undergraduate Research in Mathematics as a Strategy to Increase Academic Achievement and Promote Students to Higher Education in Mathematics, NSA, \$450,044, 2005-2007.

PI, Enhancement of the Mathematics Component of the 2003-2006 SACNAS Conferences, NSA \$215,000.

Co-PI, Mathematics Mini-courses for Students at the 2003 and 2004 SACNAS Conferences, NSF \$29,531.

Co-PI, Humacao Research Scholarships: Increasing Student Achievement in Computational Mathematics NSF-CSEMS \$340,277, 2002-2005.

PI, Summer Institute in Mathematics for Undergraduates-1998-2002, National Security Agency \$560,000, University of Puerto Rico \$160,000, NSF-REU \$407,000.

RECENT HONORS AND AWARDS

2019 Included as one of about 300 names of current and historic women in STEAM fields that compose the 3D printed conceptual art piece "Name Dress".

2017-2020 Member-at-Large of the Executive Committee of the Association for Women in Mathematics

2010-2018 US National Committee for Mathematics

2016 Included in the inaugural list in <http://lathisms.org/> as one of the Latin@s and Hispanics who have made contributions in research and mentoring in the mathematical sciences.

2012-2016 Member of the Editorial Board of the American Mathematical Monthly

2010 Dr. Etta Z. Falconer Award for Mentoring and Commitment to Diversity.

2006 SACNAS Presidential Service Award

2006 Mathematics Programs that Make a Difference, Award given by the American Mathematical Society to the REU-Summer Institute in Mathematics for Undergraduates at the UPR-Humacao. This was the first award of this type ever given.

OTHER NON-ACADEMIC ACTIVITIES

2005-present Member of the Board of Directors of *Claridad*, an alternative weekly newspaper, the oldest newspaper in Puerto Rico.

2005-present Organizing Committee of Festival in support of Claridad, a four days cultural festival, one of the oldest in Puerto Rico.

2013, 2014 President, Organizing Committee of Festival in support of Claridad.

2009-2012 Co-President, Organizing Committee of Festival in support of Claridad

2006-2014 Member of the Executive Committee of *Claridad*.

Editor of the book *Oye Cómo Vá: Santos y señas de la música popular puertorriqueña*, by Irvin García, 2012.

Editor of the book *Punto Decimal: Décimas para decir más*, by Silverio Pérez, 2012.