# Pedro Morales-Almazán PhD
mathematician

## about
Santa Cruz, CA
USA

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@p3d40

## languages
spanish (native)
english (fluent)
french (intermediate)

## personal
04/01/1986
Guatemalan
Single

## interests

### research

Casimir Effect, Regularization, Zeta Functions, Quantum Field Theories, Asymptotic Analysis. *MSC2010:* Primary 11M36, 14G10, 11F72, 35J05 ; Secondary 35J15, 34L20, 11M45, 11M06

### education

Inquiry-Based Learning, Flipped Classroom, Blended Learning, Math Outreach, Math Circles.

## education

| 2012 | **Ph.D. Mathematics** | Baylor University |
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*Spectral Functions for Generalized Piston Configurations.*
Adviser: Klaus Kirsten, PhD.

| 2011 | **M.Sc. Mathematics** | Baylor University |
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| 2008 | **BE, Electronics Engineering - Excellence Award** | Universidad de San Carlos |
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Guatemala
*Reconstrucción de señales de audio* [Audio signal reconstruction]
Adviser: Enrique Ruiz-Carvallo, PhD.

| 2006 | **BS, Applied Mathematics - Magna Cum Laude** | Universidad de San Carlos |
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Guatemala
*Distribución de raíces de polinomios* [Polynomial root distribution]
Adviser: Rodrigo Vásquez, MSc.

## honors and awards

| 2018 | **Guatemalteco Ilustre, Orator** | Seguros Universales, Guatemala |
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*Nationwide award for achievements in mathematics education and outreach in Guatemala.*

| 2017 | **Teaching Excellence Award** | UT Austin |
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*College of Natural Sciences Teaching Excellence Award.*

| 2015 | **Honorable Mention** | UT Austin |
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*Visualizing Science Contest of the College of Natural Sciences.*

| 2008-2012 | **Scholarship, Full Tuition** | Baylor University |
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*Mathematics PhD Program.*

| 2009, 2010 | **Research Fellowship** | National Science Foundation |
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*Graduate Research Fellowship.*

| 2007 | **Excellence Award** | Universidad de San Carlos |
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*For highest GPA of graduating class in Electronics Engineering.*

| 2006 | **Magna Cum Laude** | Universidad de San Carlos |
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| | *For exceptional GPA in Mathematics.* | |
| 2006 | **Excellence Award** | Universidad de San Carlos |
| | *For highest GPA of student body in the Engineering School.* | |
| 2003 | **Bronze Medal** | Iberoamerican Math Olympiad |
| | *High school Iberoamerican Math Olympiad, Mar del Plata, Argentina.* | |
| 2002 | **Bronze Medal** | Iberoamerican Math Olympiad |
| | *High school Iberoamerican Math Olympiad, San Salvador, El Salvador.* | |
| 2002 | **Puerto Rico Cup** | Iberoamerican Math Olympiad |
| | *Award for greatest country improvement. San Salvador, El Salvador.* | |
| 2002 | **Gold Medal** | National Science Olympiad |
| | *High school national olympiad in mathematics, Guatemala.* | |
| 2002 | **Gold Medal** | State Science Olympiad |
| | *High school state olympiad in mathematics, Guatemala.* | |
| 2000-2002 | **National Team** | IMO |
| | *Contestant in the International Mathematical Olympiad for Guatemala.* | |
| 1999 | **Bronze Medal** | National Science Olympiad |
| | *Eight grade national olympiad in mathematics, Guatemala.* | |
| 1999 | **Silver Medal** | State Science Olympiad |
| | *Eight grade state olympiad in mathematics, Guatemala.* | |
| 1998 | **Gold Medal** | State Science Olympiad |
| | *Seventh grade state olympiad in mathematics, Guatemala.* | |
| 1998 | **Silver Medal** | State Science Olympiad |
| | *Seventh grade state olympiad in natural sciences, Guatemala.* | |

# **sel**ected publications

[8] Graham, C., Kirsten, K., Streit, B., and Morales-Almazan, P., Functional determinants for Laplacians on annuli and elliptical regions, *Journal of Mathematical Physics*, **59**,1, 013508, (2018)

[7] Morales-Almazan, P. A geometrical approach to measure irrationality. *Funct. Approx. Comment. Math.*, advance publication, 27 January (2017)

[6] Morales-Almazan, P., Casimir energy for perturbed surfaces of revolution, *Int. J. Mod. Phys. A*, 31, 1650044 (2016)

[5] Morales-Almazan, P. and Kirsten, K., Casimir effect for smooth potentials on spherically symmetric pistons, *J. Phys. A: Math. Theor.* **48** 495201 (2015)

[4] Morales-Almazan, P., Grothendieck ring class of Banana and Flower graphs, *Geometric, Algebraic and Topological Methods for Quantum Field Theory*, 346-356 (2014)

[3] Beauregard, M., Fucci, G., Kirsten, K., and Morales-Almazan, P., Casimir Effect in the Presence of External Fields, *J. Phys. A: Math. Theor.* **46** 115401 (2013)

[2] Fucci, G., Kirsten, K., and Morales-Almazan, P., Pistons modeled by potentials, *Springer Proceedings in Physics* **137** 28 (2011)

[1] Morales-Almazan, P. and Kirsten, K., Semitransparent Pistons. *International Journal of Physics A* **25** 2196-2200 (2010)

# inpreparation

Morales-Almazan, P. Math N' Life (Book), *in preparation*

Morales-Almazan, P., Singular contours on meromorphic one forms, *in preparation*

Morales-Almazan, P., Improvisation and Active Teaching in Mathematics, *in preparation*

# projects and grants

2017      **Quantitative Reasoning Flag for Calculus**     Project, UT Austin
*Develop, implement, and assess material that includes quantitative reasoning into calculus courses. This includes the use of real-world examples to help students understand numbers and use them to reason at a sophisticated level.*

2017      **Experiential Learning for Calculus**     Grant, UT Austin
*Develop and assess experiential learning for calculus classes for students in the College of Natural Sciences.*

2017      **Math Placement and College Readiness**     Project, UT Austin
*Develop, implement, and analyze data from the incoming freshmen mathematics placement exam, as well as develop, design, and analyze readiness material to prepare incoming freshmen for college level mathematics courses.*

# advising and mentoring

2020      **Undergraduate thesis**     Universidad del Valle de Guatemala
Vásquez, M. *Modelos de difusión en grafos para epidemias.* [Epidemiological graph diffusion models].

2019      **Undergraduate thesis**     Universidad de San Carlos
Raxon, C. *Invarianza del efecto Casimir en variedades unidimensionales* [Invariance of the Casimir effect in one dimensional manifolds].

2018      **Undergraduate thesis**     Universidad del Valle de Guatemala
Hurtado, A. *Autoenergía y El efecto Casimir* [Self Energy and the Casimir Effect].

2017-2018      **Undergraduate thesis**     Universidad de San Carlos
Mazariegos, F. *Representaciones numéricas con fracciones continuas* [Number representation with continued fractions].

2015-2016      **Undergraduate thesis**     Universidad de San Carlos
Martinez, R., *Función espectral zeta para operadores acotados* [Spectral zeta functions for bounded operators].

2016      **Reading course**     UT Austin
Directed Reading Program *Differential geometry with applications in relativity*.

2003 - 2008      **Trainer**     Guatemalan National Team
Trainer for the Mathematics National Team.

# service

## professional development

2019     **Active Learning Faculty Workshop** <span style="float:right;">Savannah State University</span>
*Lead an Active Learning and Innovative Strategies in mathematics education workshop for faculty and graduate students in the Mathematics Department at Savannah State University.*

2019     **Improv for STEM students** <span style="float:right;">UCSC</span>
*Lead a session about Improv techniques for STEM students geared towards professional communication, networking, collaboration, and other professional social interactions.*

## committees

2019     **Peer observations - Coordinator** <span style="float:right;">UCSC</span>
*Coordinate peer review observations in the mathematics department. Create observation schedule, pre-observation, observation, and post-observation guidelines.*

2019     **Mathematics Department** <span style="float:right;">UCSC</span>
*Discuss matters related to the mathematics department management, course planning, scheduling, curriculum for the mathematics programs, among other duties.*

2017-2018     **Teaching evaluation** <span style="float:right;">UT Austin</span>
*Review and improve the evaluation process for teaching faculty. Manage the evaluation process and the promotion materials.*

2017-2018     **Peer observations - Coordinator** <span style="float:right;">UT Austin</span>
*Coordinate peer review observations in the mathematics department. Create observation schedule, pre-observation, observation, and post-observation guidelines.*

2017-2018     **Non-Tenure Track Faculty Review Committee - Chair** <span style="float:right;">UT Austin</span>
*Direct the faculty evaluation and review process, design and promote faculty development strategies in the Mathematics Department.*

2017-2018     **Coordinator for Differential and Integral Calculus** <span style="float:right;">UT Austin</span>
*Manage and coordinate the uniform calculus classes. Design and schedule uniform class schedule, assignments, and exams. Organize instructors, teaching assistants, and learning assistants into incorporating flipped classroom and experiential learning methodologies.*

2016-2017     **Calculus Reform** <span style="float:right;">UT Austin</span>
*Analyze and design of calculus course reform and implementation of innovative methodologies, specifically experiential learning.*

2016-2017     **Non-Tenure Track Faculty Review Committee - Chair** <span style="float:right;">UT Austin</span>
*Direct the faculty evaluation and review process, design and promote faculty development strategies in the Mathematics Department.*

## math circles

2020     **Santa Cruz Teacher's Circle** <span style="float:right;">Circle</span>
*Lead session over Hamming Codes.*

2020     **Santa Cruz Circle** <span style="float:right;">Circle</span>
*Lead session over Pascal's Mystic Hexagram.*

| 2020 | **San Jose Math Circle** | Circle |
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| | *Lead session over the Invariance and the Extreme principle.* | |
| 2019 | **San Jose Teachers Circle Summer Workshop** | Teachers' Circle |
| | *Lead a session over the Rubik's Cube.* | |
| 2019 | **Santa Cruz Teachers' Circle** | Teachers' Circle |
| | *Lead a session on The pigeonhole principle.* | |
| 2019 | **Savannah Teachers' Circle** | Teachers' Circle |
| | *Lead a session on Permutations and the Rubik's cube.* | |
| 2019 | **Savannah Teachers' Circle** | Teachers' Circle |
| | *Lead a session on the Liar's bingo.* | |
| 2018 | **Math Teachers' Circle of Austin Summer Workshop** | UT Austin |
| | *Organize the summer workshop for the Math Teachers' Circle of Austin.* | |
| 2018 | **Merced Teachers' Circle** | Teachers' Circle |
| | *Lead a session on the Liar's bingo.* | |
| 2018 | **Austin Teachers' Circle Summer Workshop** | Teachers' Circle |
| | *Lead a session on the Liar's bingo.* | |
| 2018 | **MAA Teachers' Circle Summer Workshop** | Washington, D.C. |
| | *Lead a session on Random stuff about $\pi$.* | |
| 2018 | **TAMU Circle** | College Station, TX |
| | *Lead a session on How do secure-communications work?.* | |
| 2017 | **Texas Lutheran University Math Teachers' Circle** | Seguin, TX |
| | *Lead a session on the Pigeonhole Principle.* | |

## outreach

| 2020 | **Webinar** | Universidad de Panam]'a |
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| | *Mathematical models in the COVID19 pandemic.* | |
| 2020 | **Webinar** | CONCYT/SENACYT |
| | *Mathematical models in the COVID19 pandemic.* | |
| 2020 | **Panel** | gaZetA |
| | *Limits of mathematical modeling in real world phenomena.* | |
| 2020 | **Panel** | CerveCiencia |
| | *Paths towards a scientific culture in society.* | |
| 2019 | **Panel** | Converciencia |
| | *Discussion about the National status of science and technology in Guatemala.* | |
| 2018 | **Math Teachers' Circle Training Workshop** | MAA, Washington, D.C. |
| | *Lead math circle sessions and panels for participants regarding recruitment, logistics, and fundraising for long-term sustainability in implementing new Teachers' Circles .* | |
| 2016-2017 | **Founder, organizer** | NotSoMath |
| | *Create, organize, and host bimonthly math outreach performances and talks aimed at the Austin community and through social media.* | |
| 2015-2017 | **Founder, Organizer** | Encuentro Virtual |
| | *Create, organize, and promote a yearly online conference on research and outreach in math and physics with participation from individuals in over 15 Latin American countries.* | |
| 2016-2017 | **Organizer** | Math Teachers' Circle of Austin |
| | *Organize and maintain the Math circle for middle and high school teachers in the Austin district area with monthly meetings.* | |

## academic

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| 2019 | **Workshop** | Converciencia |

*Data analysis workshop for the National Council of Science and Technology of Guatemala [CONCYT].*

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| 2017 | **Experiential Learning** | UT Austin |

*Create daily activities for discussion sessions in Integral Calculus implementing real life and locally relevant content.*

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| 2017 | **Workshop** | Universidad de San Carlos |

*Regularization and divergent series.*

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| 2015-2017 | **Proceedings Editor** | Summer School |

*Summer School in Geometric, Algebraic and Topological Methods for Quantum Field Theory, Villa de Leyva, Colombia 2015.*

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| 2015 | **Workshop** | Universidad del Valle |

First Winter School in Mathematics *Zeta Functions in Mathematics and Physics*.

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| 2011 | **Summer School** | Universidad de San Carlos |

*Additive Combinatorics.*

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| 2008 | **Summer School** | Universidad de San Carlos |

*Introduction to Lie Algebras.*

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| 2003-2005 | **Organizing Committee** | Universidad de San Carlos |

*National congress in Mathematics Education.*

## olympiads

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| 2019-2024 | **Editorial Board** | American Mathematics Competitions 10/12 |

*Editor of the corresponding exams for the 10/12 level of the AMC.*

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| 2019-2024 | **Editorial Board** | American Mathematics Competitions AIME |

*Editor of the corresponding exams for the AIME level of the AMC.*

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| 2011 | **Team leader** | Iberoamerican University Mathematical Competition |

*Team leader for the Guatemalan undergraduate team.*

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| 2002-2007 | **Team leader, Deputy leader** | Guatemalan National Math Teams |

*Guatemalan high school national team participating in the International Mathematical Olympiads, Central-american and the Caribbean Mathematical Olympiad, and Iberoamerican Mathematical Olympiad.*

# teaching experience

| 2018-Present | **Teaching Professor** | UC Santa Cruz, Mathematics Department |
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*Undergraduate level math courses using traditional lecture style, flipped classroom and inquiry based learning methodologies.*

| 2017-2018 | **Online Instructor** | University Extension UT Austin |
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*Undergraduate mathematics courses for education majors.*

| 2013-2018 | **Lecturer** | UT Austin, Mathematics Department |
|---|---|---|

*Undergraduate level math courses using traditional lecture style, flipped classroom and inquiry based learning methodologies.*

| 2012-2013 | **Adjunct Professor** | Baylor University, Mathematics Department |
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*Undergraduate level math courses.*

| 2009-2012 | **Teacher of Record** | Baylor University, Mathematics Department |
|---|---|---|

*Undergraduate level math courses.*

| 2007 | **Adjunct Professor** | Universidad de San Carlos, Engineering School, Pharmacy School |
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*Undergraduate level courses.*

# <span style="color:violet">mem</span>berships

- Red Internacional de Científicos de Guatemala [Guatemalan Scientist International Network]

# presentations

## academic

[21] *Zeta functions and perturbations in the Casimir Effect.* UNICAMP, Campinas, Brazil. (2018)

[20] *Regularización con funciones Zeta*[Zeta function regularization]. Converciencia, Guatemala. (2018)

[19] *Spectral zeta function and vacuum energy of perturbed warped manifolds.* Contributed talk, Texas Analysis and Mathematical Physics Symposium, UT Austin, Austin, TX. (2017)

[18] *Metodologías de Enseñanza en Matemáticas* [Mathematics Education Methodologies]. CONCYT/SENACYT Talk, Universidad Galileo, Guatemala (2017)

[17] *Zeta function for perturbed surfaces of revolution.* Contributed talk, Texas Analysis and Mathematical Physics Symposium, Rice University, Houston, TX. (2016)

[16] *Perturbaciones en el efecto Casimir* [Perturbations in the Casimir Effect]. Seminar talk, Universidad de San Carlos de Guatemala, Guatemala. (2016)

[15] *Una forma geométrica de definir irracionalidad* [A geometric way to define irrationality]. II Escuela de Invierno en Matemática, Universidad del Valle de Guatemala, Guatemala. (2016)

[14] *Regularización en matemática y física* [Regularization in mathematics and physics]. Colloquium talk, Universidad Diego Portales, Santiago, Chile. (2015)

[13] *Zeta function regularization with unknown eigenvalues.* Geometric, Algebraic and Topological Methods for Quantum Field Theory, Villa de Leyva, Colombia. (2015)

[12] *Funciones zeta en capas esféricas con potenciales suaves* [Zeta functions in spherical shells with smooth potentials]. I Encuentro Virtual de Física y Matemáticas, Online event. (2015)

[11] *Series divergentes en matemática y física* [Divergent series in mathematics and physics]. IV Congreso de Física y Matemáticas, Universidad de las Américas Puebla, Puebla, Mexico. (2014)

[10] *Linealización de problemas por medio de valores propios* [Linearizing problems using eigenvalues]. I Escuela de Matemática Pura y Aplicada, Guatemala City. (2012)

[9] *Spectral functions, the geometric power of eigenvalues*. Colloquium talk, Ohio University. (2012)

[8] *Spectral Functions in the Presence of Background Potentials*. USTARS, University of Iowa. (2012)

[7] *El efecto Casimir* [The Casimir Effect]. Colegio de Ingenieros de Guatemala, Guatemala City. (2011)

[6] *Casimir energies and forces in the presence of background potentials*. University of Oklahoma, Norman, Oklahoma. (2011)

[5] *Semitransparent Pistons*. MAA Sectional Meeting, Tyler, Texas. (2011)

[4] *Pistons with Compact Support*. A&M University, College Station, Texas. (2010)

[3] *Funciones Zeta y Pistones Semitransparentes* [Zeta functions and semitransparent pistons]. Universidad del Valle de Guatemala. (2010)

[2] *Semitransparent Pistons*. A&M University, College Station, Texas. (2009)

[1] *Generalidades sobre la función Zeta de Riemann* [Generalities about Riemann zeta function]. Universidad de San Carlos de Guatemala. 2005)

## outreach

[21] *Matematicas en el mundo real*[Real world mathematics]. Converciencia, Universidad de San Carlos, Guatemala. (2019)

[20] *Pronosticos y aleatoriedad*[Forecasting and randomness]. Converciencia, Universidad Galileo, Guatemala. (2019)

[19] *The pigeonhole principle*. BEAM, Los Angeles, CA. (2019)

[18] *Cálculo en Ingeniería*[Calculus in Engineering]. Converciencia, Guatemala. (2018)

[17] *Summability of divergent series.* Math club, UT Austin, Austin, TX. (2018)

[16] *Pi² day*. Austin Public Library, Austin, TX. (2018)

[15] *The hidden math in science*. Explore UT, UT Austin, Austin, TX. (2018)

[14] *Symmetries and Tessallations*. Saturday Morning Math Group, UT Austin, Austin, TX. (2017)

[13] *What is math anyways?*. Westlake High School, Austin, TX. (2017)

[12] *Primes: the building blocks of numbers*. NotSoMath, Austin, TX. (2017)

[11] *La importancia de las matemáticas* [The importance of mathematics]. Outreach talk, CONCYT/SENACYT event, Escuela Villa de las Niñas, Guatemala. (2017)

[10] *Patterns in randomness*. Summer session, Math Teachers' Circle of Austin, Austin, TX. (2017)

[9] *What is mathematics*. Explore UT, UT Austin, Austin, TX. (2017)

[8] *Measuring information*. NotSoMath, Austin, TX. (2017)

[7] *Forecasting the elections*. NotSoMath, Austin, TX. (2016)

[6] *Mathematics in Futurama*. NerdNite, Austin, TX. (2016)

[5] *Calculus: Infinity now and then*. NotSoMath, Austin, TX. (2016)

[4] *Inequalities*. Math Circle Session, UT Arlington Math Circle, University of Texas at Arlington, Arlington, TX. (2016)

[3] *Fun in Fibonacci*. Saturday Morning Math Group, UT Austin, Austin, TX. (2016)

[2] *Random stuff about pi*. Saturday Morning Math Group, UT Austin, Austin, Texas. (2014)

[1] *Unwrapping Infinity*. Summer Program in Mathematical Problem Solving, Bard College, Annandale-on-Hudson, New York. (2013)

# workshops/conferences attended

Converciencia, Guatemala. (2019)

ICM, Rio de Janeiro, Brazil. (2018)

Converciencia, Guatemala. (2018)

Non-hermitian operators, AIM, San Jose, CA. (2018)

IBL Workshop, Los Angeles, CA. (2018)

Math Teachers' Circle Workshop, MAA, Washington, DC. (2018)

Texas Analysis and Mathematical Physics Symposium, UT Austin, Austin, TX. (2017)

USTARS, Amherst College Amherst, MA. (2017)

Texas Analysis and Mathematical Physics Symposium, Rice University, Houston, TX. (2016)

The p-adic Langlands Program and Related Topics, Indiana University, Bloomington, IN. (2016)

USTARS, Sam Houston State University, Huntsville, TX. (2016)

Texas-Oklahoma Representations and Automorphic forms, UNT, Denton, TX. (2016)

Texas Geometry and Topology Conference, TCU, Dallas Fort Worth, TX. (2016)

Geometric, Algebraic and Topological Methods for Quantum Field Theory, Villa de Leyva, Colombia. (2015)

Primer Encuentro Virtual de Física y Matemáticas, Online event. (2015)

The interrelation between mathematical physics, number theory and noncommutative geometry, Erwin Schrödinger Institute, Vienna, Austria. (2015)

Escuela de Invierno en Matemática. Universidad del Valle de Guatemala, Guatemala. (2015)

Inverse Problems and Spectral Theory. A&M University, College Station, Texas. (2014)

Third International Workshop on Zeta Functions in Algebra and Geometry. CIMAT, Guanajuato, Mexico. (2014)

IV Congreso de Física y Matemáticas, Universidad de las Américas Puebla, Puebla, Mexico. (2014)

I Escuela de Matemática Pura y Aplicada, Guatemala City. (2012)

USTARS 2012, Iowa City, Iowa. (2012)

Texas-Oklahoma Representations and Automorphic Forms II, Stillwater, Oklahoma. (2012)

Topological and Algebraic Methods for Quantum Field Theory. Villa de Leyva, Colombia. (2011)

The Dirichlet Space. MSRI, Berkeley, California. (2011)

Mathematical Aspects of Quantization. Notre Dame University, South Bend, Indiana. (2011)

Quantization and Related Topics. Notre Dame University, South Bend, Indiana. (2011)

Underrepresented Students in Topology and Algebra Research Symposium. University of Iowa, Iowa City, Iowa. (2011)

Waves and Spectra. A&M University, College Station, Texas. (2011)

Texas Geometry and Topology Conference. A&M University, College Station, Texas. (2010)

Analysis on Graphs and its applications. Newton Institute, Cambridge, UK. (2010)

CIMPA Algebraic Geometry and Dynamical Systems. IMCA, Lima, Peru. (2010)

Number Theory and Representation Theory. Harvard University, Cambridge, Massachusetts. (2010)

Career Options for Underrepresented Groups in Mathematics. IMA, Minneapolis, Minnesota. (2010)

SACNAS National Conference. Dallas, Texas. (2009)

Modern Math Institutes Workshop. Dallas, Texas. (2009)

Quantum Field Theory under the influence of external conditions. Oklahoma University, Norman, Oklahoma. (2009)

Random Matrix Workshop. MSRI, Oakland, California. (2009)

Texas Algebraic Geometry Seminar. A&M University, College Station, Texas. (2009)

Mathematical Models in Population Dynamics. Universidad de El Salvador. (2006)