Pedro Morales-Almazán**PhD**

mathematician

about

Austin, TX
USA

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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

2008-2012 **Ph.D. Mathematics** — Baylor University
Spectral Functions for Generalized Piston Configurations.
Adviser: Klaus Kirsten, PhD.

2008–2011 **M.Sc. Mathematics** — Baylor University

2003–2008 **Electronics Engineering - Excellence Award** — Universidad de San Carlos Guatemala
Reconstrucción de señales de audio [Audio signal reconstruction]
Adviser: Enrique Ruiz-Carvallo, PhD.

2003–2006 **Applied Mathematics - Magna Cum Laude** — Universidad de San Carlos Guatemala
Distribución de raíces de polinomios [Polynomial root distribution]
Adviser: Rodrigo Vásquez, MSc.

honors and awards

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

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

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

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

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

2006 **Magna Cum Laude** — Universidad de San Carlos
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.

selected publications

[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. and Ramirez-Rivera, A. Hybrid Local Meta-Concept Embeddings and their relation with concept relations, *in preparation*

Morales-Almazan, P., Entropy in numbers, *in preparation*

Morales-Almazan, P. and Fucci, G., Zeta functions on perturbed warped manifolds, *in preparation*

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

Graham, C., Kirsten, K., Streit, B., and Morales-Almazan, P., Functional determinants for Laplacians on annuli and elliptical regions, *submitted*

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

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

Current **Undergraduate thesis** Universidad de San Carlos
Mazariegos, F. *Representación numérica por medio de fracciones continuas* [Number representation with continued fractions].

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

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

committees

2017-2018 **Peer observations - Coordinator** UT Austin
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** UT Austin
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** UT Austin
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** UT Austin
Analyze and design of calculus course reform and implementation of innovative methodologies, specifically experiential learning.

2016-2017 **Non-Tenure Track Faculty Review Committee - Chair** UT Austin
Direct the faculty evaluation and review process, design and promote faculty development strategies in the Mathematics Department.

outreach

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

2017 **Experiential Learning** UT Austin
Create daily activities for discussion sessions in Integral Calculus implementing real life and locally relevant content.

2017 **Workshop** Universidad de San Carlos
Regularization and divergent series.

2015-2017 **Proceedings Editor** Summer School
Summer School in Geometric, Algebraic and Topological Methods for Quantum Field Theory, Villa de Leyva, Colombia 2015.

2015 **Workshop** Universidad del Valle
First Winter School in Mathematics *Zeta Functions in Mathematics and Physics*.

2011 **Summer School** Universidad de San Carlos
Additive Combinatorics.

2008 **Summer School** Universidad de San Carlos
Introduction to Lie Algebras.

2003-2005 **Organizing Committee** Universidad de San Carlos
National congress in Mathematics Education.

olympiads

2011 **Team leader** Iberoamerican University Mathematical Competition
Team leader for the Guatemalan undergraduate team.

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

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

2013-Present **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
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
Undergraduate level courses.

presentations

academic

[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

[14] *The Pigeonhole Principle*. Texas Lutheran University Math Teachers' Circle, Seguin, 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, University of Texas at Austin, Austin, TX. (2016)

[2] *Random stuff about pi*. Saturday Morning Math Group, The University of Texas at Austin, Austin, Texas. (2014)

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

workshops/conferences attended

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)