

PATRICIA ALONSO RUIZ

Department of Mathematics
Texas A&M University
College Station TX 77843-3368

Email: paruiz@tamu.edu
website: <http://people.tamu.edu/~paruiz/>

RESEARCH Stochastic processes, Dirichlet forms, heat kernels and semigroups on metric measure spaces, fractals and graphs.

APPOINTMENTS Assistant Professor, Texas A&M University, August 2019 - present
Evarist Giné Assistant Research Professor, University of Connecticut, August 2016 - July 2019
Scientific employee, Ulm University, September 2013 - July 2016.

EDUCATION Ph.D. in Mathematics, University of Siegen, May 2013
Thesis advisor: Uta R. Freiberg
Thesis title: Dirichlet forms on non self-similar sets, Hanoi attractors and the Sierpiński Gasket
Licenciatura en Ciencias Matemáticas, Universidad Complutense de Madrid, July 2009
Erasmus exchange program, Ludwig Maximilians University Munich, 2007 - 2008

SELECTED FUNDING NSF CAREER grant DMS 2140664 (PI), September 2022 - August 2027
Structured Quartet Research Ensemble (co-PI with A. Aboud, T. Das and M. Vaughan), AIMS research program, 2021 - 2024
NSF Research grant DMS 1951577 (PI), July 2019 - June 2022
AWM-NSF travel grant, September 2018
Feodor Lynen fellowship, Alexander von Humboldt Foundation, October 2016 - August 2018
DAAD graduate fellowship, September 2009 - April 2012

PUBLICATIONS & WRITINGS **Preprints**

- [2] P. Alonso Ruiz, F. Baudoin, L. Chen, L. Rogers, N. Shanmugalingam and A. Teplyaev, *BV functions and fractional Laplacians on Dirichlet spaces* (2019) arXiv:1910.13330, 20 pp.
[1] *Canonical diffusions on pattern spaces of aperiodic Delone sets*, with M. Hinz, A. Teplyaev and R. Treviño (2018) arXiv:1801.08956, 46 pp.

Peer reviewed papers

- [18] P. Alonso Ruiz, *Minimal gap in the spectrum of the Sierpinski gasket*, to appear in International Mathematics Research Notices (2021) arXiv: 2105.00143, 14 pp.
[17] P. Alonso Ruiz, F. Baudoin, *Yet another heat semigroup characterization of BV functions on Riemannian manifolds*, to appear in Annales de la Faculte des Sciences de Toulouse (2021) arXiv:2010.12131, 24 pp.
[16] P. Alonso Ruiz, F. Baudoin, L. Chen, L. Rogers, N. Shanmugalingam and A. Teplyaev, *Besov class via heat semigroup on Dirichlet spaces III: BV functions and sub-Gaussian heat kernel estimates*, Calc. Var. Partial Differential Equations **60** (2021), no. 5, Paper No. 170, 38 pp.

- [14] P. Alonso Ruiz, F. Baudoin, *Gagliardo-Nirenberg, Trudinger-Moser and Morrey inequalities on Dirichlet spaces*. Journal of Mathematical Analysis and Applications **497** (2021), no. 2, 124899, 26pp.
- [13] P. Alonso Ruiz, *Heat kernel analysis on diamond fractals*, Stochastic Processes and their Applications **131**, 51-72 (2021).
- [12] P. Alonso Ruiz, F. Baudoin, L. Chen, L. Rogers, N. Shanmugalingam and A. Teplyaev, *Besov class via heat semigroup on Dirichlet spaces II: BV functions and Gaussian heat kernel estimates*, Calculus of Variations and PDE's (2020), no. 3, **59**, Paper No. 103, 32 pp.
- [11] P. Alonso Ruiz, F. Baudoin, L. Chen, L. Rogers, N. Shanmugalingam and A. Teplyaev, *Besov class via heat semigroup on Dirichlet spaces I: Sobolev type inequalities*, Journal of Functional Analysis **278** (2020), no. 11, 108459.
- [10] P. Alonso Ruiz, Y. Chen, H. Gu, R. S. Strichartz and Z. Zhou, *Analysis on hybrid fractals*, Communications in Pure and Applied Analysis **19** (2020), no. 1, 47–84.
- [9] P. Alonso Ruiz, *Explicit formulas for heat kernels on diamond fractals*, Communications in Mathematical Physics **364** (2018), no. 3, 1305–1326.
- [8] P. Alonso Ruiz, U. Freiberg and J. Kigami, *Completely symmetric resistance forms on the Stretched Sierpinski gasket*, Journal of Fractal Geometry **5** (2018), no. 3, 227–277.
- [7] P. Alonso Ruiz, E. Spodarev, *Entropy-based inhomogeneity detection in fiber materials*, Methodology and Computing in Applied Probability (2018), **20**, no. 4, 1223–1239.
- [6] P. Alonso Ruiz, *Power dissipation in fractal Feynman-Sierpinski AC circuits*, Journal of Mathematical Physics, **58** (2017), no. 7, 073503.
- [5] P. Alonso Ruiz, E. Spodarev, *Nonparametric estimation of entropy for marked Poisson point processes*, Advances in Applied Probability, **49** (2017), no. 1, 258–278.
- [4] P. Alonso Ruiz, U. Freiberg, *Weyl asymptotics for Hanoi attractors*, Forum Mathematicum **29** (2017), no. 5, 1003–1022.
- [3] P. Alonso Ruiz, A. Rakitko, *The limit theorem for maximum of partial sums of exchangeable random variables*, Statistics and Probability Letters **119** (2016), 357–362.
- [2] P. Alonso Ruiz, D. Kelleher, and A. Teplyaev, *Energy and Laplacian on Hanoi-type fractal quantum graphs*, Journal of Physics A: Mathematical and Theoretical **49** (2016), no. 4, 1501–1533 (electronic).
- [1] P. Alonso Ruiz, U. Freiberg, *Dirichlet forms on Hanoi attractors*, Int. J. Applied Nonlinear Science, **1** (2014), no. 3, 247–274.
- [0] P. Alonso Ruiz, U. Freiberg, *Hanoi attractors and the Sierpiński Gasket*, Special issue of Int. J. Math. Model. Numer. Optim. on Fractals, Fractal-based Methods and Applications **3** (2012), no. 3, 251–265.

OUTREACH

Speaker in *The Kenya Workshop*, an event held online for aspiring African STEM high-school students to learn about doing research in mathematics.

Instructor at the Summer Educational Enrichment in Math Program, Texas A&M University, July 2021, July 2020 (online)

Volunteer at the *Mathematics and Statistics Fair*, Texas A&M University, February 2020

Speaker in the *Applied Mathematics Undergraduate SEminar (AMUSE)*, Texas A&M University, February 2020

Speaker in the series *Women in Lunch Seminar* at MIT Women In Mathematics, Massachusetts Institute of Technology, Boston, February 2020

Online mentor for female school students at *CyberMentor: E-Mentoring-Programm für Mädchen in MINT*, University of Regensburg, 2015-2016

SERVICE

Student advising and mentoring

Adviser: Undergraduate Fractals Research Team (MATH 491). Students: Angelica Benitez, Xochitl Maldonado, Jessica Nunez, Amy Zhou, Texas A&M, Fall 2020, Spring 2021

Research mentor for the Texas A&M University System Louis Stokes Alliance for Minority Participation. Student: Jessica Nunez, Fall 2020

Co-adviser (with R. S. Strichartz): REU project. Students: Y. Chen, H. Gu, and Z. Zhou, Cornell University, 2017

Co-adviser (with E. Spodarev): B.Sc. Thesis *Estimation of entropy of directional distributions*. Student: J. Schwarz, Ulm University, Spring 2016

Justice, Equity, Diversity and Inclusion

Panelist in *Collaborating Across Diverse Backgrounds*, Texas A&M, November 2021

Faculty participant in *Take a Scientist To Eat*, College of Science, Texas A&M, Fall 2021

Committee member

Graduate committee, Texas A&M. PhD candidates: Parker Duncan, Spring 2020

Master committee, Texas A&M. Student: Jintong Huang, Spring 2021

Hiring committee, Ulm University. W3 Professorship, Spring 2016

Conference seminar and workshop organization

7th Cornell Conference on Analysis, Probability and Mathematical Physics on Fractals (with M. Hinz, L. Rogers, A. Teplyaev and R. S. Strichartz). June 2022

Austin-TAMU Probability and Related Fields (with J. Neemar). Texas A&M University, November 2021

Probability and Mathematical Physics Seminar (with G. Berkolaiko). Texas A&M, Fall 2021

Probability Seminar. Texas A&M, Fall 2020 - Spring 2021

Special Session: *Schrödinger operators on graphs and manifolds* (with K. Kaleta). Virtual Conference Analysis and Probability, Wrocław University, May 2021

SIAM Texas-Louisiana Section Virtual Mini-symposium: *Stochastic processes on graphs and networks*. Texas A&M, October 2020

Austin-TAMU Probability and Related Fields (with J. Neemar). Texas A&M University, October 2019

AMS Special Session: *Stochastic processes, random walks and heat kernels* (with P. Mariano). Spring Eastern Sectional meeting, Hartford, April 2019

AMS Special Session: *Analysis on fractals* (with J. P. Chen, L. Rogers, A. Teplyaev and R. S. Strichartz). Joint Mathematics Meetings, Baltimore, January 2019

Mini-Workshop *Dirichlet forms, Riemannian structures and spectral analysis on fractals* (with U. R. Freiberg and P. Arzt), University of Siegen, Germany, June 2012

Referee review

Journal of Functional Analysis, Fractals, Communications in Pure and Applied Analysis, Demonstratio, Monatshefte für Mathematik, Potential Analysis, Statistics & Probability Letters, Stochastic Processes and their Applications, Comptes Rendus Mathématique, Journal of Theoretical Probability, Chaos, Involve

Editorial activity

Co-editor (with J. P. Chen, L. Rogers, A. Teplyaev and R. S. Strichartz): Proceedings volume for the 6th Cornell Conference on Analysis, Probability and Mathematical Physics on Fractals 2017

Proposal reviewer

NSF Probability panel, 2019, 2020

Miscellaneous reviewing

Reviewer for MathSciNet

Scholarly writings from service activities

Co-writer (with probability group at the University of Connecticut), Open-Source Undergraduate Probability textbook www.probability.oer.math.uconn.edu, University of Connecticut, 2017-2019

Scholarly membership

National Association of Mathematics, Association of Women in Mathematics, Women in Probability Group, American Mathematical Society, Association Fachgruppe Stochastik (DMV)

COLLOQUIUM TALKS

Coloquio de Matemática UCR, Universidad de Costa Rica (online), November 2021

Colloquium, Texas A&M University, College Station, TX, January 2019

Colloquium, Purdue University, West Lafayette, IN, January 2019

Colloquium, Washington University in St Louis, St Louis, MO, December 2018

Mathematisches Kolloquium, Martin-Luther-University Halle-Wittenberg, Halle (Saale), Germany, December 2018

Mathematisches Kolloquium, University of Kaiserslautern, Kaiserslautern, Germany, November 2018

Colloquium, Bonn University, Bonn, Germany, October 2018

Lehigh Math Colloquium, Lehigh University, Bethlehem, PA, February 2017

Mathematisches Kolloquium, University of Bremen, Germany, June 2015

RESEARCH TALKS

Conferences and workshops

SUMIRFAS 2021, Texas A&M University, July 2021

AMS Special Session on Probabilistic and Diffusion Methods in Analysis and Geometry, University of Cincinnati (online), April 2021

AMS Special Session on Nonsmooth Analysis and Geometry, University of Cincinnati (online), April 2021

Workshop Women in Probability, Technische Universität Munich, (online), July 2020

Texas Women In Mathematics Symposium 2020, Texas A&M University, College Station, TX, February 2020

Heat Kernels, Stochastic Processes and Functional Inequalities, Oberwolfach, Germany, November 2019

Japanese-German Open Conference on Stochastic Analysis, Fukuoka, September 2019

AMS Special Session on Analysis, Geometry, and PDEs in Non-smooth Metric Spaces, University of Connecticut, Hartford, April 2019

AMS Special Session in Analysis on fractals, Joint Mathematics Meetings, Baltimore, January 2019

Fractal geometry and Stochastics VI, Bad Herrenalb, Germany, October 2018

Theoretical and Applied Stochastic Analysis, Casa matemática, Oaxaca, Mexico, September 2018

AMS Special Session on Analysis and Geometry of Fractals, UC Riverside, CA, November 2017

Nonsmooth Analysis Workshop, University of Connecticut, Storrs, CT, November 2017

Analysis and Geometry on Graphs and Manifolds, University of Potsdam, Germany, August 2017

6th Cornell Conference on Analysis, Probability, and Mathematical Physics on Fractals, Cornell University, Ithaca, NY, June 2017

Women's Intellectual Network Research Symposium, Brown University, RI, March 2017

German Probability and Stochastic Days, University of Bochum, Germany, March 2016

Workshop: Probability, Analysis and Geometry, Moscow State University, Russia, October 2014

The 10th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Universidad Autónoma de Madrid, Spain, July 2014

5th Cornell Conference on Analysis, Probability, and Mathematical Physics on Fractals Cornell University, Ithaca, NY, June 2014

Fractal geometry and Stochastics V, Tabarz, Germany, March 2014

Workshop: Probability, Analysis and Geometry, Ulm University, Germany, September 2013

International Conference of Advances on Fractals and Related Topics, Hong Kong University, Hong Kong, December 2012

Seminar talks

Oberseminar Analysis, Mathematische Physik & Dynamische Systeme, Technische Universität Dortmund (online), December 2021

Hamiltonian Methods in Dispersive and Wave Evolution Equations, ICERM, Brown University, November 2021

Random graphs and discrete structures, Wrocław University of Science and Technology, May 2021 (online)

Probability Seminar, University of Virginia, March 2021 (online)

Analysis Seminar, Northwestern, March 2021 (online)

Probability Seminar, CUNY, October 2020 (online)

Mathematics Graduate Students Organization, Texas A&M University, March 2020 (online)

PDE/Analysis Seminar, Massachusetts Institute of Technology, Boston, February 2020

Stochastics Seminar, Georgia Institute of Technology, Atlanta, January 2020

Kansai Probability Seminar, Kyoto University, Japan, July 2019

Oberseminar Analysis, Geometrische Analysis, University of Bielefeld, Germany, June 2019

Analysis and PDE Seminar, Worcester Polytechnic Institute, Worcester, MA, November 2018

Oberseminar Stochastik, University of Tübingen, Germany, July 2018

Oberseminar Stochastik und Anwendungen, University of Stuttgart, Germany, July 2018

Mathematics Seminar, Seoul National University, Seoul, South Korea, June 2018

Probability Seminar, Michigan State University, East Lansing, MI, April 2018

Norbert Wiener Center Seminar, University of Maryland, Washington DC, MD, February 2018

15th Northeast Probability Seminar, Columbia University, New York, November 2017
Analysis Seminar, Cornell University, Ithaca, NY, January 2017
Stochastics Seminar, Moscow State University, Russia, April 2014
Probability Seminar, University of Essen, Germany, November 2013
Analysis and Probability Seminar, University of Connecticut, Storrs, CT, March 2013

TEACHING
EXPERIENCE

Texas A&M University

Math 304 Linear Algebra, Spring 2022 (service course, two sections)
Math 606 Graduate Probability, Spring 2021
Math 425 The mathematics of contingent claims, Fall 2020
Math 411 Probability, Spring 2020
Math 411 Probability, Fall 2019

University of Connecticut

MATH 3150 Analysis I, Spring 2019
MATH 3160 Probability, Fall 2018
MATH 2410 Q Differential equations, Fall 2018
MATH 3160 Probability, Fall 2017
MATH 3160 Probability, Fall 2016 (two sections)

Ulm University

Random fields, Spring 2016 (M.Sc. course)
Stochastic for Economic Sciences, Fall 2014 (service course, 150 students)
Stochastic Geometry and its Applications, undergraduate seminar organization, Spring 2014

Academy of Sciences, Finance and Technology, Ulm
(distance course teaching assistant)

Stochastic risk modeling and statistical methods, Spring 2015
Stochastic risk modeling and statistical methods, Spring 2014
Insurance claim mathematics, Spring 2014

University of Siegen: teaching assistant

Fractal Geometry, Spring 2013
Mathematics III for engineers, Spring 2013
Linear Algebra I, Fall 2012
Fractal Geometry, Spring 2012
Discrete Mathematics for Computer Sciences, Fall 2011

Ludwig-Maximilians University Munich (undergraduate teaching assistant)

Analysis I, Fall 2010
Ordinary Differential Equations, Spring 2010

Universidad Complutense Madrid (undergraduate teaching assistant)

Introductory course in Mathematics, Fall 2009

LANGUAGES

Spanish (Native), English (Fluent), German (Fluent), French (Good).

Date: January 17, 2022