

PATRICIA ALONSO RUIZ

Curriculum vitae

Department of Mathematics
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RESEARCH INTERESTS

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

APPOINTMENTS

- 08/19 - **Assistant Professor**, Texas A&M University
08/16 - 07/19 Evarist Giné Assistant Research Professor, University of Connecticut
09/13 - 07/16 Scientific employee, Ulm University

EDUCATION

- May 2013 Ph.D. in Mathematics, University of Siegen
July 2009 Licenciatura en Ciencias Matemáticas, Universidad Complutense de Madrid
2007 - 2008 Erasmus exchange program, Ludwig Maximilians University Munich

GRANTS

Research grants

- 09/22 - 08/27 **PI, NSF CAREER grant**, *CAREER: Heat semigroups and Strichartz estimates on fractals*, reference number DMS 2140664
2021 - 2024 **AIM SQuaRe grant**, *Fractional Laplacians on fractal domains*, Research program of the American Institute of Mathematics, Structured Quartet Research Ensemble: A. Aboud, P. Alonso Ruiz, T. Das and M. Vaughan
07/19 - 06/22 **PI, NSF Standard research grant**, *Stochastic processes on rough spaces and geometric properties of random sets* reference number DMS 1951577

Other federal grants

- 2019 **co-PI, Conference grant**, *Cornell 7th Conference on Analysis, Probability, and Mathematical Physics on Fractals*, (PI: R. Ramakrishna, co-PIs: L. Rogers and A. Teplyaev) reference number DMS 2000148
2018 AWM-NSF travel grant

AWARDS AND FELLOWSHIPS

- 2022 NSF CAREER award
10/16 - 08/18 Feodor Lynen fellowship, Alexander von Humboldt Foundation
09/09 - 04/12 DAAD graduate fellowship, Deutscher Akademischer Austauschdienst

PUBLICATIONS

Names of authors in mathematical publications are commonly listed in alphabetical order. Undergraduate coauthors are marked with *.

Articles submitted to peer-reviewed journals

- P. Alonso Ruiz, F. Baudoin, *Oscillations of BV measures on nested fractals* (2022) arXiv:2201.12274, 16 pp.

Articles accepted for publication in peer-reviewed journals

- [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.

Articles published in peer-reviewed journals

- [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.
- [15] 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.
- [14] P. Alonso Ruiz, *Heat kernel analysis on diamond fractals*, Stochastic Processes and their Applications **131**, 51-72 (2021).
- [13] 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.
- [12] 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.
- [11] 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.
- [10] P. Alonso Ruiz, *Explicit formulas for heat kernels on diamond fractals*, Communications in Mathematical Physics **364** (2018), no. 3, 1305–1326.
- [9] 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.

- [8] P. Alonso Ruiz, E. Spodarev, *Entropy-based inhomogeneity detection in fiber materials*, Methodology and Computing in Applied Probability (2018), **20**, no. 4, 1223–1239.
- [7] P. Alonso Ruiz, *Power dissipation in fractal Feynman-Sierpinski AC circuits*, Journal of Mathematical Physics, **58** (2017), no. 7, 073503.
- [6] P. Alonso Ruiz, E. Spodarev, *Nonparametric estimation of entropy for marked Poisson point processes*, Advances in Applied Probability, **49** (2017), no. 1, 258–278.
- [5] P. Alonso Ruiz, U. Freiberg, *Weyl asymptotics for Hanoi attractors*, Forum Mathematicum **29** (2017), no. 5, 1003–1022.
- [4] 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.
- [3] 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).
- [2] P. Alonso Ruiz, U. Freiberg, *Dirichlet forms on Hanoi attractors*, Int. J. Applied Non-linear Science, **1** (2014), no. 3, 247–274.
- [1] 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.

Preprints

- 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.
- P. Alonso Ruiz, M. Hinz, A. Teplyaev and R. Treviño, *Canonical diffusions on pattern spaces of aperiodic Delone sets*, with (2018) arXiv:1801.08956, 46 pp.

Scholarly writings from service activities

2017-2019 **Open-Source Undergraduate Probability textbook**, University of Connecticut. www.probability.oer.math.uconn.edu (co-writers: probability group at the University of Connecticut)

STUDENT ADVISING AND MENTORING

Fall 2020 - **TAMU Fractals Research Team**, director. Advised undergraduate students:

- Spring 2022: J. Cruz, V. Flores, E. Vasquez
- Fall 2021: J. Cruz, C. Duong, V. Flores, E. Vasquez
- Fall 2020 - Spring 2021: A. Benitez, X. Maldonado, J. Nunez, A. Zhou

Fall 2021 Faculty Mentoring Academy certificate, Texas A&M University

- Fall 2020 Texas A&M University System Louis Stokes Alliance for Minority Participation, research mentor.
Undergraduate student: J. Nunez
- Summer 2017 Summer Program for Undergraduate Research project *Analysis on hybrid fractals*, Cornell University. Co-advisor: Prof. R. S. Strichartz.
Undergraduate students: Y. Chen, H. Gu, and Z. Zhou
- Spring 2016 B.Sc. Thesis *Estimation of entropy of directional distributions*, Ulm University. Co-advisor: Prof. E. Spodarev.
Undergraduate student: J. Schwarz

OUTREACH

- 02/22 *Aggie Saturday*, invited speaker, Texas A&M University
- 08/2021 *The Kenya Workshop*, invited speaker. Online event for aspiring African STEM high-school students to learn about doing research in mathematics.
- 2020,2022 *Mathematics and Statistics Fair*, volunteer, Texas A&M University
- 2020-2021 *Summer Educational Enrichment in Math*, instructor, Texas A&M University
- 02/20 *Applied Mathematics Undergraduate SEminar (AMUSE)*, speaker, Texas A&M University
- 02/20 *Women in Lunch Seminar*, speaker, MIT Women In Mathematics, Massachusetts Institute of Technology, Boston
- 2015-2016 *CyberMentor: E-Mentoring-Programm für Mädchen in MINT*, mentor for female school students, University of Regensburg, Germany

SERVICE

International conference and workshop organization

- 11/22 **BIRS workshop** *Smooth functions on rough spaces and fractals with connections to curvature functional inequalities*. Bamff International Research Station, Canada (co-organizers T. Kumagai, L. Rogers, N. Shanmugalingam)
- 06/22 **7th Cornell Conference on Analysis, Probability and Mathematical Physics on Fractals**, Cornell University (co-organizers M. Hinz, L. Rogers and A. Teplyaev)
- 05/21 **Special Session** *Schrödinger operators on graphs and manifolds*. Virtual Conference Analysis and Probability, Wrocław University (co-organizer K. Kaleta)
- 10/20 **Virtual Mini-symposium** *Stochastic processes on graphs and networks*. SIAM Texas-Louisiana Section, Texas A&M
- 04/19 **AMS Special Session** *Stochastic processes, random walks and heat kernels*. AMS Spring Eastern sectional meeting, Hartford (co-organizer P. Mariano)
- 01/19 **AMS Special Session** *Analysis on fractals*. Joint Mathematics Meetings, Baltimore (co-organizers J. P. Chen, L. Rogers, A. Teplyaev and R. S. Strichartz)

National conference, workshop and seminar organization

- 10/19,11/21 **Austin-TAMU Probability and Related Fields**, Texas A&M University (co-organizer J. Neemar)

Fall 2021 - **Probability and Mathematical Physics Seminar** Texas A&M University (co-organizer G. Berkolaiko)

2020-2021 **Probability Seminar**, Texas A&M University

[Committee member](#)

Ph.D. Thesis committee (non-chair), Texas A&M University. PhD candidate: Parker Dunkan

Master's committee, Texas A&M University. Student: Jintong Huang

Hiring committee, Ulm University. W3 Professorship (2016)

[Justice, Equity, Diversity and Inclusion](#)

11/21 *Collaborating Across Diverse Backgrounds*, panelist. Texas A&M University

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

02/20 *First Thursday Speaker Series, Aggie Women Network*, invited speaker. Messina Hof, Bryan, TX

[Scholarly membership](#)

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

[Editorial activity](#)

Editor **Conference proceedings volume** *Analysis, Probability and Mathematical Physics on Fractals*, World Scientific (2021) doi 10.1142/11696 (co-editors J. P. Chen, L. Rogers, A. Teplyaev and R. S. Strichartz)

Reviewer **NSF Probability panel**, proposal reviewer (2019,2020)

MathSciNet, review writer (since 2019)

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

[TALKS AND PRESENTATIONS](#)

(since 2017, invited speaker marked with *)

[Colloquium talks](#)

11/21 *Coloquio de Matemática UCR*, Universidad de Costa Rica (online)

01/19 *Colloquium*, Texas A&M University, College Station, TX

01/19 *Colloquium*, Purdue University, West Lafayette, IN

01/18 *Colloquium*, Washington University in St Louis, St Louis, MO

12/18 *Mathematisches Kolloquium*, Martin-Luther-University Halle-Wittenberg, Halle (Saale), Germany

- 11/18 *Mathematisches Kolloquium*, University of Kaiserslautern, Kaiserslautern, Germany
- 10/18 *Colloquium*, Bonn University, Bonn, Germany
- 02/17 *Lehigh Math Colloquium*, Lehigh University, Bethlehem, PA
- 06/15 *Mathematisches Kolloquium*, University of Bremen, Germany
- [International conference and workshop talks](#)
- 07/21 *SUMIRFAS 2021*, Texas A&M University
- AMS Special Session on Probabilistic and Diffusion Methods in Analysis and Geometry*, University of Cincinnati (online), April 2021
- 04/21 *AMS Special Session on Nonsmooth Analysis and Geometry*, University of Cincinnati (online)
- 07/20 *Workshop Women in Probability**, Technische Universität Munich, (online)
- 11/19 *Heat Kernels, Stochastic Processes and Functional Inequalities*, Oberwolfach, Germany
- 09/19 *Japanese-German Open Conference on Stochastic Analysis**, Fukuoka, Japan
- 01/19 *AMS Special Session in Analysis on fractals*, Joint Mathematics Meetings, Baltimore
- 10/18 *Fractal geometry and Stochastics VI**, Bad Herrenalb, Germany
- 09/18 *Theoretical and Applied Stochastic Analysis*, Casa matemática, Oaxaca, Mexico
- 11/17 *AMS Special Session on Analysis and Geometry of Fractals*, UC Riverside, CA
- 11/17 *Nonsmooth Analysis Workshop*, University of Connecticut, Storrs, CT
- 08/17 *Analysis and Geometry on Graphs and Manifolds*, University of Potsdam, Germany
- 06/17 *6th Cornell Conference on Analysis, Probability, and Mathematical Physics on Fractals**, Cornell University, Ithaca, NY
- 03/17 *Women's Intellectual Network Research Symposium*, Brown University, RI
- [National conference and seminar talks](#)
- 02/22 *Texas Women In Mathematics Symposium 2020*, Rice University, TX
- 12/21 *Oberseminar Analysis, Mathematische Physik & Dynamische Systeme*, Technische Universität Dortmund, Germany (online)
- 12/21 *Mathematical Physics and Harmonic Analysis*, Texas A&M University, TX
- 11/21 *Hamiltonian Methods in Dispersive and Wave Evolution Equations*, ICERM, Brown University, RI
- 05/21 *Random graphs and discrete structures*, Wrocław University of Science and Technology, (online)
- 05/21 *Probability Seminar*, University of Virginia, VA (online)
- 03/21 *Analysis Seminar*, Northwestern, IL (online)
- 10/20 *Probability Seminar*, CUNY, NY (online)
- 03/20 *Mathematics Graduate Students Organization*, Texas A&M University, TX (online)
- 02/20 *Texas Women In Mathematics Symposium 2020*, Texas A&M University, College Station, TX

02/20	<i>PDE/Analysis Seminar</i> , Massachusetts Institute of Technology, MA
01/19	<i>Stochastics Seminar</i> , Georgia Institute of Technology, GA
07/19	<i>Kansai Probability Seminar</i> , Kyoto University, Japan
06/19	<i>Oberseminar Analysis, Geometrische Analysis</i> , University of Bielefeld, Germany
04/19	<i>AMS Special Session on Analysis, Geometry, and PDEs in Non-smooth Metric Spaces</i> , University of Connecticut, Hartford
11/18	<i>Analysis and PDE Seminar</i> , Worcester Polytechnic Institute, Worcester, MA
07/18	<i>Oberseminar Stochastik</i> , University of Tübingen, Germany
07/18	<i>Oberseminar Stochastik und Anwendungen</i> , University of Stuttgart, Germany
06/18	<i>Mathematics Seminar</i> , Seoul National University, Seoul, South Korea
04/18	<i>Probability Seminar</i> , Michigan State University, East Lansing, MI
02/18	<i>Norbert Wiener Center Seminar</i> , University of Maryland, MD
11/17	<i>15th Northeast Probability Seminar</i> , Columbia University, NY
01/17	<i>Analysis Seminar</i> , Cornell University, Ithaca, NY

TEACHING EXPERIENCE

Texas A&M University

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

University of Connecticut

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

Ulm University

Spring 2016	Random fields (graduate course)
Fall 2014	Stochastic for Economic Sciences (service course, 150 students)

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

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

University of Siegen
(undergraduate/graduate teaching assistant)

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

Ludwig-Maximilians University Munich
(undergraduate teaching assistant)

Fall 2010 Analysis I
Spring 2010 Ordinary Differential Equations

Universidad Complutense Madrid
(undergraduate teaching assistant)

Fall 2009 Introductory course in Mathematics

LANGUAGES

Native Spanish (Native)
Fluent English, German
Good French