

Ricardo Grande

Curriculum Vitae

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Research Interests

Nonlinear PDEs, Kinetic theory, Turbulence, Nonlinear evolution of probability measures, Large Deviations

Academic Appointments

- 2023 - Currently **Assistant Professor** (RTD-A), *SISSA, Trieste*
- 2021 - 2023 **Postdoctoral Researcher**, *École Normale Supérieure, Paris*
- *Mentors*: Isabelle Gallagher (ENS) and Laure Saint-Raymond (IHES)
 - Postdoctoral associate of the Simons Collaboration in Wave Turbulence
- 2020 - 2021 **Postdoctoral Assistant Professor**, *University of Michigan, Ann Arbor*
- *Mentor*: Zaher Hani
 - Postdoctoral associate of the Simons Collaboration in Wave Turbulence

Education

- 2015 - 2020 **PhD in Mathematics**, *Massachusetts Institute of Technology*
- *Advisor*: Gigliola Staffilani
 - *Thesis title*: The role of smoothing effect in some dispersive equations
 - *Committee*: Gigliola Staffilani, MIT
David Jerison, MIT
Andrew Lawrie, MIT
- 2014 - 2015 **Master of Advanced Study in Mathematics**, *University of Cambridge*
- *Essay*: Averaging Lemmas and the X-ray transform
 - *Directed by*: Clément Mouhot
- 2010-2014 **Licenciatura en Matemáticas**, *Universidad del País Vasco (UPV-EHU)*

Scientific Work

THESIS

- [0] R. Grande, *The role of smoothing effect in some dispersive equations*. PhD Thesis, Massachusetts Institute of Technology (2020). Available at <https://dspace.mit.edu/handle/1721.1/126921>.

PREPRINTS

- [1] R. Grande, *Resonant large deviations principle for the beating NLS equation*, (arxiv:2408.05791) (2024)
- [2] R. Grande, Z. Hani *Rigorous derivation of damped-driven wave turbulence theory*, (arxiv:2407.10711) (2024)

PUBLICATIONS

- [3] M. Dolce, R. Grande, *On the convergence rates of discrete solutions to the Wave Kinetic Equation*, Math. Eng. 6 (4), 536-558 (2024)
- [4] G. Beck, C-E. Bréhier, L. Chevillard, R. Grande, W. Ruffenach, *Numerical simulations of a stochastic dynamics leading to cascades and loss of regularity: applications to fluid turbulence and generation of fractional Gaussian fields*, Phys. Rev. Research 6, 033048 (2024)
- [5] G. B. Apolinário, G. Beck, L. Chevillard, I. Gallagher, R. Grande, *A linear stochastic model of turbulent cascades and fractional fields* (2023), to appear on Annali della Scuola Normale Superiore di Pisa, Classe di Scienze (arxiv:2301.00780)

- [6] M. A. Garrido, R. Grande, K. M. Kurianski, G. Staffilani, *Large deviations principle for the cubic NLS equation*, Comm. on Pure and Applied Math. 76: 4087-4136 (2023)
- [7] R. Grande, *Continuum limit for discrete NLS with memory effect*, to appear in Journal of Nonlinear Modeling and Analysis (2024)
- [8] R. Grande, K. M. Kurianski, G. Staffilani, *On the nonlinear Dydne equation*, Nonlinear Analysis 207, 112292 (2021)
- [9] R. Grande, *Space-time fractional Nonlinear Schrödinger equation*, SIAM J. Math. Anal (2019), 51(5), 4172-4212
- [10] R. Grande, I. Kovács, K. Kutnar, A. Malnič, L. Martínez, D. Marušič, *Equisizable partial sum families*, Journal of Algebraic Combinatorics 51, 273-296 (2020)
- [11] M. Conder, R. Grande, *On embeddings of circulant graphs*, Electronic Journal of Combinatorics 22 (2015), # P2.28

Teaching Experience

BACHELOR LEVEL

Winter 2021	Math 316 - Differential Equations , University of Michigan,	42h
Fall 2020	Math 116 - Calculus II , University of Michigan,	63h
Spring 2020	Grader for 18.615 - Introduction to Stochastic Processes, MIT,	14h
Fall 2019	Grader for 18.085 - Computational Science and Engineering I, MIT,	14h
Spring 2019	Grader for 18.615 - Introduction to Stochastic Processes, MIT,	14h
Spring 2018	Recitation Instructor for 18.03 - Differential Equations, MIT,	28h
Fall 2017	Recitation Instructor for 18.02 - Multivariable Calculus, MIT,	28h
Fall 2016	Grader for 18.085 - Computational Science and Engineering I, MIT,	14h

PhD LEVEL

Jan 2025	Derivation of Wave Kinetic Equations , BCAM, Bilbao	10h
Feb 2024	Weak Turbulence and Wave Kinetic Equation , SISSA, Trieste	20h
June 2022	Large Deviations and PDEs , SISSA, Trieste	4h

STUDENT SUPERVISION

2024	Supervision of Master Thesis , SISSA/UniTS <ul style="list-style-type: none"> o <i>Student</i>: Riccardo Berforini D'Aquino o <i>Project</i>: Large Deviations Principle for the KdV equation on \mathbb{T} over long timescales 	
Summer 2021	Research Experience for Undergraduates co-mentor (with Z. Hani), University of Michigan <ul style="list-style-type: none"> o <i>Students</i>: Yubing Cui and Joshua Messing o <i>Project</i>: Wave Kinetic Equation and Kolmogorov-Zakharov Cascade Spectra 	
Summer 2018	Research supervisor for the Undergraduate Research Opportunities Program , MIT <ul style="list-style-type: none"> o <i>Student</i>: Zixuan Xu o <i>Project</i>: Almost Conservation Laws for KdV and Cubic NLS 	
Summer 2016	Research supervisor for the Undergraduate Research Opportunities Program , MIT <ul style="list-style-type: none"> o <i>Student</i>: Eli Sadovnik o <i>Project</i>: A Central Limit Theorem for Fluctuations of Internal Diffusion-Limited Aggregation with Multiple Sources 	

Talks at International Conferences and Workshops

- Sept 2025 **Long-Time Dynamics in Random and Deterministic Systems**, EPFL, Lausanne
- June 2025 **Summer school: Probabilistic Approaches to Dispersive PDEs**, BCAM, Bilbao
- May 2025 **Physics and Mathematics of hydrodynamic and wave turbulence**, CIRM, Marseille
- Sept 2024 **Summer School in Fluid dynamics and Nonlinear PDEs**, Università di Padova
- July 2024 **Joint Meeting AMS-UMI**, Università degli Studi di Palermo
- May 2024 **Wave Dynamics and Fluid-Structure Interactions**, Lake Como School of Advanced Studies
- May 2024 **Workshop Turbulent.e.s**, École Polytechnique
- March 2024 **Journées Jeunes EDPistes en France 2024**, Institut de Mathématiques de Toulouse
- Nov 2023 **Simons Collaboration in Wave Turbulence Annual Meeting**, Courant Institute
- Aug 2023 **School/Workshop on Wave Dynamics: Turbulent vs Integrable Effects**, ICTP Trieste
- May 2023 **Nonlinear waves and turbulence workshop**, IHP
- Sept 2022 **Trials in wave turbulence: from random waves to kinetic equations**, GSSI
- May 2022 **Oberwolfach Workshop**, Deterministic Dynamics and Randomness in PDE, Junior talk
- March 2022 **SIAM PD22**, Decay, Stability and Growth in Fluids and Wave Systems minisymposium
- Dec 2021 **Simons Collaboration in Wave Turbulence Annual Meeting**, Courant Institute
- May 2020 **Mathematics of Planet Earth: Analysis and Modelling**, Webinar
- Jan 2020 **Winter School: Turbulence in fluids and PDEs**, Lausanne

Talks at University Seminars

- Nov 2024 **Analysis Seminar**, University of Bielefeld
- Nov 2024 **Séminaire de EDP - Physique Mathématique**, IMB, Bordeaux
- Nov 2024 **Séminaire de Mathématiques et de leurs Applications**, UPPA, Pau
- Apr 2024 **Analysis Seminar**, SISSA
- Jan 2024 **Séminaire EDP et Physique mathématique**, LAGA, Université Paris 13
- Nov 2023 **Séminaire ÉDP, Modélisation et Calcul Scientifique** de Lyon-Saint Etienne
- March 2023 **Séminaire Cristollien d'Analyse Multifractale**, Université Paris Est Créteil - Val de Marne
- March 2023 **Séminaire GT Modélisation Stochastique**, LPSM, Université Paris Cité
- Feb 2023 **Séminaire du Groupe de Travail EDP**, LAMA, Université Paris Est Créteil
- Nov 2022 **Séminaire de Physique Non-Linéaire**, Dép. de Physique, ENS
- May 2022 **Ghent Methusalem Junior Seminar**, Ghent University
- March 2022 **Analysis and PDE seminar**, BCAM
- Nov 2020 **Differential Equations Seminar**, University of Michigan
- Jan 2020 **Seminar**, GSSI L'Aquila
- Jan 2020 **BCAM Scientific Seminar**, BCAM
- Nov 2019 **Brown-BU-UMass Amherst seminar in PDE and Dynamics**, Brown University

Grants and awards

- 2025 **GNAMPA Project**: PI of project "Deterministic and probabilistic evolution of out-of-equilibrium Hamiltonian systems". Group members: M. Berti, M. Dolce, A. Maspero, S. Terracina. Funds: 3.000 €.
- 2024 **iNEST Young Researcher**: PI of project "Rogue Wave Forecasting" - 40.000 €
- 2024 **Chaire Aliénor, Fédération Margaux, CNRS**: 1-month invited position at a department of the federation. Affectation: Université de Pau.
- 2014-15 **La Caixa Fellowship**: Full tuition and stipend for master degree at the Univ. of Cambridge ~ 35.000 €

Member in evaluation and hiring committees

03-2025 Committee for PhD admission in SISSA
06-2024 Committee for three postdoctoral positions at SISSA
03-2024 Committee for PhD admission in SISSA

Other

Referee for: Annals of PDEs, Nonlinearity, Ars Inveniendi Analytica, Nonlinear Analysis, SIMA, Advances in Differential Equations, Zeitschrift für angewandte Mathematik und Physik

Qualification for Maître de Conférences, Section 25 CNU, n° 22225373921, (obtained 08/02/2022).

Languages

Basque, Mother tongue

Italian, Fluent

French, Advanced

Spanish, Mother tongue

English, Fluent