

Institutional information

Departament de Matemàtiques
Universitat Politècnica de Catalunya
Campus Diagonal Besòs, Edifici A (EEBE)
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Researcher ID: J-6103-2016

Personal information

Birthdate: October 24th, 1983
Birthplace: Mollet del Vallès (Spain)
Citizenship: Spanish

Professional trajectory

Research positions

- 03/2019 – Present** **Agregat** (Associate Professor),
Departament de Matemàtiques, Universitat Politècnica de Catalunya.
- 02/2017 – 02/2019** **Lector** (Assistant Professor),
Departament de Matemàtiques i Informàtica, Universitat de Barcelona.
- 09/2014 – 01/2017** **Postdoctoral Researcher** *Juan de la Cierva*,
Departament de Matemàtiques, Universitat Politècnica de Catalunya.
- 09/2013 – 08/2014** **Postdoctoral Research Position**,
Departament de Matemàtiques, Universitat Autònoma de Barcelona.
Supported by the ERC Advanced Grant *Geometric Analysis in the Euclidean Space* (PI: Xavier Tolsa).
- 10/2011 – 08/2013** **Postdoctoral Research Position**,
Departamento de Matemáticas, Universidad del País Vasco (UPV/EHU).
- 05/2009 – 04/2011** **Research Assistant**,
Departament de Matemàtiques, Universitat Autònoma de Barcelona.
Supported by the Spanish Grant *Formación de Profesorado Universitario*.

Education

- 09/2007 – 06/2011** **PhD in Mathematics with European Mention**,
Universitat Autònoma de Barcelona.
Thesis: Variation for Riesz transforms and analytic and Lipschitz harmonic capacities. *Advisers:* Mark Melnikov, Xavier Tolsa. *GPA:* 10.0/10.0, Excellent “Cum Laude”.
- 09/2006 – 09/2007** **Master’s Degree in Advanced Mathematics**,
Universitat Autònoma de Barcelona.
GPA: 9.7/10.0.
Thesis: Local uniform approximation by rational functions, analytic capacity and Radó’s theorem. *Advisers:* Mark Melnikov, Xavier Tolsa.

09/2001 – 06/2006 Degree in Mathematics,

Universitat Autònoma de Barcelona.

GPA: 8.3/10.0.

Thesis: Littlewood-Paley theory and Fourier series. Adviser: Artur Nicolau.

Research

Research interests

Partial differential equations, mathematical physics, harmonic analysis, geometric measure theory.

Organization of scientific events

- **Bilbao-Barcelona Analysis and PDEs meeting**, BCAM, Bilbao. Co-organized with Naiara Arrizabalaga (UPV/EHU), Carme Cascante (CRM), Luz Roncal (BCAM), and Luis Vega (UPV/EHU). 03 – 05/09/2025.
<https://www.bcamath.org/events/biobcnapde/en/>
- **Analytic and algebraic methods in physics**, Czech Technical University, Prague. Co-organized with Biagio Cassano (Università degli Studi della Campania), Vít Jakubský (Nuclear Physics Institute, Czech Academy of Sciences), Vladimir Lotoreichik (Nuclear Physics Institute, Czech Academy of Sciences), and Matěj Tušek (Czech Technical University). 26 – 29/08/2025.
<http://www.ujf.cas.cz/aamp>
- **Analytic and algebraic methods in physics**, Czech Technical University, Prague. Co-organized with Biagio Cassano (Università degli Studi della Campania), Vít Jakubský (Nuclear Physics Institute, Czech Academy of Sciences), Vladimir Lotoreichik (Nuclear Physics Institute, Czech Academy of Sciences), and Matěj Tušek (Czech Technical University). 28 – 31/08/2023.
<http://www.ujf.cas.cz/aamp>
- **FME academic year in honor of Olga A. Ladyzhenskaya**, FME (UPC), Barcelona: Organization of the *Opening lesson of the Ladyzhenskaya FME course 2022-2023*, 19/10/2022, and of the *Conference Olga Ladyzhenskaya FME 2023*, 26/04/2023. Co-organized with Xavier Cabré, Ángeles Carmona, Andrés Encinas, and Joan Sánchez (all of them from UPC).
- **Special session *Geometric analysis and PDEs***, within the *Barcelona Mathematical Days 2020*, Institut d'Estudis Catalans. Co-organized with Luis Vega (Universidad del País Vasco - BCAM). 23 – 24/10/2020.
<https://bmd2020.espais.iec.cat/thematic-sessions/geometric-analysis-and-pdes>
- **Triple Minisymposia *Dirac Hamiltonians with critical singularities*** within the *9th International Congress on Industrial and Applied Mathematics (ICIAM 2019)*, Valencia. Co-organized with Naiara Arrizabalaga (Universidad del País Vasco UPV/EHU) and Luis Vega (BCAM and UPV/EHU). 15 – 19/07/2019.
- **Barcelona Analysis Conference 2019**, Barcelona. Member of the Organizing Committee. Congress organized by the Barcelona Analysis Seminar and the research groups in mathematics in Barcelona (Universitat Autònoma de Barcelona, Universitat de Barcelona, and Universitat Politècnica de Catalunya). 25 – 28/06/2019.
- **Special session *Recent advances in relativistic quantum mechanics*** within the *Congreso Bienal de la Real Sociedad Matemática Española 2019*, Santander. Co-organized with Naiara Arrizabalaga (Universidad del País Vasco UPV/EHU) and Luis Vega (BCAM and UPV/EHU). 04 – 08/02/2019.

- **Geometric Function Theory in Fluid Mechanics monthly program**, Universitat Autònoma de Barcelona, CRM and Universitat de Barcelona. Co-organized with Albert Clop (Universitat Autònoma de Barcelona) and Jordi Marzo (Universitat de Barcelona). 02/07/2018 – 20/07/2018.
Supported by Unidad de Excelencia Maria de Maeztu MDM-2014-0445 (13500€), Institute of Mathematics of the University of Barcelona (2000€), and Universitat de Barcelona (2000€).
- **Special session Harmonic Analysis and Applications** within the *4th Congreso de Jóvenes Investigadores, Real Sociedad Matemática Española*, Universitat de València. Co-organized with José Conde (Universidad Autónoma de Madrid) and Teresa Luque (Universidad Complutense de Madrid). 04 – 08/09/2017.
- **Special session Harmonic Analysis** within the *First Joint International Meeting RSME-SCM-SEMA-SIMAI-UMI*, UPV/EHU. Co-organized with Marco Peloso (Università degli Studi di Milano). 30/06/2014 – 04/07/2014.
- **Mathematical analysis and applications seminar coordinator**, Departamento de Matemáticas, UPV/EHU. 04/2012 – 08/2013.

Short research visits

- 01/2023 – 02/2023 MATRIX - Mathematical Research Institute, Creswick, Australia.
15 days.
- 07/2017 Institut für Numerische Mathematik, Graz University of Technology, Graz, Austria.
10 days.
- 11/2015 – 01/2016 CEREMADE, Université Paris-Dauphine, Paris, France.
3 months.
- 10/2014 – 11/2014 Basque Center for Applied Mathematics (BCAM), Bilbao, Spain.
1 month.
- 04/2010 – 07/2010 Department of Mathematics and Statistics, University of Helsinki, Helsinki, Finland.
3 months.

Publications in indexed journals

1. J. Duran, A. Mas, T. Sanz-Perela; 2026. *A connection between quantum dot Dirac operators and $\bar{\partial}$ -Robin Laplacians in the context of shape optimization problems*, **Journal of Functional Analysis** 290(10), 111398. <https://doi.org/10.1016/j.jfa.2026.111398>.
2. G. Csató, A. Mas; 2025. *Strict rearrangement inequalities: nonexpansivity and periodic Gagliardo seminorms*, **Trans. Amer. Math. Soc.** 378(10), 7163–7197. <https://doi.org/10.1090/tran/9510>.
3. G. Csató, A. Mas; 2025. *Examples of optimal Hölder regularity in semilinear equations involving the fractional Laplacian*, **Nonlinear Analysis** 255, 113755. <https://doi.org/10.1016/j.na.2025.113755>.
4. X. Cabré, G. Csató, A. Mas; 2025. *Periodic solutions to integro-differential equations: variational formulation, symmetry, and regularity*, **Commun. Partial Differential Equations**, 1–49. <https://doi.org/10.1080/03605302.2024.2441851>.
5. J. Duran, A. Mas; 2024. *Convergence of generalized MIT bag models to Dirac operators with zigzag boundary conditions*, **Anal. Math. Phys.** 14, 85. <https://doi.org/10.1007/s13324-024-00946-7>.
6. X. Cabré, G. Csató, A. Mas; 2023. *Existence and symmetry of periodic nonlocal-CMC surfaces via variational methods*, **J. reine angew. Math.** <https://doi.org/10.1515/crelle-2023-0057>.

7. N. Arrizabalaga, A. Mas, T. Sanz-Perela, L. Vega; 2022. *Eigenvalue curves for generalized MIT bag models*, **Commun. Math. Phys.** <https://doi.org/10.1007/s00220-022-04526-3>.
8. B. Cassano, V. Lotoreichik, A. Mas, M. Tušek; 2022. *General δ -shell interactions for the two-dimensional Dirac operator: self-adjointness and approximation*, **Rev. Mat. Iberoam.** 39 (2023), no. 4, pp. 1443–1492. <https://doi.org/10.4171/RMI/1354>.
9. D. Alonso-Orán, F. Chamizo, Á.D. Martínez, A. Mas; 2021. *Pointwise monotonicity of heat kernels*, **Rev. Mat. Complut.** <https://doi.org/10.1007/s13163-021-00417-8>.
10. J. Marzo, A. Mas; 2021. *Discrepancy of minimal Riesz energy points*, **Constr. Approx.** <https://doi.org/10.1007/s00365-021-09534-5>.
11. J. Behrndt, M. Holzmann, A. Mas; 2020. *Self-adjoint Dirac operators on domains in \mathbb{R}^3* , **Ann. Henri Poincaré** 21, 2681–2735. <https://doi.org/10.1007/s00023-020-00925-1>.
12. N. Arrizabalaga, L. Le Treust, A. Mas, N. Raymond; 2019. *The MIT Bag Model as an infinite mass limit*, **Journal de l'École polytechnique – Mathématiques**, Volume 6. 329–365. <https://doi.org/10.5802/jep.95>.
13. A. Mas, F. Pizzichillo; 2018. *Klein's Paradox and the relativistic δ -shell interaction in \mathbb{R}^3* , **Anal. & PDE**, Vol. 11, No. 3, 705–744. <https://doi.org/10.2140/apde.2018.11.705>.
14. A. Mas, F. Pizzichillo; 2017. *The relativistic spherical δ -shell interaction in \mathbb{R}^3 : spectrum and approximation*, **J. Math. Phys.** 58, 082102. <http://dx.doi.org/10.1063/1.5000381>.
15. A. Mas; 2017. *Dirac operators, shell interactions and discontinuous gauge functions across the boundary*, **J. Math. Phys.** 58, 022301. <http://dx.doi.org/10.1063/1.4974359>.
16. A. Mas, X. Tolsa; 2017. *L^p -estimates for the variation for singular integrals on uniformly rectifiable sets*, **Trans. Amer. Math. Soc.** 369(11), 8239–8275. <https://doi.org/10.1090/tran/6987>.
17. N. Arrizabalaga, A. Mas, L. Vega; 2016. *An isoperimetric-type inequality for electrostatic shell interactions for Dirac operators*, **Commun. Math. Phys.** 344, 483–505. <https://doi.org/10.1007/s00220-015-2481-y>.
18. N. Arrizabalaga, A. Mas, L. Vega; 2015. *Shell interactions for Dirac operators: on the point spectrum and the confinement*, **SIAM J. Math. Anal.** 47(2), 1044–1069. <https://doi.org/10.1137/14097759X>.
19. A. Mas, X. Tolsa; 2014. *Variation for the Riesz transform and uniform rectifiability*, **J. Eur. Math. Soc.** 16(11), 2267–2321. <https://doi.org/10.4171/JEMS/487>.
20. N. Arrizabalaga, A. Mas, L. Vega; 2014. *Shell interactions for Dirac operators*, **J. Math. Pures Appl.** 102, 617–639. <https://doi.org/10.1016/j.matpur.2013.12.006>
21. A. Mas; 2013. *Variation for singular integrals on Lipschitz graphs: L^p and endpoint estimates*, **Trans. Amer. Math. Soc.** 365(11), 5759–5781. <https://doi.org/10.1090/S0002-9947-2013-05815-1>.
22. A. Mas, X. Tolsa; 2012. *Variation and oscillation for singular integrals with odd kernel on Lipschitz graphs*, **Proc. London Math. Soc.** 105(1), 49–86. <https://doi.org/10.1112/plms/pdr061>.
23. A. Mas, M. Melnikov, X. Tolsa; 2011. *Erratum to: "A dual characterization of the C^1 harmonic capacity and applications"*, **Duke Math. J.** 153 (2010), 1–22, **Duke Math. J.** 157(2), 421–423. <https://doi.org/10.1215/00127094-2011-009>.
24. A. Mas, M. Melnikov, X. Tolsa; 2010. *A dual characterization of the C^1 harmonic capacity and applications*, **Duke Math. J.** 153(1), 1–22. <https://doi.org/10.1215/00127094-2010-019>.
25. A. Mas; 2009. *Failure of rational approximation on some Cantor type sets*, **Proc. Amer. Math. Soc.** 137(2), 635–640. <https://doi.org/10.1090/S0002-9939-08-09573-7>.

Preprints

1. A. Mas; 2018. *Characterization of balls as minimizers of an endpoint Gagliardo seminorm on the boundary*, arXiv:1805.03557.

Books/Chapters

1. N. Arrizabalaga, A. Fernández, A. Mas, S. Montaner, L. Potenciano, O. Rey, L. Urrutia, L. Vega, 2013. *Una mirada a la mecánica cuántica*, Editorial Académica Española (AV Akademikerverlag GmbH & Co. KG.), ISBN 978-3-659-07608-4.
2. A. Mas, 2011. *Variation for Riesz transforms and analytic and Lipschitz harmonic capacities*, Doctoral dissertation, Departament de Matemàtiques, UAB. Published with **LAP Lambert Academic Publishing** (currently AV Akademikerverlag GmbH & Co. KG.) with the title *Cauchy and Riesz transforms in geometric analysis*, ISBN 978-3-8465-5729-7.

Surveys, proceedings, and other publications

1. A. Mas; 2012. *Variational inequalities for singular integral operators*, **Journées équations aux dérivées partielles**, Exp. No. 7 (survey). <https://doi.org/10.5802/jedp.90>.
2. A. Mas, M. Magdziarz, C. Klotz, C. Hemmelmeir, K. Borset; 2007. *Strategies for darts*, 21st ECMI modeling week.

Presentations in conferences

- *A connection between quantum dot Dirac operators and $\bar{\partial}$ -Robin Laplacians*, Joint Meeting and Conference of the Czech, Slovenian, Austrian, Slovak and Catalan Mathematical Societies – CSASC 2026, Pilsen, Czech Republic. Invited speaker. 05/02/2026.
- *Periodic solutions to integro-differential equations*, Meeting of the Spanish “Nonlocal PDEs and Applications” Network, Valencia, Spain. Invited speaker. 02/10/2024.
- *Convergence of generalized MIT bag models to Dirac operators with zigzag boundary conditions*, Minisymposium “Spectral Theory of Differential Operators in Mathematical Physics” within the 9th European Congress of Mathematics – 9ECM, Sevilla, Spain. Invited speaker. 15/07/2024.
- *Eigenvalue curves for generalized MIT bag models: resolvent convergence and corona type domains*, Conference “Spectral Analysis for Quantum Hamiltonians”, Marseille, France. Invited speaker. 15/01/2024.
- *Periodic surfaces with constant nonlocal mean curvature*, Meeting of the “Red de EDPs No Locales y Aplicaciones”, Madrid, Spain. Invited speaker. 22/09/2023.
- *Shell interactions for Dirac operators*, Workshop “Harmonic analysis and differential equations: new questions and challenges”, Bilbao, Spain. Invited speaker. 07/09/2023.
- *Spectral analysis of a confinement model in relativistic quantum mechanics*, Workshop “Two Dirac days”, Padova, Italy. Invited speaker. 20/02/2023.
- *Periodic surfaces with constant nonlocal mean curvature*, Workshop “Minimal surfaces and geometric flows: interaction between the local and the nonlocal worlds”, Creswick, Australia. Invited speaker. 27/01/2023.
- *Spectral analysis of a confinement model in relativistic quantum mechanics*, Workshop “The Dirac equation”, Bordeaux, France. Invited speaker. 07/07/2022.
- *Spectral analysis of a confinement model in relativistic quantum mechanics*, Workshop “PDEs and Relativistic Quantum Mechanics”, Nice, Italy. Invited speaker. 11/05/2022.

- *Spectral analysis of a confinement model in relativistic quantum mechanics*, Minisymposium “Harmonic Analysis and Partial Differential Equations” within the 8th European Congress of Mathematics – 8ECM. Invited speaker. 22/06/2021.
- *The MIT bag model as an infinite mass limit*, Quantum Mechanics of Artificial Material Structures, Sochi, Russia. Invited speaker. 18/02/2020.
- *Periodic solutions of integro-differential equations*, 30th International Workshop on Operator Theory and its Applications (IWOTA 2019), Lisbon. Invited speaker. 23/07/2019.
- *The Square root of the Laplacian: local vs. nonlocal*, 2nd BMS – BGSMath Junior meeting 2019, Berlin, Germany. Invited speaker. 27/06/2019.
- *Discrepancy of minimal Riesz energy points*, Optimal Point Configurations and Potential Theory – 2019, Castro Urdiales, Spain. Invited speaker. 09/04/2019.
- *A nonlocal shape optimization problem*, 7th Iberian Mathematical Meeting, Évora. Invited speaker. 13/10/2018.
- *Periodic stationary solutions of integro-differential equations*, Trobada d’EDPs i Aplicacions – 2018, Girona. Invited speaker. 31/05/2018.
- *Shape optimization problems for Schrödinger and Dirac operators*, Harmonic analysis in winter, Madrid. Invited speaker. 12/01/2018.
- *Shell interactions for Dirac operators and approximation by short range potentials*, First Summer School in Harmonic Analysis, Spectral Theory and PDE’s, Rome. Invited speaker. 14/09/2017.
- *The relativistic δ -shell interaction in \mathbb{R}^3 and its approximation by short range potentials*, Encuentros de Análisis Real y Complejo 2017, Santa Cruz de Tenerife. Invited speaker. 19/05/2017.
- *The relativistic δ -shell interaction in \mathbb{R}^3 and its approximation by short range potentials*, Linear and Nonlinear Dirac Equation: advances and open problems. Como, Italy. Invited speaker. 08/02/2017.
- *The relativistic δ -shell interaction in \mathbb{R}^3 and its approximation by short range potentials*, Congreso RSME 2017. Zaragoza, Spain. Invited speaker. 31/01/2017.
- *Electrostatic shell interactions for Dirac operators: an isoperimetric-type inequality*, Geometrical aspects of spectral theory. Bilbao, Spain. Invited speaker. 06/04/2016.
- *L^p and weak- L^1 estimates for the variation of singular integrals on uniformly rectifiable measures*, Congreso RSME 2015, Granada. Invited speaker. 02/02/2015.
- *L^p and weak- L^1 estimates for the variation of singular integrals on uniformly rectifiable measures*, Workshop on Harmonic Analysis, Partial Differential Equations and Geometric Measure Theory, ICMAT, Madrid. 13/01/2015.
- *Interacciones sobre superficies para el operador de Dirac: espectro puntual y confinamiento*, Encuentros de Análisis Real y Complejo 2014, Girona. Invited speaker. 23/05/2014.
- *On shell interactions for Dirac operators: self-adjointness, point spectrum and confinement*, Analysis of Relativistic and Nonrelativistic Models in Quantum Mechanics, University Sapienza, Rome. Invited speaker. 17/04/2014.
- *Interacciones sobre superficies para el operador de Dirac*, Segundo Congreso de Jóvenes Investigadores de la Real Sociedad Matemática Española, Universidad de Sevilla. Invited speaker, 17/09/2013.
- *Shell interactions for Dirac operators*, Trimester on real harmonic analysis and applications to partial differential equations, ICMAT, Madrid. 16/04/2013.
- *Variation for the Riesz transform and uniform rectifiability*, 9th International Conference on Harmonic Analysis and Partial Differential Equations, El Escorial. 13/06/2012.

- *Variational inequalities for singular integral operators*, 39th “Days on PDE”, Biarritz. Invited speaker, 06/06/2012.
- *Variation for Riesz transforms and uniform rectifiability*, ICREA Conference on Approximation Theory and Fourier Analysis, UAB. 16/12/2011.
- *Variation for the Riesz transform and uniform rectifiability*, Workshop on Quasiconformal Mappings and Mappings of Finite Distortion, Prague. 27/09/2011.
- *Variation and oscillation for Cauchy and Riesz transforms on Lipschitz graphs*, Primera jornada SCM de joves investigadors en matemàtiques, Societat Catalana de Matemàtiques, Barcelona. 05/11/2010.
- *A dual characterization of the C^1 harmonic capacity and applications*, ESF research conference on harmonic analysis, geometric measure theory and quasiconformal mappings, UAB. 15/06/2009.
- *Strategies for darts*, 21st ECMI modeling week, Institut National des Sciences Appliquées (INSA), Rouen. 02/09/2007.

Seminars

- *Periodic surfaces with constant nonlocal mean curvature*, Barcelona Analysis Seminar, UB. 14/03/2022.
- *Spectral analysis of a confinement model in relativistic quantum mechanics*, Séminaire de Physique Mathématique – EDP, IMB Bordeaux. 01/02/2022.
- *Variation of singular integrals on uniformly rectifiable measures*, Energy, Entropy, and Dissipative Dynamics research group seminar, RWTH Aachen. 30/01/2020.
- *Shell interactions for Dirac operators and approximation by short range potentials*, Barcelona Analysis Seminar, UB. 06/11/2017.
- *A shape optimization problem for the relativistic δ -shell interaction in \mathbb{R}^3* , Seminar Angewandte Analysis und Numerische Mathematik, TU Graz, Austria. 06/07/2017.
- *The Dirac operator and shell potentials on smooth surfaces in \mathbb{R}^3* , analysis-probability seminar, CEREMADE, Université Paris-Dauphine. 23/11/2015.
- *Electrostatic shell interactions for Dirac operators: an isoperimetric-type inequality*, Barcelona Analysis Seminar, UAB. 26/10/2015.
- *Rational approximation, analytic capacity and gratings*, Analysis Seminar, UPV/EHU. 13/03/2014.
- *On shell interactions for Dirac operators: self-adjointness, point spectrum and confinement*, Barcelona Analysis Seminar, UAB. 20/01/2014.
- *Shell interactions for Dirac operators and confinement*, “EDP’s y Mecánica de Fluidos” seminar, ICMAT, Madrid. 30/10/2013.
- *Shell interactions for Dirac operators*, Barcelona Analysis Seminar, UAB. 08/04/2013.
- *On self-adjoint extensions of the Dirac operator*, UPV/EHU. Six-hour graduate level course, 11/2012.
- *Variational inequalities for singular integral operators*, Analysis seminar, Universidad Autónoma de Madrid. 08/05/2012.
- *Variation for Riesz transforms and uniform rectifiability*, Analysis seminar, UPV/EHU. 20/01/2012.
- *Variation for Riesz transforms and analytic and Lipschitz harmonic capacities*, Doctoral dissertation defense, UAB. 22/06/2011.

- *Rational approximation and analytic capacity*, Young researchers analysis seminar, UB. 15/06/2011.
 - *Variation for Riesz transforms and uniform rectifiability*, Barcelona Analysis Seminar, UAB. 23/05/2011.
 - *Oscillation and variation for Cauchy and Riesz transforms on Lipschitz graphs*, Analysis seminar, University of Jyväskylä. 02/06/2010.
 - *Oscillation and variation for Cauchy and Riesz transforms on Lipschitz graphs*, Geometric analysis seminar, University of Helsinki. 23/04/2010.
 - *Oscillation and variation for Cauchy and Riesz transforms on Lipschitz graphs*, Barcelona Analysis Seminar, UAB. 22/03/2010.
 - *Failure of rational approximation on some Cantor type sets*, Barcelona Analysis Seminar, UAB. 17/11/2008.
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Teaching and administration

Certifications

- Positive evaluation by the Spanish Agency for Quality Assessment and Accreditation (ANECA) for the academic figures of **Profesor Contratado Doctor** (10/2015), **Profesor de Universidad Privada** (10/2015) and **Profesor Ayudante Doctor** (10/2012). Ministerio de Educación, Cultura y Deporte.
- Positive evaluation by the Agency for the Quality of the University System in Catalonia (AQU) for the academic figure of **Lector** (02/2013). Agència per a la Qualitat del Sistema Universitari de Catalunya.

Participation in academic committees

- Academic Secretary of the Department of Mathematics, Universitat Politècnica de Catalunya. Since 16/02/2024.
- Jury member of two Lector (Assistant Professor) contests at Universitat de Girona (Ref. PLECT24-75). 04-05/2025.
- Jury member of three Lector (Assistant Professor) contests at Universitat Politècnica de Catalunya (Ref. LE65-66-67/749). 05-06/2023.
- Jury member of the Emmy Noether Award 2022 (Societat Catalana de Matemàtiques) to the best Bachelor's thesis in mathematics in Catalunya.
- Jury member of the Agregat (Associate Professor) contest at Universitat de Barcelona (Ref. 7820). 05/2019.

Jury member in PhD defenses

- Christian Stelzer-Landauer (Technische Universität Graz), *Approximation of Dirac operators with δ -shell potentials in the norm resolvent sense*, directed by Jussi Behrndt. 27/02/2025. Official committee member and external examiner.
- Víctor de la Torre Estévez (Universitat de Barcelona), *Energy and random point processes on two-point homogeneous manifolds*, directed by Jordi Marzo. 24/11/2023.
- Badreddine Benhellal (Université de Bordeaux), *Spectral analysis of Dirac operators on bounded domains*, directed by Vincent Bruneau and Luis Vega. 06/07/2022.

- Juan Carlos Felipe Navarro (Universitat Politècnica de Catalunya), *Qualitative properties of solutions to integro-differential elliptic problems*, directed by Xavier Cabré. 14/07/2021.
- Tomás Sanz Perela (Universitat Politècnica de Catalunya), *Stable solutions of nonlinear fractional elliptic problems*, directed by Xavier Cabré. 18/06/2019.
- Fabio Pizzichillo (BCAM, Bilbao), *Singular Perturbations of the Dirac Hamiltonian*, directed by Luis Vega. 15/12/2017.

Direction of PhD/Master/Bachelor thesis

PhD thesis

- Joaquim Duran Lamiel (codirected with Tomás Sanz Perela), UPC. 03/2024–Present.

Master's thesis

- Joaquim Duran Lamiel, UPC. 09/2023–02/2024.
- Josep M. Gallegos Saliner, UPC. 02/2020–07/2020.
- Marc Nualart Batalla, UPC. 02/2020–07/2020.

Bachelor's thesis

- Max Cunill García, UPC. 02/2023–07/2023.
- Bernat Ramis Vich, UoE–UPC. 09/2022–05/2023.
Co-directed with James R. Wright (University of Edinburgh).
- Clàudia Rodés Bachs, UPC. 09/2020–02/2021.
- Víctor José Martínez Lahuerta, UB. 09/2017–02/2018.
- Josep Banach Cañís, UB. 02/2017–07/2017.
- Joan Estévez Estudis, UB. 02/2017–07/2017.
- Luis Martínez Zoroa, UPC. 09/2016–02/2017.

Teaching activity

- *Partial differential equations* for Mathematics, UPC. 02/2025–06/2025, 4 hours/week.
- *Functional analysis* for Mathematics, UPC. 02/2025–06/2025, 2 hours/week.
- *Calculus* for several scientific degrees, UPC. 09/2024–01/2025, 3 hours/week.
- *Partial differential equations* for Mathematics, UPC. 02/2024–06/2024, 4 hours/week.
- *Functional analysis* for Mathematics, UPC. 02/2024–06/2024, 2 hours/week.
- *Calculus* for several scientific degrees, UPC. 09/2023–01/2024, 8 hours/week.
- *Advanced course on partial differential equations* for the Master on Advanced Mathematics and Engineering (coordinator), UPC. 02/2023–06/2023, 2 hours/week.
- *Partial differential equations* for Mathematics, UPC. 02/2023–06/2023, 4 hours/week.
- *Functional analysis* for Mathematics, UPC. 02/2023–06/2023, 2 hours/week.
- *Calculus* for several scientific degrees, UPC. 09/2022–01/2023, 8 hours/week.
- *Advanced course on partial differential equations* for the Master on Advanced Mathematics and Engineering (coordinator), UPC. 02/2022–06/2022, 2 hours/week.
- *Partial differential equations* for Mathematics, UPC. 02/2022–06/2022, 4 hours/week.
- *Functional analysis* for Mathematics, UPC. 09/2021–01/2022, 2 hours/week.

- *Integral calculus* for Mathematics, UPC. 09/2021–01/2022, 2 hours/week.
- *Calculus* for several scientific degrees, UPC. 09/2021–01/2022, 6 hours/week.
- *Advanced course on partial differential equations* for the Master on Advanced Mathematics and Engineering (coordinator), UPC. 02/2021–06/2021, 2 hours/week.
- *Partial differential equations* for Mathematics, UPC. 02/2021–06/2021, 2 hours/week.
- *Algebra and calculus in several variables* for several scientific degrees, UPC. 02/2021–06/2021, 4 hours/week.
- *Calculus* for several scientific degrees, UPC. 09/2020–01/2021, 6 hours/week.
- *Advanced course on partial differential equations* for the Master on Advanced Mathematics and Engineering (coordinator), UPC. 02/2020–06/2020, 2 hours/week.
- *Partial differential equations* for Mathematics, UPC. 02/2020–06/2020, 2 hours/week.
- *Algebra and calculus in several variables* for several scientific degrees, UPC. 02/2020–06/2020, 4 hours/week.
- *Calculus* for several scientific degrees, UPC. 09/2019–01/2020, 6 hours/week.
- *Calculus with Maple* for several scientific degrees, UPC. 09/2019–01/2020, 2 hours/week.
- *Algebra and calculus in several variables* for several scientific degrees, UPC. 02/2019–06/2019, 4 hours/week.
- *Calculus with Maple* for several scientific degrees, UPC. 02/2019–06/2019, 2 hours/week.
- *Numerical calculus and ODEs with Matlab* for several scientific degrees, UPC. 02/2019–06/2019, 1 hour/week.
- *Functional analysis and PDEs* for the Master on Advanced Mathematics, UB. 09/2018–01/2019, 2 hours/week.
- *Graph theory* for Mathematics, UB. 09/2018–01/2019, 5,5 hours/week.
- *Mathematics II* for Chemistry, UB. 02/2018–06/2018, 10 hours/week.
- *Graph theory* for Mathematics, UB. 09/2017–01/2018, 2,5 hours/week.
- *LaTeX course within the Advanced Methodology in Mathematics course* for the Master on Advanced Mathematics, UB. 02/2017–06/2017, 1 hour/week.
- *Linear algebra* for Mathematics, UB. 02/2017–06/2017, 1 hour/week.
- *Scientific programming* for Mathematics, UB. 02/2017–06/2017, 1,5 hours/week.
- *Ordinary differential equations* for Mathematics, UB. 02/2017–06/2017, 1 hour/week.
- *Advanced course on partial differential equations* for the Master on Advanced Mathematics and Engineering, UPC. 02/2016–06/2016, 2 hours/week.
- *Partial differential equations* for Mathematics, UPC. 02/2016–06/2016, 2 hours/week.
- *Advanced course on partial differential equations* for the Master on Advanced Mathematics and Engineering (coordinator), UPC. 02/2015–06/2015, 2 hours/week.
- *Partial differential equations* for Mathematics, UPC. 02/2015–06/2015, 2 hours/week.
- *Calculus* for Chemical Engineering, UAB. 02/2011–06/2011, 2 hours/week.
- *Mathematics* for Environmental Sciences, UAB. 09/2010–01/2011, 2 hours/week.
- *Calculus* for Engineering, UAB. 09/2009–01/2010, 2 hours/week.
- *Initiation course on mathematics* for Engineering, UAB. 09/2010, 10 hours.
- *Initiation course on mathematics* for Engineering, UAB. 09/2009, 10 hours.
- Teaching assistant, UAB. 09/2004–06/2005.

Financial support

Grants

- *JCI2012-14073*, **postdoctoral grant *Juan de la Cierva***, Ministerio de Economía y Competitividad, Gobierno de España, 2012. 09/2014–08/2017.
- **Grant for a two-month stay** at the Department of Mathematics and Statistics of the University of Helsinki, FPU program (fellowship *AP2006-02416*), 2009. 05/2010–07/2010.
- *AP2006-02416*, **PhD Fellowship of FPU program (Formación de Profesorado Universitario)**, Ministerio de Ciencia e Innovación, Gobierno de España, 2006. 05/2007–04/2011.
- **Free-inscription grant for the Master's Degree** on Advanced Mathematics, Departament de Matemàtiques, UAB, 2006.
- **Teaching's support grant**, Departament de Matemàtiques, UAB, 2006. 11/2006–05/2007.
- **Teaching's support grant**, Departament de Matemàtiques, UAB, 2004. 09/2004–06/2005.

Funding projects

- *2021-SGR-00087*, **Teoria de Funcions i Equacions en Derivades Parcials**, Agència de Gestió d'Ajuts Universitaris i de Recerca, Generalitat de Catalunya, 2023. PI: Maria del Carmen Cascante Canut (UB). 2022–2024. 60000 €. Researcher.
- *PID2021-123903NB-I00*, **Ecuaciones en Derivadas Parciales: problemas de reacción-difusión, integro-diferenciales, y de la física matemática**, Ministerio de Ciencia e Innovación, Gobierno de España, 2022. PI: Xavier Cabré (ICREA and UPC) and Albert Mas (UPC). 2022–2026. 137800 €. **Principal Investigator**.
- *2017-SGR-358*, **Grup de teoria de funcions**, Agència de Gestió d'Ajuts Universitaris i de Recerca, Generalitat de Catalunya, 2018. PI: Maria del Carmen Cascante Canut (UB). 2017–2019. 20000 €. Researcher.
- *MTM2017-84214-C2-1-P*, **Ecuaciones en derivadas parciales: problemas de reacción-difusión, integro-diferenciales y geométricos**, Ministerio de Ciencia, Innovación y Universidades, Gobierno de España, 2017. PI: Xavier Cabré (ICREA and UPC). 2018–2022. 101761 €. Researcher.
- *MTM2017-83499-P*, **Espacios de funciones holomorfas y procesos de puntos**, Ministerio de Ciencia, Innovación y Universidades, Gobierno de España, 2017. PI: Joaquim Ortega-Cerdà (UB). 2018–2021. 120637 €. Researcher.
- *Advanced Grant (AdG), PE1, ERC-2014-ADG, Project ID 669689*, **Harmonic Analysis and Differential Equations: new challenges (HADE)**, European Research Council, 2014. PI: Luis Vega (BCAM and UPV/EHU). 01/12/2015–30/11/2020. 1672103 €. Researcher.
- *2014-SGR-1083*, **Equacions en derivades parcials i aplicacions**, Agència de Gestió d'Ajuts Universitaris i de Recerca, Generalitat de Catalunya, 2014. PI: Xavier Cabré (ICREA and UPC). 2014–2016. Researcher.
- *MTM2014-52402-C3-1-P*, **Ecuaciones en derivadas parciales: problemas de reacción-difusión, integrodiferenciales y geométricos**, Ministerio de Economía y Competitividad, Gobierno de España, 2014. PI: Xavier Cabré (ICREA and UPC). 01/01/2015–31/12/2017. 95711 €. Researcher.
- *Advanced Grant (AdG), PE1, ERC-2012-ADG_20120216, Project ID 320501*, **Geometric analysis in the Euclidean space (ANGEOM)**, European Research Council, 2012. PI: Xavier Tolsa (ICREA and UAB). 01/05/2013–30/04/2018. 1105930 €. Researcher.

- *IT-641-13, Partial differential equations, harmonic analysis and numerical analysis*, Departamento de Educación, Universidades e Investigación, Gobierno Vasco, 2012. PI: Luis Vega (BCAM and UPV/EHU). 2013–2018. 303997 €. Researcher.
 - *MTM2011-27739, Ecuaciones en derivadas parciales: problemas de reacción-difusión y problemas geométricos*, Ministerio de Ciencia e Innovación, Gobierno de España, 2011. PI: Xavier Cabré (ICREA and UPC). 2012–2015. 192995 €. Researcher.
 - *MTM2010-16232, Análisis geométrico en el espacio euclídeo*, Ministerio de Ciencia e Innovación, Gobierno de España, 2010. PI: Xavier Tolsa (ICREA and UAB). 2010–2014. 57838 €. Researcher.
 - *2009-SGR-000420, Grup d'anàlisi harmònica i complexa*, Departament d'Universitats, Recerca i Societat de la Informació, Generalitat de Catalunya, 2009. PI: Joan Mateu (UAB). 2009–2013. 52000 €. Fellow.
 - *IT-305-07, Evolution equations, Fourier and numerical analysis*, Departamento de Educación, Universidades e Investigación, Gobierno Vasco, 2007. PI: Luis Vega (UPV/EHU). 2007–2012. 321881 €. Researcher.
 - *MTM2007-62817, Las transformadas de Cauchy y de Riesz y la rectificabilidad*, Ministerio de Ciencia e Innovación, Gobierno de España, 2007. PI: Xavier Tolsa (ICREA and UAB). 2007–2010. 65461 €. Researcher.
 - *2005-SGR-00774, Grup d'anàlisi harmònica i complexa*, Departament d'Universitats, Recerca i Societat de la Informació, Generalitat de Catalunya, 2005. PI: Artur Nicolau (UAB). 2005–2009. 42200 €. Fellow.
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Languages

- **Catalan**: High level talking, reading and writing.
 - **Spanish**: High level talking, reading and writing.
 - **English**: High level reading. Good level talking and writing.
 - **French**: Good level reading. Basic level talking and writing.
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Other merits

- **Referee** for *Analysis and Mathematical Physics*, *Annales Henri Poincaré*, *Annals of Functional Analysis*, *Communications in Contemporary Mathematics*, *International Mathematics Research Notices*, *Journal of Applied Analysis*, *Journal of Geometric Analysis*, *Journal of Mathematical Physics*, *Mathematical Physics - Analysis and Geometry*, *Pure and Applied Analysis*, *Reports@SCM*, *Revista Matemática Iberoamericana*.
- **Referee** for *Agencia Estatal de Investigación*, Gobierno de España. Since 10/2021.
- **Reviewer** for *Mathematical Reviews (MathSciNet)*. 2013–2021.
- **Member of the Institute of Mathematics of UPC-BarcelonaTech (IMTech)**. Since 07/2021.
- **Member of the Institute of Mathematics of the UB (IMUB)**. 02/2017–02/2019.
- **Member of the Barcelona Graduate School of mathematics (BGSMath)**. Since 11/2015.
- **Webmaster** of the *Mathematical analysis and applications* webpage of the Departamento de Matemáticas, UPV/EHU. 04/2012–08/2013.

- **Member of the Postgraduate Committee** of the Departament de Matemàtiques and Representative of the postgraduate students, UAB. 09/2008–06/2011.
 - **Programming** in C, C++, Matlab, Maple.
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February, 2026.