

CURRICULUM VITAE ABREVIADO (CVA)

IMPORTANT – The Curriculum Vitae cannot exceed 4 pages. Instructions to fill this document are available in the website.

Part A. PERSONAL INFORMATION

First name	Fabricio		
Family name	Macia Lang		
Gender (*)		Birth date (dd/mm/yyyy)	
ID number			
e-mail		URL Web	
Open Researcher and Contributor ID (ORCID) (*)			

(*) Mandatory

A.1. Current position

Position	Profesor Titular de Universidad		
Initial date	10/08/2012		
Institution	Universidad Politécnica de Madrid		
Department/Center	Matemática e Informática Aplicadas a las Ingenierías Civil y Naval	ETSI Navales	
Country	Spain	Teleph. number	
Key words	Semiclassical Analysis, Partial Differential Equations, Numerical Analysis		

A.2. Previous positions (research activity interruptions, art. 14.2.b))

Period	Position/Institution/Country/Interruption cause
2008-2012	Prof. Ayudante Doctor, Universidad Politécnica de Madrid
2005-2008	<i>Juan de la Cierva</i> fellow, Universidad Complutense Madrid
2003-2005	Ayudante, Universidad Complutense Madrid
2002-2003	Postdoc, École Normale Supérieure, France

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Licenciado CC. Matemáticas	Universidad Complutense de Madrid	1997
Doctor en CC. Matemáticas	Universidad Complutense de Madrid	2002

Part B. CV SUMMARY (max. 5000 characters, including spaces)

I obtained my PhD in Mathematics at Universidad Complutense de Madrid in 2002, with a thesis on study controllability properties of waves in discrete media. I was a post-doc for two years, at Università di Pisa, where I worked on problems on optimal mass transportation and calculus of variations and École Normale Supérieure, where I developed a project on the study of high-frequency analysis of discrete signals. I came back to UCM as a *Juan de la Cierva* research fellow, where I worked on various topics in PDEs (geometric flows and viscosity solutions; kinetic-type models in biology). After a long-term research visit at Université Paris-Sud Orsay I started working on a the project that became over the years my main research line: semiclassical analysis and spectral theory applied to Schrödinger flows. This project has involved various international researchers at prestigious universities, a substantial part of it was developed in collaboration with Nalini Anantharaman, a first-class mathematician (Plenary speaker ICM 2018, Poincaré Prize 2012, Member of the French Académie des sciences). As

a result of it we solved, together with M. Léautaud a long-standing problem in the theory of Schrödinger equations; the results were published in a 100-page article in *Inventiones Mathematicae*, and a talk at the prestigious Séminaire Bourbaki was devoted to it (https://bourbaki.fr/seminaires/2018/Prog_mars18.html). Together with G. Rivière we disproved a long-believed conjecture on the structure of quantum limits on Zoll manifolds. I currently continue working on these problems, in 2018 my student Víctor Arnaiz defended his PhD thesis, among various other interesting results, we obtained a complete characterization of quantum limits for general harmonic oscillators. Arnaiz is now associate professor at Université de Bordeaux. In 2020-21 I mentored Antoine Prouff, a pre-doctoral student from École Normale Supérieure, who is now post-doc at Purdue, and I am currently supervising the thesis of Santiago Verdasco on the study of quantum limits on singular spaces. From 2018 on, I started working on the Calderón inverse problem, together with my colleagues J.A. Barceló, C. Castro, T. Daudé, and C.J. Meroño we are developing new analytical and numerical methods for reconstruction, partly using techniques from semiclassical analysis and spectral theory. In our most recent articles on the subject we prove the existence of the Born approximation, an object that encodes spectral information of Dirichlet-to-Neumann maps whose existence is a hard problem [arXiv:2402.06321](https://arxiv.org/abs/2402.06321), [arXiv:2501.05889](https://arxiv.org/abs/2501.05889). In that context, I mentored as a post-doc Daniel Sánchez-Mendoza during the academic year 2022-2023, he is now assistant professor at UPM.

In 2008 I joined Universidad Politécnica de Madrid, where I am currently working. There, I started collaborating with the multidisciplinary group CEHINAV on computational aspects of hydrodynamics. Surprisingly, semiclassical analysis techniques turned out to be relevant in the domain; the research in that area has had great impact, some of my articles are highly cited. As a result of this collaboration, we published more than 10 articles, and co-supervised the PhD thesis of P.E. Merino. Since 2018, I am the principal investigator of the UPM research group Modelización Matemática, Análisis y Simulación Aplicadas a la Ingeniería (M2ASAI).

I have been hired as a visiting professor in several international institutions: Northwestern University, École Normale Supérieure, University of Tokyo, Université Paris-7, Université de Lille, Université Paris-Est Créteil, Université de Nantes; I've been invited to thematic trimesters at Institut Henri Poincaré and MSRI. I have given graduate courses on topics issued from my research at Hausdorff Center Bonn, Max Planck Institute Leipzig, UNAM, U. Tokyo, U. Roma "La Sapienza". I am regularly invited to the international conferences. Recently, I was a plenary speaker at the conference "Recent developments in microlocal analysis", at MSRI Berkeley, which was the main event in the field in the last five years. I've recently co-organized two international conferences on microlocal analysis that were attended by the top researchers in the field: https://irma.math.unistra.fr/~klevtsov/Steve_Zelditch_Conference_2022/index.html and <https://sites.northwestern.edu/dynamicsrtg/maqd-2024/>

I have published 46 articles in peer-reviewed journal. According to WoS I have been cited 545 times and my h-index is 12. I have 3 **sexenios** (2004-2021). I was the principal investigator of Node 3 in coordinated project MTM2017-41780 and Node 1 in coordinated project PID2021-124195NB.

Part C. RELEVANT MERITS (*sorted by typology*)

C.1. Publications (*see instructions*)

1. V. Arnaiz, F. Macià, Concentration of Quasimodes for Perturbed Harmonic Oscillators. *Annales Henri Poincaré*, to appear (2025).
2. V. Chabu, C. Fermanian-Kammerer, F. Macià, Effective Mass Theorems with Bloch Modes Crossings. *Archive for Rational Mechanics and Analysis* 245(3) (2022), 1339–1400. DOI: 10.1007/s00205-022-01803-2

3. J.A. Barceló; C. Castro; F. Macià; C.J. Meroño, The Born approximation in the three-dimensional Calderón problem. *J. Funct. Anal.* 283 (2022), no. 12, Paper No. 109681, 43 pp. DOI: 10.1016/j.jfa.2022.109681
4. F. Macià, G. Rivière, Two-microlocal regularity of quasimodes on the torus, *Analysis and PDE* 11(8) (2018), 2111–2136. DOI:10.2140/apde.2018.11.2111
5. N. Anantharaman, M. Léautaud and F. Macià. Wigner measures and observability for the Schrödinger equation on the disk, *Inventiones Mathematicae* 206(2) (2016), 485–599. DOI: 10.1007/s00222-016-0658-4 (citations: WoS 30; Google Scholar 79)
6. F. Macià, G. Rivière. Concentration and non-concentration for the Schrödinger evolution on Zoll manifolds, *Communications in Mathematical Physics*, 345(3) (2016), 1019–1054. DOI: 10.1007/s00220-015-2504-
7. N. Anantharaman, C. Fermanian-Kammerer, and F. Macià. Semiclassical Completely Integrable Systems: Long-Time Dynamics And Observability Via Two-Microlocal Wigner Measures, *American Journal of Mathematics*. 137(3) (2015), 577–638. DOI: 10.1353/ajm.2015.0020 (citations: WoS 22; Google Scholar 53; MathSciNet 16)
8. N. Anantharaman and F. Macià. Semiclassical measures for the Schrödinger equation on the torus, *Journal of the European Mathematical Society*, 16(6) (2014), 1253–1288. DOI: 10.4171/jems/460 (citations: WoS 40; Google Scholar 113)
9. F. Macià. High-frequency propagation for the Schrödinger equation on the torus, *Journal of Functional Analysis*, 258(3) (2010), 933–955. DOI:10.1016/j.jfa.2009.09.020
10. G. Buttazzo, A. Davini, I. Fragalà and F. Macià. Optimal Riemannian distances preventing mass transfer, *Journal für die reine und angewandte Mathematik (Crelle's Journal)*, 575 (2004), 157–171.

C.2. Congress

Ten more relevant publications. All these contributions are **invited conferences**.

1. July 2024. LMS-Bath Symposium: Advances in Spectral Theory. <https://www.ucl.ac.uk/%7Eucahalk/LMSBath2024.html>
2. November 2022. Centre International de Rencontres Mathématiques, Luminy. Bergman kernels in microlocal analysis and mathematical physics. https://www.cirm-math.fr/Schedule/screen_display.php?id_renc=2649
3. January 2020. Hausdorff Center for Mathematics, Bonn. 3 hour course at the 11th Itinerant Workshop in PDEs on Quasimodes and perturbations of completely integrable systems. <https://www.hcm.uni-bonn.de/events/eventpages/2020/itinerant-2020/>
4. January 2020. Spectral Theory and Related Topics, Gakkushuin University, Tokyo, Japan. <https://srik.kumamoto-u.ac.jp/hisa/SORT2020/program.pdf>
5. December 2019. From semi-classical to quantum many body through normal forms, Milan, Italy.
6. October 2019. Recent developments in microlocal analysis, MSRI, Berkeley, USA. <https://www.msri.org/workshops/899>
7. July 2019. Mathematical Frontiers in the Analysis of Many-particle Systems, Cambridge, UK. <https://mafran2019.sciencesconf.org/>
8. June 2019. Journées équations aux dérivées partielles, Obernai, France. <http://jedp-2019.iecl.univ-lorraine.fr/>
9. September 2018. Max Planck Institute for Applied Mathematics, Leipzig. 6 hour course at the Summer School Inverse and Spectral Problems for (Non)-Local Operators on Modes and quasimodes: concentration and non-concentration. <https://www.mis.mpg.de/calendar/conferences/2018/operators2018.html>

10. July 2017. Asymptotic Analysis of Evolution Equations, CIRM Luminy, France.
<https://conferences.cirm-math.fr/1546.html>

C.3. Research projects

Reference : PID2021-124195NB-C31

Title : Análisis Semiclásico y Numérico con Aplicaciones a Control y Problemas Inversos

Funding body : Ministerio de Economía, Industria y Competitividad

Principal Investigator : **Fabricio Macia**

Duration : September 2022 - August 2025

Funding : 99.704,00 euros

Reference : MTM2017-85934-C3-3-P

Title : Análisis Semiclásico y Numérico con Aplicaciones a Control y Problemas Inversos

Funding body : Ministerio de Economía, Industria y Competitividad

Principal Investigator : **Fabricio Macia**

Duration : January 2018 - September 2022

Funding : 51.304 euros

Reference : MTM2013-41780-P

Title : Oscilación, Control y Aplicaciones

Funding body : Ministerio de Economía, Industria y Competitividad

Principal Investigator : Keith Rogers (CSIC)

Duration : January 2014 - December 2017

Funding : 15.449 euros

Reference : TRA2013-41096-P

Title : Optimización del transporte de gas licuado en buques lng mediante estudios sobre interacción fluido-estructura

Funding body : Ministerio de Economía, Industria y Competitividad

Principal Investigator : Leo M. González (UPM)

Duration : January 2014 - December 2017

Funding : 35.000 euros

Reference : StG-2777778

Title : Restriction of the Fourier Transform with Applications

Funding body : European Research Council

Principal Investigator : Keith Rogers (CSIC)

Duration : September 2011 - August 2017

Funding : 950.000 euros

Reference : MTM2010-16467

Title : Ecuaciones Diferenciales en Derivadas Parciales en Física Matemática

Funding body : Ministerio de Ciencia e Innovación

Principal Investigator : Juan J. López Velázquez (CSIC)

Duration : January 2011 - December 2013

Funding : 38.720 euros

C.4. Contracts, technological or transfer merits