Ezequiel Maderna, PhD
Mathematician

Full Researcher at
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EDUCATION

- **Doctor of Philosophy, École Normale Supérieure de Lyon, 2000.**

Supervisor : Prof. Albert Fathi
Thesis title : Symétries des systèmes lagrangiens
Committee : Prof. Francis Clarke (President), Prof. Marie-Claude Arnaud, Prof. Guy Barles, Prof. Jean-Michel Roquejoffre and Prof. Bruno Sevennec

- **Licenciado en Matemática, Universidad de la República, 1997.**

Supervisor : Prof. Gabriel Paternain
Thesis title : Curvatura, diámetro y números de Betti según M. Gromov

RESEARCH PROFILE

Mathematical methods in Celestial Mechanics, Lagrangian Dynamics and Calculus of Variations, Hamiltonian Dynamics and Symplectic Geometry, Aubry-Mather theory and Hamilton-Jacobi equations.

ACADEMIC POSITIONS

- **Actual Position : CIMAT – Centro de Investigación en Matemáticas, A.C.**

1. Since 01/07/2025 : Full Researcher (Investigador Titular B)
2. Since 05/03/2025 : Coordinator of the Postgraduate Program in Basic Mathematics

- **Universidad de la República (Uruguay)**

2019 – 2025 : Associate Professor, full time, IMERL – Facultad de Ingeniería
2010 – 2019 : Adjoint Professor, full time, Centro de Matemática – Facultad de Ciencias
2005 – 2009 : Adjoint Professor, full time, IMERL - Facultad de Ingeniería
2001 – 2003 : Teacher Assistant, IMERL – Facultad de Ingeniería

- **University of Avignon (UAPV France)**

2004 – 2005 : ATER Attaché Temporaire d'Enseignement et de Recherche
2008, 2017, 2019, 2021, 2024 : Visiting Professor

- **CNRS and Université Côte d'Azur (Nice France)**

2011 : (sabbatical) Poste Rouge du CNRS, Laboratoire J.A. Dieudonné UMR 7351

- **Visiting Professor (2 weeks – 1 month)**

University of Maryland at College Park (2011, Maryland, USA)
CIMAT – Centro de Investigación en Matemáticas A.C.
(2003, 2006, 2014, 2020, 2023, Gto. Mexico)
CINVESTAV – Instituto Politécnico Nacional (2020, CDMX Mexico)
IMPA – Instituto de Matemática Pura y Aplicada (2004, 2017, Rio de Janeiro, Brazil)
UFF – Universidad Federal Fluminense (2017, Niteroi, Brazil)
UFMG – Universidad Federal de Minas Gerais (2013, Belo Horizonte, Brasil)
Laboratorio de Matemática de la Universidad Católica (2010, Santiago, Chile)
IST – Instituto Superior Técnico (2011, Lisboa, Portugal)
UMPA – École Normale Supérieure de Lyon (2008, 2014, Lyon, France)
Centre de Mathématiques Laurent Schwartz, École polytechnique (2007, Paris, France)
IMCCE – Observatoire de Paris (2008, 2014, 2018, Paris, France)
Dip. di Matematica Guido Castelnuovo, Sapienza Università di Roma (2008, Rome, Italy)
Dip. di Matematica e Applicazioni, Università di Milano – Bicocca (2011, Milano, Italy)
Dip. di Matematica Giuseppe Peano, Università degli studi di Torino (2015, 2020, Italy)

GRANTS AND FELLOWSHIPS

1997 – 2000 : BGF (Bourse du Gouvernement Français) 3 years grant for PhD studies
2003 (summer) : Postdoctoral grant of IMPA, with Enrique Pujals (Rio de Janeiro, Brazil)

Member of

2020 – p : CIMPA Centre International de Mathématiques Pures et Appliquées
2009 – 2024 : Institut Franco Uruguayen de Mathématiques (LIA CNRS)
Coordinador del eje Sistemas Dinámicos (2009 - 2018)
2024 – 2025 : Laboratorio del Plata https://irl-uy-ifumi.apps.math.cnrs.fr/ (IRL 2030 CNRS)
2009 – 2025 : SNI Sistema Nacional de Investigadores (Uruguay)
2003 – p : Programa de Desarrollo de las Ciencias Básicas (Uruguay)
2001 – p : Sociedad Uruguaya de Matemáticos y Estadísticos (Uruguay)

PUBLICATIONS

1. R. Iturriaga and E. Maderna, ***A natural decomposition of the Jacobi equation for some classes of N body problems***, Journal of Differential Equations 469, pap. 114421 (2026)
2. E. Maderna and A. Venturelli, ***Uniqueness of hyperbolic Busemann functions in the Newtonian N-body problem***, Calculus of Variations and Partial Differential Equations 65 no. 2, pap. 51 (2026)
3. J.M. Burgos and E. Maderna, ***Geodesic Rays of the N-body problem***, Archive for Rational Mechanics and Analysis 243, 807-827 (2022)
4. J.M. Burgos, E. Maderna, and M. Paternain, ***On the Lyapunov instability in Newtonian dynamics,*** Nonlinearity 34 no. 10, 6719-6726 (2021)
5. E. Maderna and A. Venturelli, ***Viscosity solutions and hyperbolic motions: a new PDE method for the N-body problem***, Annals of Mathematics 192, no. 2, 499-550 (2020)
6. R. Iturriaga and E. Maderna, ***Generic uniqueness of the minimal Moulton central configuration***,

Celestial Mechanics and Dynamical Astronomy 123 no. 3, 351-361 (2015)

7. A. da Luz and E. Maderna, ***On the free time minimizers of the Newtonian N-body problem***, Mathematical Proceedings of the Cambridge Philosophical Society 156 no. 2, 209-227 (2014)
8. E. Maderna, ***Minimizing configurations and Hamilton-Jacobi equations of homogeneous N-body problems***, Regular and Chaotic Dynamics 18 no. 6, 656-673 (2013)
9. E. Maderna, ***Translation invariance of weak KAM solutions of the Newtonian N-body problem***, Proceedings of the American Mathematical Society 141 no. 8, 2809-2816 (2013)
10. E. Maderna, ***On weak KAM theory for N-body problems***, Ergodic Theory and Dynamical Systems 32 no. 3, 1019-1041 (2012)
11. E. Maderna and A. Venturelli, ***Globally minimizing parabolic motions in the Newtonian N-body problem***, Archive for Rational Mechanics and Analysis 194 no. 1, 283-313 (2009)
12. E. Maderna and A. Venturelli, ***Globally minimizing parabolic motions in the Newtonian N-body problem***, Symmetry and perturbation theory, Proceedings of the 6th international conference SPT 2007, Otranto, June 2-9 2007. Gaeta, Giuseppe (ed.) et al. ISBN 978-981-277-616-7 (2008)
13. A. Fathi and E. Maderna, ***Weak KAM theory on non compact manifolds***, NoDEA Nonlinear Differential Equations and Applications 14 no. 1-2, 1-27 (2007)
14. E. Maderna, ***Invariance of global solutions of the Hamilton-Jacobi equation***, Bulletin de la Société Mathématique de France 130 no. 4, 493-506 (2002)

Manuscripts in preparation

- R. Iturriaga, E. Maderna, ***Green bundles and local solutions of a Newtonian scattering problem***.
- G. M. Canneori, E. Guerra, E. Maderna and B. Percino, ***Global solutions to the Hamilton-Jacobi equation of N-center problems on manifolds.***

Editorial work

- 2020 - 2024 : Editor of *Publicaciones Matemáticas del Uruguay*
- Referee for : Proceedings of the London Mathematical Society, Nonlinear Analysis, Proceedings of the American Mathematical Society, Journal of Functional Analysis, Discrete and Continuous Dynamical Systems, Ergodic Theory & Dynamical Systems, Journal of Differential Equations, Nonlinearity, Physica D: Nonlinear Phenomena, Journal of Mathematical Analysis and Applications, Journal of the European Mathematical Society, Archive for Rational Mechanics and Analysis, Inventiones Mathematicae.
- Reviewer for Mathematical Reviews (Mathscinet) and Zentralblatt Math.

ACADEMIC ACTIVITIES

- **Teaching of mathematics for undergraduate students**

Courses of Mathematical Analysis, Abstract Algebra, Linear Algebra, Discrete Mathematics, Differential Geometry, Calculus of Variations, Vector and Tensor Analysis, Differential Equations, Probability and Statistics, Real Analysis, Complex Analysis for students of the Faculty of Engeneering (UdelaR).

Person in charge of massive courses of the first year (1200 students) several times.

Special courses of basic mathematics for students of Biology, Biochemistry, Physics and Astronomy.

Courses of Differential Calculus, Linear Algebra, General Topology, Real Analysis, Complex Analysis, Differential Equations, Differential Topology for students of the degree in Mathematics, Faculty of Sciences (UdelaR).

- **Teaching of mathematics for graduate students**

Advanced courses of Differential Equations, Riemannian Geometry, Dynamical Systems (in particular Lagrangian Dynamics and Weak KAM Theory) for Master and PhD students in Uruguay, México, Argentina and Brazil.

- **Supervision of undergraduate students**

2008 – 2009 Lic. Adriana da Luz, *Study of the dynamics of the free time minimizers (semistatics) of the Newtonian N-body problem.*

2015 – 2016 Lic. José Fernández, *On the the completeness of the Jacobi-Maupertuis metric of some mechanical systems.*

2018 – 2019 Lic. Joaquín Lema, *Pseudoholomorphic curves and applications.*

2020 – 2021 Lic. Agustín Castro, *Global viscosity solutions to the Hamilton-Jacobi equation on non compact manifolds.*

- **Supervision of PhD Students**

2013 – 2016 Dr. Boris Percino, UNAM – Universidad Nacional Autónoma de México Thesis title: *On the Hamilton-Jacobi equation of the N-body problem*

- **Organisation of Workshops and CIMPA / ICTP International Schools**

August 2024	CLAM VI – *Session 35 Dynamical Systems*, Joao Pessoa, Brasil
June 2022	CIMPA – *The N-body Problem: Old and New*, Chiapas, Mexico
July 2021	*Special Session of the MCA 2021,* Buenos Aires, Argentina
December 2017	*Final Meeting,* MATH-AmSud Proyect, Montevideo, Uruguay
March 2015	CIMPA – *Hamiltonian and Lagrangian Dynamics*, Salto, Uruguay

CONFERENCES and WORKSHOPS

- Workshop, Hamiltonian systems and Celestial Mechanics (2022, Torino, Italy)
- Congress, Geometric and Var. Methods in Celestial Mechanics (2022, Oaxaca, México)
- Congress, Weak KAM theory – XXV+1 years later (2022, Avignon, France)
- Séminaire de Systèmes Dynamiques, Analyse et Géométrie (2021, Avignon, France)
- Seminario de Geometría del ICMAT-UAM (2021, Madrid, Spain)
- Seminari de Sistèmes Dinamics UB-UPC (2021, Barcelona, Spain)
- Coloquio de Matemática, Cinvestav, Instituto Politécnico Nacional (2020, México)
- Congress, Celestial Mechanics and Beyond (2020, Puebla, Mexico)
- Congress, Equadiff 2019 (2019, Leiden, Netherlands)
- Congress, New Trends in Celestial Mechanics (2019, Cogne, Italy)
- Séminaire de Systèmes Dynamiques, Analyse et Géométrie (2019, Avignon, France)
- Séminaire de Géométrie, Groupes et Dynamiques (2019, ENS de Lyon, France)
- Seminari di Analisi Matematica (2019, Università di Torino, Italy)

- Congress, DEA Dynamics, Equations and Applications (2019, AGH UST, Krakow, Poland)
- ICM Satellite Conference, Weak KAM in Rio (2018, Rio de Janeiro, Brazil)
- Congress, Beyond Hamilton-Jacobi, Last call to Bordeaux (2017, Bordeaux, France)
- Seminario de Sistemas Dinámicos, IMPA (2017, Rio de Janeiro, Brazil)
- MCA Congress, Mathematical Congress of the Americas (2017, Montréal, Canada)
- XXIX Venezuelian School of Mathematics – EMALCA (2016, Mérida, Venezuela)
- The 11th AIMS Conference on Dyn. Syst., Diff. Equat. and App. (2016, Orlando, USA)
- Congress, Complex Patterns in Nonlinear Phenomena (2015, Torino, Italy)
- Congress, Hamiltonian Systems and Celestial Mechanics (2015, BIRS, Oaxaca, Mexico)
- Seminario de Historia de la Matemática (2015, Montevideo, Uruguay)
- Congress, The Hamilton-Jacobi Equation: At the crossroads of PDE, Dynamical Systems & Geometry (2015, INdAM, Cortona, Italy)
- Seminari di Analisi Matematica (2019, Università di Torino, Italy)
- Séminaire d'Astronomie et Systèmes Dynamiques ASD (2014, IMCCE, Paris, France)
- Seminario de Sistemas Dinámicos (2014, UdelaR, Montevideo, Uruguay)
- Seminario de Sistemas Dinámicos (2014, UFMG, Belo Horizonte, Brazil)
- The 10th AIMS Conference on Dyn. Syst., Diff. Equat. and App. (2014, Madrid, Spain)
- Congress, Beyond Hamilton-Jacobi in Avignon (2014, Avignon, France)
- MCA Congress, Mathematical Congress of the Americas (2013, Guanajuato, Mexico)
- Seminario de Sistemas Dinámicos (2013, Montevideo, Uruguay)
- Dynamics Seminar, University of Maryland at College Park (2013, Maryland, USA)
- Congress, New Perspectives in the N-body problem (2013, BIRS, Banff, Canada)
- Seminar, Dinámica Porteña, Pontificia Universidad Católica (2012, Valparaíso, Chile)
- 6h course in Aubry-Mather theory and Weak KAM theorey (2012, Santiago, Chile)
- 6h course, International Workshop and Avanced School in N-Body and Vortex Dynamics, Università di Salento (2012, Lecce, Italy)
- Seminar on Partial Differential Equations, IST (2011, Lisboa, Portugal)
- Seminari del Dipartimento di Matematica e Applicazioni, Università di Milano-Bicocca (2011, Milano, Italy)
- Congress, Weak KAM theory in Italy (2011, Sapienza & INdAM, Cortona, Italy)
- Congress, Classical and weak KAM theorem: the Aubry-Mather sets, a break-through in the study of dynamical systems (2010, Università degli studi di Padova, Italy)
- Congress, Nice weak KAM methods in Nice (2009, Nice, France)
- Congress, First Franc-Uruguayan Colloquium, (2009, Punta del Este, Uruguay)
- Congress, The fifth international meeting in Celestial Mechanics (2009, Viterbo, Italy)
- Séminaire d'Astronomie et Systèmes Dynamiques ASD (2008, IMCCE, Paris, France)
- Seminari Hamiltoniane, Metriche e Controllo, Sapienza (2008, Roma, Italy)
- Second Latin America Congress of Lie Groups in Geometry (2008, Córdoba, Argentina)
- Séminaire Symplect'X, CMLS – École Polytechnique (2007, Palaiseau, France)
- Congress on Conservative Dynamics, UFMG (2007, Belo Horizonte, Brazil)
- Séminaire d'Algèbre, Dynamique et Topologie (2007, Marseille, France)
- Conference, Homenaje al Prof. Rafael Laguardia (2006, Montevideo, Uruguay)
- ICMP International Congress on Mathematical Physics (2006, Rio de Janeiro, Brazil)
- Seminar on Differential Geometry, FAMAF (2005, Córdoba, Argentina)
- Séminaire “Gaston Darboux” (2005, Montpellier, France)

Abbreviated CV, updated April 2026, Certificates and diplomas available upon request