

CURRICULUM VITAE

Simona ROTA NODARI

Born on August 28, 1984

Married, 1 child

French and Italian Citizen

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Last update: July 2024

RESEARCH INTERESTS

Nonlinear PDE's and variational methods, mathematical and numerical methods in relativistic quantum mechanics and in relativistic mean-field theory of atomic nuclei, PDE's in general relativity, renormalized energy for Coulomb and Riesz gases, PDEs in nonlinear optics

POSITIONS

- 2024 - 2029 Junior member of the Institut Universitaire de France
- 2021 - Professeur des Universités at Laboratoire Jean Alexandre Dieudonné, Université Côte d'Azur
- 2015 - 2021 Maître de Conférences, Institut de Mathématiques de Bourgogne, Université de Bourgogne
- 2013 - 2015 Postdoctoral fellowship, Laboratoire Paul Painlevé, Université Lille 1, hosted by Stephan De Bièvre
- 2012 - 2013 Postdoctoral fellowship, Laboratoire AGM, Université de Cergy-Pontoise, hosted by Mathieu Lewin
- 2011 - 2012 Postdoctoral fellowship, CNRS, Laboratoire Jacques-Louis Lions, hosted by Sylvia Serfaty
- 2008 - 2011 Doctoral fellowship, Université Paris-Dauphine

EDUCATION/DEGREES

- 2020 - 2021 HDR in Applied Mathematics, Université de Bourgogne, France. Defended on February 12, 2021.
Title: *Contributions to the mathematical study of models from classical and quantum physics*
- 2008 - 2011 PhD in Applied Mathematics, Université Paris-Dauphine, France and Università degli Studi di Milano, Italy. Thesis defended on July 6, 2011.
Title: *A mathematical study of nonlinear models from relativistic quantum physics*
Advisors: Éric Séré et Bernhard Ruf

FUNDING, SCHOLARSHIPS AND PRIZES

- 2024 ANR PRME MADynOS project
- 2024 IUF Junior chair
- 2017 ANR JCJC DYRAQ project
- 2016 PEPS “Jeunes chercheur-e-s”
- 2010 Merit Prize *Virlogeux en Science* awarded by *Chancellerie des universités de Paris*
- 2006 Scholarship for students in Mathematics from *Istituto Nazionale di Alta Matematica*

SCIENTIFIC RESPONSABILITIES

- March 2025 - **PI of the ANR PRME MADynOS project:** Many-body dynamics in open systems
- September 2023 - **Co-organizer of the Colloquium** at the Laboratoire J.A. Dieudonné, Université Côte d’Azur
- January 2023 - **Member of the committee of the French thematic networks AEDP :** Analyse des Équations aux Dérivées Partielles
- January 2023 - **Member of the ANR JCJC SING project:** Singularities of energy-minimizing vector-valued maps
- January 2023 **Co-organizer of the conference** “The analysis of relativistic quantum systems” at CIRM, Marseille
- May 2022 **Co-organizer of the conference** “PDEs and Relativistic Quantum Mechanics” at Laboratoire J.A. Dieudonné, Nice
- 2021 - 2025 **PI of the EUR-EIPHI Université de Bourgogne and Bourgogne-Franche-Comté region EEQuaR project:** Équations Effectives en Dynamique Quantique Relativiste
- March 2021 **Co-organizer of the conference** “13th (Online) Meeting of the GDR DYNQUA” initially planned to be held in Dijon
- January 2020 - **Member of the GDR CALVA :** Calcul des variations et théorie géométrique de la mesure
- September 2019 **Co-organizer of the conference** “Classical and quantum integrability” à l’Institut de Mathématiques de Bourgogne
- June 2018 **Co-organizer of the workshop** “The Analysis of Dirac equations” à l’Institut de Mathématiques d’Orsay
- 2018 - 2022 **PI of the ANR JCJC DYRAQ project:** Dynamics of relativistic quantum systems
- 2018 - 2022 **Member of the ANR-FWF ANuI project:** Analytical, Numerical and Integrable systems approaches for nonlinear dispersive partial differential equations
- 2018 - 2022 **Member of the IPaDEGAN network:** Integrable Partial Differential Equations: Geometry, Asymptotics, and Numerics
- 2017 - 2018 **Member Van Gogh project:** Nonlinear Waveguides
- January 2017 - **Member of the GDR DYNQUA:** Dynamique quantique

- 2016 **PI of the PEPS - Jeunes Chercheur-e-s** : Autour de la cristallisation dans les systèmes de points avec interactions de Riesz
- 2016 - 2021 **Co-organizer of the ICB/IMB/LMB working group** Institut de Mathématiques de Bourgogne, Laboratoire Interdisciplinaire Carnot de Bourgogne and Laboratoire de Mathématiques de Besançon.
- 2015 - 2021 **Co-organizer of the Mathematical Physics team seminar** at the Institut de Mathématiques de Bourgogne

Rewiever for : SIAM Journal on Mathematical Analysis, Monatshefte für Mathematik, Nonlinearity, Zeitschrift für Angewandte Mathematik und Physik, Mathematische Nachrichten, ESAIM: Control, Optimisation and Calculus of Variations, Journal of Mathematical Physics, Acta Applicandae Mathematicae, Analysis & PDE, Calculus of Variations and Partial Differential Equations, Journal of Functional Analysis, Nonlinearity.

OTHER ACTIVITIES AND RESPONSABILITIES

- January 2024 - **Appointed member** of the Scientific Council of INSMI, Comité National de la Recherche Scientifique (CoNRS)
- 2023 - 2024 **Head** of 2nd year of Mathematics, Université Côte d’Azur
- August 2023 - **INSMI parity/equality referent** for the Laboratoire J.A. Dieudonné, Université Côte d’Azur
- June 2023 - **Elected member** of the Scientific and Educational Council of the SPECTRUM Graduate School, Université Côte d’Azur
- October 2022 **Member of the jury** of the Pierre Laffitte thesis prize, Mines Paris-PSL et Fondation Mines ParisTech
- October 2022 – **Elected member** of the Scientific Council of the Laboratoire J.A. Dieudonné, Université Côte d’Azur
- October 2022 – **Appointed member** of the board of the Doctoral School in fundamental and applied sciences ED.SFA, Université Côte d’Azur
- June 2020 **Member of the jury of the Mathematical Physics master**, Université de Bourgogne
- 2019 - 2021 **Elected deputy member** of the Conseil National des Universités, section 26
- 2019 - 2021 **Vice-president** of the Bureau de commissions de proposition de l’Université de Bourgogne, sections 25/26, collège B
- 2018 - 2021 **Member of jury** of the *agrégation externe section mathématiques* (competitive examination for civil service in the French public education system)
- 2017 - 2021 **Elected member** of the Council of the Institut de Mathématiques de Bourgogne

HDR juries

- Member of jury** 2024 Luca Nenna (Université Paris-Saclay), David Gontier (Université Paris-Dauphine), Bruno Marcos (Université Côte d’Azur)
- 2023 Maxime Ingremeau (Université Côte d’Azur)

PhD jurys

Reviewer	2023	Johannes Agerskov (University of Copenhagen), Jimmy Payet (Université de Lorraine)
	2022	Gaspard Kemlin (École des Ponts ParisTech)
Member of jury	2023	Enguerrand Lavigne Bon (Aix-Marseille Université)
	2022	Ramon Oliver-Bonafoux (Sorbonne Université), Badreddine Benhellal (Université de Bordeaux), Phan Van Tin (Université Toulouse Paul Sabatier)
	2020	Long Meng (Université Paris-Dauphine)
	2017	Tianxiang Gou (Université de Bourgogne-Franche-Comté), Cyril Godey (Université de Bourgogne-Franche-Comté)

Hiring committees (external member)

2024	25/26 MCF 127 Université de Rennes, 25 PR 4521 Université Angers
2023	26 MCF 4316 Université Paris-Dauphine, 25/26 MCF 0736 Université de Bordeaux, 30/28 CPJ 4754 Université de Bourgogne
2022	26 MCF 0052 Université de Lille
2021	25/26 MCF 0202 Université d'Orléans, 26 MCF 1385 Université de Lorraine
2020	26 MCF 4679 Université de Strasbourg
2016	26 MCF 0470 Université Toulouse 3

Hiring committees (local member): 3

OUTREACH AND OTHER ACTIVITIES

February 2024	Mathcamp, Laboratoire J.A. Dieudonné, Université Côte d'Azur
October 2022, 2023	Fête de la Science, Nice

SCIENTIFIC SUPERVISION

PhD Thesis

2021 -	Co-advisor of the PhD thesis in Mathematics (with N.Boussaid and J. Lampart) of Meriem Bahhi (Université de Bourgogne)
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2nd year MSc thesis

2023 - 2024	Esma Benaissa (Université Tlemcen)
2022 - 2023	Loth Damagui Chabi (Université Sorbonne Paris Nord), Imed-Eddine Benmehdi (Université de Tlemcen)
2020 - 2021	Jerôme Bolmont (Université de Franche-Comté)
2018 - 2019	Tunde Joseph Osunmusanmi (Université de Bourgogne)
2016 - 2017	Joseph Sahyoun (Université de Bourgogne)

1st year MSc thesis : 7

PUBLICATIONS

- (with T. Goudon), *A simple testbed for stability analysis of quantum dissipative systems*, Ann. Henri Poincaré, (2024), arXiv:2311.17782.
- (with T. Goudon), *Plane wave stability analysis of Hartree and quantum dissipative systems*, Nonlinearity, vol. 36, (2023), 6639.
- (with J. Lampart, L. Le Treust, J. Sabin), *The Dirac-Klein-Gordon system in the strong coupling limit*, Annales Henri Lebesgue, vol. 6 (2023), pp. 541-573.
- (with G. Dujardin, A. Armaroli, A. Mussot, A. Kudlinski, S. Trillo, M. Conforti, S. De Bièvre), *Modulational instability in optical fibers with randomly-kicked normal dispersion*, Phys. Rev. A 103,(2021), 053521.
- (with C. Klein) *On a nonlinear Schrödinger equation for nucleons in one space dimension*, ESAIM: M2AN vol. 55(2), (2021), pp. 409 - 427.
- (with M. Lewin) *The double-power nonlinear Schrödinger equation and its generalizations: uniqueness, non-degeneracy and applications*, Calc. Var. 59, (2020).
- (with S. De Bièvre), *Orbital stability via the energy-momentum method: the case of higher dimensional symmetry groups*, Arch. Rational Mech. Anal. 231, (2019), pp. 233–284.
- (with M. Petrache), *Equidistribution of jellium energy for Coulomb and Riesz Interactions*, Constr. Approx. 47, (2018).
- (with M. Conforti, A. Mussot, A. Kudlinski, G. Dujardin, S. De Bièvre, A. Armaroli, S. Trillo), *Heteroclinic structure of parametric resonance in the nonlinear Schrödinger equation*, Phys. Rev. Lett. 117, (2016), 013901
- (with S. De Bièvre and F. Genoud), *Orbital stability: analysis meets geometry*, in Nonlinear Optical and Atomic Systems, Lecture Notes in Mathematics 2146, (2015), 147–273.
- (with M. Conforti, G. Dujardin, A. Kudlinski, A. Mussot, S. Trillo and S. De Bièvre), *Modulational instability in dispersion-kicked optical fibers*, Phys. Rev. A 92, (2015), 013810.
- (with M. Lewin), *Uniqueness and non-degeneracy for a nuclear nonlinear Schrödinger equation*, Nonlinear Differ. Equ. Appl. (NoDEA) 22(4) (2015), 673–698.
- (with S. Serfaty), *Renormalized energy equidistribution and local charge balance in 2D Coulomb systems*, Int. Math. Res. Not. IMRN 11 (2015), 3035–3093.
- (with L. Le Treust), *Symmetric Excited States for a Mean-Field Model for a Nucleon*, J. Differential Equations 255(10) (2013), 3536-3563.
- (with M.J. Esteban), *Ground States for a Stationary Mean-Field Model for a Nucleon*, Ann. Henri Poincaré 14(5) (2013), 1287–1303.

(with M.J. Esteban), *Symmetric ground states for a stationary relativistic mean-field model for nucleons in the nonrelativistic limit*, Rev. Math. Phys. 24(10) (2012).

The relativistic mean-field equations of the atomic nucleus, Rev. Math. Phys. 24(4) (2012), 1250008.

Perturbation method for particle-like solutions of the Einstein-Dirac-Maxwell equations, C. R. Acad. Sci. Paris, Ser. I 348 (2010).

Perturbation Method for Particle-like Solutions of the Einstein-Dirac Equations, Ann. Henri Poincaré, vol. 10(7), 1377-1393, (2010).

CONFERENCE PROCEEDINGS

(with M. Conforti, A. Mussot, A. Kudlinski, G. Dujardin, S. De Bièvre, A. Armaroli and S. Trillo), *Heteroclinic structure of parametric resonance in fibers with periodic dispersion*, in Photonics and Fiber Technology 2016.

(with M. Conforti, A. Mussot, A. Kudlinski, G. Dujardin, S. De Bièvre, A. Armaroli and S. Trillo), *Nonlinear Stage of Modulation Instability in Dispersion Oscillating Fibers*, in Conference on Lasers and Electro-Optics 2016

(with M. Conforti, G. Dujardin, A. Kudlinski, A. Mussot, S. Trillo, S. De Bièvre), *Modulation instability in periodically dispersion kicked optical fibers*, in Conference on Lasers and Electro-Optics - European Quantum Electronics Conference (CLEO/EUROPE - EQEC) 2015.

TALKS

International conferences : 32

- 2024 Mar. Workshop *Long time behaviour of quantum and classical systems*, IRMAR, Université de Rennes, Rennes, France
Feb. Workshop *Variational Models in Materials Science*, Naples, Italy
Jan. *Spectral Analysis for Quantum Hamiltonians* CIRM, Marseille, France
- 2023 June *Ulysseus Spring School in PDEs (USSPDE)*, Seville, Spain
Jan. *The analysis of relativistic quantum systems* CIRM, Marseille, France
- 2022 Sept. Workshop *The Statistical Physics of Continuum Particle Systems with Strong Interactions*, Institut for Mathematical Sciences, National University of Singapore, Singapore
July *The Dirac equation*, Institut de Mathématiques de Bordeaux, Université de Bordeaux, France
June *Determinantal and permanental point processes, quantum physics, and signal processing*, ENS Lyon, Lyon, France
May *Nonlinear Dispersive Equations*, Institut de Mathématiques de Toulouse, Université Paul Sabatier, France
Feb. Workshop *14th Meeting of the GDR Quantum Dynamics*, Institut de Mathématiques de Toulouse, Université Paul Sabatier, France
- 2021 Nov. Workshop *Inverse Problems and Related Fields*, FRUNAM, Université Aix-Marseille, France
May *Schrödinger equations: normal forms, quantum mechanics, and nonlinear aspects*, Le Croisic, France
- 2020 Jan. *Workshop on singularities in variational models*, Université Paul Sabatier, Toulouse, France
- 2019 Nov. *French Latin-American Conference on New Trends in Applied Mathematics*, Universidad de Chile, Santiago, Chile
Oct. *The Analysis of Complex Quantum Systems: Large Coulomb Systems and Related Matters*, CIRM, Marseille, France
Oct. Workshop *Numerical and analytical approaches for nonlinear dispersive PDEs*, Université de Bourgogne, Dijon, France
June *Waves Côte d'Azur*, Université Côte D'Azur, Nice, France
May Workshop *Champ moyen et autres modèles effectifs en physique mathématique*, Fondation les Treilles, Tourtour, France
Jan. Workshop *Optimal Transport Methods in Density Functional Theory*, BIRS, Banff, Canada
- 2018 Nov. Workshop *Brown measures and non-normal random matrices*, Institut de Mathématiques de Toulouse, Toulouse, France
Feb. *Optimal and Random Point Configurations*, ICERM, Providence, USA
- 2017 Apr. *Spectral Days 2017*, Stuttgart, Germany
- 2016 July *11th AIMS Conference on Dynamical Systems, Differential Equations and Applications*, Orlando, USA

- 2015 Feb. *Mathematical Physics GDR DYNQUA Annual Meeting*, Centre Henri Lebesgue, Nantes, France
- Jan. *Besançon colloquium on dispersive PDE's and related problems*, Besançon, France
- Jan. *IDTPSI: Theory and Numerics*, Laboratoire J.A. Dieudonné, Nice, France
- 2014 July *10th AIMS Conference on Dynamical Systems Differential Equations and Applications*, Madrid, Spain
- 2014 Apr. *Workshop Analysis of Relativistic and Non-Relativistic models in Quantum Mechanics*, Sapienza Università di Roma, Roma, Italy
- 2013 Apr. *Variational and spectral methods in Quantum Field Theory*, Institut Henri Poincaré, Paris, France
- Apr. *Maths Physics Young Researchers Meeting*, Institut Henri Poincaré, Paris, France
- 2012 July *Workshop New Developments in Relativistic Quantum Mechanics and Applications*, Isaac Newton Institute for Mathematical Sciences, Cambridge, UK
- 2011 Apr. *Workshop 3rd Meeting of the GDR Quantum Dynamics*, MAPMO, Orléans, France

National conferences: 5

- 2024 Mar. *Excursions en Physique Mathématique : allers-retours classique-quantique*, Conférence en l'honneur du 65ème anniversaire de Stephan De Bièvre, Université de Lorraine, Institut Elie Cartan de Lorraine, Metz, France
- 2023 Jan. *Journée de rentrée du GT CalVa*, Paris, France
- 2021 Mar. *Journées Jeunes EDPistes*, Besançon, France
- 2019 Mar. *Journées EDP de l'Institut Élie Cartan de Lorraine*, Université de Lorraine, Metz, France
- 2014 Mar. *Journées Jeunes EDPistes Français*, Villa Clythia, Fréjus, France

Seminars: 40

- 2023 Oct. *Séminaire Physique-Mathématique*, Institut Fourier, Université Grenoble Alpes, France
- 2023 June *Colloquium du laboratoire J.A. Dieudonné*, LJAD, Université Côte d'Azur, France
- June *The Quantum Lunch*, QMATH, University of Copenhagen, Denmark
- Mer. *Séminaire Dynamique Quantique et Classique*, CPT, Université de Toulon, France
- 2022 June *Munich-Aarhus-Santiago Seminar in Mathematical Physics*, Online
- Apr. *Séminaire EDP et Physique mathématique*, LAGA, Université Sorbonne Paris Nord, France
- Mar. *Séminaire Équations aux dérivées partielles*, IRMAR, Université de Rennes 1, France

- 2021 Oct. *Séminaire de l'équipe Analyse Numérique-EDP*, Laboratoire Paul Painlevé, Université de Lille, France
 June *Séminaire de l'équipe EDP Analyse*, Institut Camille Jordan, Université Claude Bernard Lyon 1, France
 Apr. *Séminaire de l'équipe EDP Analyse Numérique*, Laboratoire J.A. Dieudonné, Université Côte d'Azur, France *Online*
 Mar. *Online Seminar of Analysis*, École Polytechnique Fédérale de Lausanne, Switzerland
- 2020 Dec. *Séminaire LieGA Institut Élie Cartan*, Université de Lorraine, France, *Online*
 2019 Dec. *Seminar Calculus of Variations and Applications*, Ludwig-Maximilians Universität München, Munich, Germany
 Oct. *Séminaire: Problèmes Spectraux en Physique Mathématique*, IHP, Paris, France
 2018 Feb. *Séminaire EDP*, Université de Rennes 1, Rennes, France
 2017 June *Séminaire de l'équipe EDP Analyse Numérique*, Université Côte D'Azur, Nice, France
 Jan. *Séminaire Équations aux Dérivées Partielles*, Université de Franche-Comté, Besançon, France
- 2016 July *Seminar*, Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany
- 2015 July *Seminar*, Universität Stuttgart, Stuttgart, Germany
 Apr. *Seminar*, Ludwig-Maximilians-Universität München, München, Germany
 Apr. *Séminaire d'analyse appliquée A^3* , Université de Picardie Jules Verne, Amiens, France
 Mar. *Séminaire Mathématique Physique*, Université de Bourgogne, Dijon, France
- 2014 Dec. *Séminaire Analyse numérique - Équations aux dérivées partielles*, Université Lille 1, Villeneuve d'Ascq, France
 Nov. *Séminaire Problèmes Spectraux en Physique Mathématique*, Institut Henri Poincaré, Paris, France
 Apr. *Séminaire EDP-Physique Mathématique*, Université Bordeaux 1, Talence, France
 Mar. *Séminaire Physique Mathématique*, Université Joseph Fourier Grenoble, St Martin d'Hères, France
 Feb. *Séminaire du Laboratoire de Mathématiques de Reims*, Université de Reims, Reims, France
- 2013 Oct. *Séminaire Physique Mathématique*, Université Lille 1, Villeneuve d'Ascq, France
 May *GT Calcul des variations X/Orsay*, Université Paris-Sud, Orsay, France
 Mar. *Séminaire Analyse numérique - Équations aux dérivées partielles*, Université Lille 1, Villeneuve d'Ascq, France
 Feb. *Séminaire d'Algèbre-Géométrie*, Université de Bretagne Occidentale, Brest, France
- 2012 June *GT Physique Mathématique*, Université Cergy-Pontoise, Cergy-Pontoise, France
 Feb. *Séminaire Analyse-EDP*, Université de Franche-Comté, Besançon, France

- 2011 Dec. *GT d'analyse non linéaire et EDP*, Laboratoire Jacques-Louis Lions, Paris, France
 Nov. *Séminaire d'analyse*, École Polytechnique Fédérale de Lausanne, Switzerland
 Apr. *GT Méthodes Variationnelles en Physique Quantique*, Université Paris-Dauphine, France
- 2010 Dec. *Séminaires d'analyse non linéaire ULB-UCL-Umons*, Université Libre de Bruxelles, Bruxelles, Belgium
 June *Seminario del Dipartimento di Matematica Applicata*, Università di Milano Bicocca, Milano, Italy
 Jan. *Séminaire du GDR Champs moyens attractifs en mécanique classique et quantique*, Université Paris-Dauphine, France
- 2009 Oct. *Seminario Analisi non lineare*, Università degli Studi di Milano, Italy

Posters: 4

- 2021 Aug. *International Congress on Mathematical Physics*, Geneva, Switzerland
 2013 Oct. *IVe Colloque EDP-NORMANDIE*, Caen, France
 2010 Apr. Conference *Differential and topological problems in modern theoretical physics*, SISSA, Trieste, Italy
 Apr. Conference *PDEs, relativity & nonlinear waves*, Granada, Spain

RESEARCH VISITS

EPFL Lausanne, Oberwolfach, LMU Munich, PUC Santiago, TU Delft, Max Planck Institute for Mathematics, Fields Institute for Research in Mathematical Sciences, Forschungsinstitut für Mathematik ETH Zürich, Isaac Newton Institute for Mathematical Sciences, ULB Bruxelles

TEACHING (LAST 5 YEARS)

CM = lectures, TD = practical tutorials, Colles = oral exams.

- 2023 - 2024 Université Côte d'Azur
 CM and TD Advanced PDEs: Nonlinear Schrödinger equation (2nd year MSc)
 CM and TD Analysis (2nd year BSc)
 TD Introduction to functional analysis (3rd year BSc)
 Colles (2nd and 3rd year BSc)
- 2023 Summer School Semiclapp: Semiclassical analysis and applications
 TD Tools of semiclassical analysis 3h
- 2022 - 2023 Université Côte d'Azur
 CM and TD Advanced PDEs: Nonlinear Schrödinger equation (2nd year MSc)
 CM and TD Analysis (2nd year BSc)
 TD Introduction to functional analysis (3rd year BSc)
 Tutorial Functional Analysis and Hilbert spaces (1st year MSc)
 Colles (2nd and 3rd year BSc)
- 2022 Lectures Sophie Kowalevski (Angers)
 Introduction to distribution theory 8h (1st year MSc)

- 2021 - 2022 Université Côte d'Azur
CM and TD Analysis (2nd year BSc)
TD Introduction to functional analysis (3rd year BSc)
TD Analysis (2nd year BSc)
Tutorial Functional Analysis and Hilbert spaces (1st year MSc)
Colles (2nd and 3rd year BSc)
- 2020 - 2021 Université de Bourgogne
CM and TD PDE (1st year MSc)
CM Functional Analysis (3rd year BSc)
TD Math4A Analysis (2nd year BSc)
TD Math3A Analysis (2nd year BSc)
TD Data analysis (1st year BSc)
- 2018 - 2020 Université de Bourgogne
CM and TD PDE (1st year MSc)
CM and TD Math41 Analysis (2nd year BSc)
TD Functional Analysis (3rd year BSc)