

Curriculum Vitae

Personal Information

Surname and Name
Nationality
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Soave Nicola

Italian
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Education and Academic positions

Academic positions

December 21, 2018 - today
Assistant Professor with tenure track at Department of Mathematics, Politecnico di Milano.

December 01, 2016 - December 20, 2018.
Assistant Professor at Department of Mathematics, Politecnico di Milano.

April 01, 2014 - November 30, 2016.
Wissenschaftliche Mitarbeiter (post-doc position) at Mathematisches Institut, Justus-Liebig-Universität of Giessen (Germany).
Supervisor: Prof. Thomas Bartsch.

Graduate Studies

January 01, 2011 - January 17, 2014.
Philosophiae Doctorate in Pure and Applied Mathematics at Università degli Studi di Milano - Bicocca and at Université de Picardie Jules Verne de Amiens (joint supervision). Evaluation: Très Honorable.
Advisors: Prof. Alberto Farina (Université de Picardie Jules Verne de Amiens), Prof. Susanna Terracini (Università degli Studi di Torino).

Master Degree

October 15, 2008 - July 20, 2010.
Master Degree in Mathematics at Università degli Studi di Torino, with the evaluation 110/110 cum laude.
Title of the thesis: *Aubry-Mather theory, and applications to ordinary differential equations*, supervisor: Prof. Anna Capietto.

Degree

September 09, 2005 - October 08, 2008.
Degree in Mathematics at Università degli Studi di Torino, with the evaluation 110/110 cum laude.
Title of the thesis: *Differential forms, Stokes theorem and applications*, supervisor: Prof. Anna Capietto.

High School

September 2000 - July 2005
High school leaving qualification at Liceo Scientifico G. Arimondi of Savigliano (CN), with evaluation 100/100.

Acknowledgments

2019-2025

Qualified as Full Professor in Mathematical Analysis, Probability and Statistics through the Italian procedure *Abilitazione Scientifica Nazionale*, valid from September 12, 2019 to September 12, 2025.

2017–2023

Qualified as Associate Professor in Mathematical Analysis, Probability and Statistics through the Italian procedure *Abilitazione Scientifica Nazionale*, valid from March 28, 2017 to March 28, 2023.

2017

Supported by the Italian grant FFABR (*Fondo per il finanziamento di base delle attività di ricerca*) in the category "Researchers" in 2017.

The thesis *Aubry-Mather theory, and applications to ordinary differential equations* has been awarded as best master degree thesis in mathematics of the Università degli Studi di Torino in the college year 2009/2010, and with the prize Luciana Picco Botta.

Research interest

Study of complex dynamics in problems of celestial mechanics: publications [1,2,4,8].
 Existence and qualitative properties of solutions to elliptic equations and systems: publications [3,5,7,10,15,23,27] and preprint [3,5].
 Existence of solutions to elliptic problems via variational and perturbative methods: publications [6,9,13,14,17,19,24] and preprints [1,2,4].
 Free-boundary problems: publications [11,12,16,21,22,26].
 Regularity and qualitative properties of solutions to non-local equations: publications [18,20,25].

Preprints

- [5] N. Soave. Saddle-shaped positive solutions for elliptic systems with bistable nonlinearity. Preprint arXiv.
- [4] D. Pierotti, N. Soave and G. Verzini. Local minimizers in absence of ground states for the critical NLS energy on metric graphs. Preprint arXiv.
- [3] E. Moreira Dos Santos, G. Nornberg, N. Soave. On unique continuation principles for some elliptic systems. Preprint arXiv.
- [2] N. Soave. Normalized ground states for the NLS equation with combined nonlinearities: the Sobolev critical case. Preprint arXiv.
- [1] N. Soave. Normalized ground states for the NLS equation with combined nonlinearities. Preprint arXiv.

Publications

- [28] A. Pistoia, N. Soave and H. Tavares. A fountain of positive Bubbles on a Coron's Problem for a Competitive Weakly Coupled Gradient System. *Journal de Mathématiques Pures et Appliquées*, doi: 10.1016/j.matpur.2019.09.004.
- [27] A. Farina, B. Sciunzi and N. Soave. Monotonicity and rigidity of solutions to some elliptic systems with uniform limits. *Communications in Contemporary Mathematics*, doi: 10.1142/S0219199719500445.
- [26] N. Soave and S. Terracini. The nodal set of solutions to some elliptic problems: singular nonlinearities. *Journal de Mathématiques Pures et Appliquées*, 128 (2019), 264–296.
- [25] N. Soave and E. Valdinoci, Overdetermined problems for the fractional Laplacian in exterior and annular sets. *Journal d'Analyse Mathématiques*, 137 (2019), no. 1, 101–134.
- [24] T. Bartsch and N. Soave, Multiple normalized solutions for a competing system of Schrödinger equations. *Calculus of Variations and Partial Differential Equations*, 58 (2019), no. 1, Art. 22, 24 pp.
- [23] N. Soave and T. Weth, The unique continuation property of sublinear equations. *SIAM Journal of Mathematical Analysis*, 50 (2018), no. 4, 3919–3938.
- [22] N. Soave and S. Terracini, The nodal set of solutions to some elliptic problems: sublinear equations, and unstable two-phase membrane problem. *Advances in Mathematics*, 334 (2018): 243–299.
- [21] N. Soave, H. Tavares, S. Terracini and A. Zilio, Variational problems with long-range interaction. *Archive for Rational Mechanics and Analysis*. 228 (3): 743–772, 2018.
- [20] S. Dipierro, N. Soave and E. Valdinoci, On stable solutions of boundary reaction-diffusion equations and applications to nonlocal problems with Neumann data. *Indiana University Mathematical Journal*. 67 (1): 429–469, 2018.

- [19] A. Pistoia and N. Soave, On Coron's problem for weakly coupled elliptic systems. *Proc. London Math. Soc.*, 116 (1): 33–67, 2018.
- [18] S. Dipierro, N. Soave and E. Valdinoci, On fractional elliptic equations in Lipschitz sets and epigraphs: regularity, monotonicity and rigidity results. *Mathematische Annalen*, 369: 1283–1326, 2017.
- [17] T. Bartsch and N. Soave, A natural constraint approach to normalized solutions of nonlinear Schrödinger equations and systems. *Journal of Functional Analysis*, 272 (12): 4998–5037, 2017.
See also Correction to: "A natural constraint approach to normalized solutions of nonlinear Schrödinger equations and systems" [J. Funct. Anal. 272 (12) (2017) 4998–5037], *Journal of Functional Analysis*, 275 (2): 516–521, 2018.
- [16] N. Soave and A. Zilio, On phase separation in systems of coupled elliptic equations: asymptotic analysis and geometric aspects. *Annales de l'Institut Henri Poincaré (C) Analyse Non Linéaire*, 34 (3): 625–654, 2017.
- [15] N. Soave and A. Zilio, Multidimensional entire solutions for an elliptic system modelling phase separation. *Analysis and Partial Differential Equations*, 9 (n. 5) (2016), 1019–1041.
- [14] T. Bartsch, L. Jeanjean and N. Soave, Normalized solutions for a system of coupled cubic Schrödinger equations on \mathbb{R}^3 . *Journal de Mathématiques Pures et Appliquées*, 106 (2016), 583–614.
- [13] N. Soave and H. Tavares, New existence and symmetry results for least energy positive solutions of Schrödinger systems with mixed cooperation and competition terms. *Journal of Differential Equations*, 261 (2016), 505–537.
- [12] N. Soave, H. Tavares, S. Terracini and A. Zilio, Hölder bounds and regularity of emerging free boundaries for strongly competing Schrödinger equations with non-trivial grouping. *Nonlinear Analysis: Theory, Methods & Applications*, 138 (2016), 388–427. Special Volume in honor of Juan Luis Vázquez for his 70th birthday.
- [11] N. Soave and A. Zilio, Uniform bounds for strongly competing systems: the optimal Lipschitz case. *Archive for Rational Mechanics and Analysis*, 218 (2015), 647–697.
- [10] N. Soave and S. Terracini, Liouville theorems and 1-dimensional symmetry for solutions of an elliptic system modelling phase-separation. *Advances in Mathematics*, 279 (2015), 29–66.
- [9] N. Soave, On existence and phase separation of solitary waves for nonlinear Schrödinger systems modelling simultaneous cooperation and competition. *Calculus of Variations and Partial Differential Equations*, 53 (3-4) (2015), 689–718.
- [8] N. Soave, Symbolic dynamics: from for the N -centre to the $(N + 1)$ -body problem, a preliminary study, *NoDEA Nonlinear Differential Equations and Applications* 21 (3) (2014), 371–413.
- [7] A. Farina and N. Soave, Monotonicity and 1-dimensional symmetry for solutions of an elliptic system arising in Bose-Einstein condensation, *Archive for Rational Mechanics and Analysis* 213 (1) (2014), 287–326.
- [6] N. Soave and G. Verzini, Bounded solutions for a forced bounded oscillator without friction, *Journal of Differential Equations* 256 (7) (2014), 2526–2558.
- [5] N. Soave and A. Zilio, Entire solutions with exponential growth for an elliptic system modeling phase-separation, *Nonlinearity* 27 (2) (2014), 305–342.
- [4] N. Soave and S. Terracini, Avoiding collisions under topological constraints in variational problems coming from celestial mechanics, *Journal of Fixed Point Theory and its Applications* 14 (2) (2013), 457–501. Special Volume *The Yvonne Choquet-Bruhat Festschrift*.
- [3] A. Farina and N. Soave, Symmetry and uniqueness of nonnegative solutions of some problems in the half-space, *Journal of Mathematical Analysis and Applications* 403 (1) (2013), 215–233.
- [2] N. Soave and S. Terracini, Symbolic dynamics for the N -centre problem at negative energies *Discrete and Continuous Dynamical Systems - Series A* 32 (9) (2012), 3245–3301, Special Volume *Orlando Issue Contributed by the Plenary Speakers*.

- [1] A. Capietto and N. Soave, Some remarks on Mather's theorem and Aubry-Mather sets, *Communications in Applied Analysis*, 15 (2011), 283–298.

Research projects

- 2019 Principal Investigator for the project INDAM-GNAMPA *Esistenza e proprietà qualitative per soluzioni di EDP non lineari ellittiche e paraboliche*. € 3000
- 2017 - today Member of the project PRIN *Variational Methods, with Applications to problems in Mathematical Physics and Geometry*; coordinator: Prof. Andrea Malchiodi. Local coordinator: Prof. Gianmaria Verzini.
- 2017 Principal Investigator for the project INDAM-GNAMPA *Aspetti non-locali in fenomeni di segregazione*, € 1200.
- 2013-today Member of the ERC Advanced Grant n. 339958 project *Complex Patterns for Strongly Interacting Dynamical Systems - COMPAT*; coordinator: Prof. Susanna Terracini.
- 2013 Member of the G.N.A.M.P.A. project *Birth of pattern in systems with anomalous diffusion and strong competition*; coordinator: Prof. Gianmaria Verzini.
- 2011-2012 Member of P.R.I.N. 2009 project *Critical Point Theory and Perturbative Methods for Nonlinear Differential Equations*; coordinator: Prof. Susanna Terracini.

Research seminars and conferences

February 18 - 22, 2019

Spring School on Local and Nonlocal Elliptic and Geometric Problems. School organized by AIMS Senegal and the Goethe-University of Frankfurt, and held at the African Institute for Mathematical Sciences (AIMS) in Mbour, Senegal.
Title: *On the nodal set of solutions to elliptic equations*.

Invited speaker at conferences

September 02 - 07, 2019

XXI congresso dell'Unione Matematica Italiana, Pavia (Italy).

June 03 - 07, 2019

Intensive Week of PDEs at Cogne, Cogne (Italy).

May 31, 2019

Brescia-Trento Nonlinear Days - Edition III, Università degli Studi di Trento (Italy).

September 10 - 14, 2018

Workshop on Nonlinear Analysis and PDEs, Caserta (Italy).

July 23 - 27, 2018

ICM 2018 Satellite conference on Nonlinear Partial Differential Equations, Fortaleza (Brazil).

July 16 - 19, 2018

Workshop on Variational Problems arising from Physics and Geometry. Rauschholzhausen Castle, Marburg (Germany).

February 12 - 16, 2018

Workshop on Variational Methods in Analysis, Geometry and Physics. Scuola Normale Superiore di Pisa (Italy).

January 25 - 26, 2018

Workshop on Interaction models: Mean Field Games, pattern formation and related topics. Università di Padova (Italy).

November 13 - 17, 2017

First Belgium-Chile-Italy conference in PDEs. Université Libre de Bruxelles (Belgium).

May 22 - 26, 2017

International Conference on Elliptic and Parabolic Problems, Gaeta (Italy).

February 17 - 18, 2017

Equazioni alle Derivate Parziali e Disuguaglianze Analitico-Geometriche Associate, Politecnico di Milano, Milan (Italy).

January 23 - 27, 2017

Workshop Roma Caput PDE. Università di Roma - La Sapienza, Rome (Italy).

December 5 - 9, 2016

Workshop Nonlinear Partial Differential Equations and Mathematical Physics, Tsinghua Sanya International Mathematics Forum (TSIMF), Sanya (China).

October 13 - 14, 2016

Nonlinear PDE days, Frankfurt-Giessen-Karlsruhe-Köln. Justus-Liebig-Universität of Giessen (Germany).

July 18 - 20, 2016

Summer School on Elliptic PDE's at Tenerife, Università de la Laguna, Tenerife (Spain).

June 20 - 24, 2016	PDEs at the Grand Paradis, Cogne (Italy).
June 6 - 10, 2016	Recent trends on elliptic nonlocal equations, Fields Institute in Toronto, Toronto (Canada).
May 2 - 5, 2016	Bruxelles - Torino seminars in PDEs, Università degli Studi di Torino, Turin (Italy).
September 7 - 11, 2015	Workshop on Nonlinear PDEs, Brussels (Belgium).
July 6 - 10, 2015	Equadiff conference 2015, Lyon (France).
September 16 - 19, 2014	Joint meeting of German and Polish Mathematical Societies, Poznań (Poland).
July 7 - 11, 2014	10th AIMS international conference on dynamical systems, differential equations and applications, Madrid (Spain).
January 14 - 18, 2013	BIRS workshop New perspectives on the N -body problem, Banff centre, Banff (Canada).
July 1 - 5, 2012	9th AIMS international conference on dynamical systems, differential equations and applications, Orlando (Florida, USA).
June 4 - 8, 2012	International workshop and advanced school on variational methods in N -body and vortex dynamics, Università del Salento, Lecce (Italy).
	Speaker at conferences
January 20 - 24, 2014	School on nonlinear elliptic problems, Università di Milano - Bicocca, Milano, Italy.
January 7 - 10, 2014	Workshop on Variational methods in elliptic equations and systems, Lisbon (Portugal).
	Invited talks in Analysis seminars
November 21, 2018	Università degli Studi Roma Tre, Rome (Italy).
February 20, 2018	University of Washington, Seattle (USA).
October 30, 2017	Scuola Normale Superiore di Pisa (Italy).
October 24, 2017	Università della Calabria, Rende (Italy).
December 14, 2016	Politecnico di Milano (Italy).
April 27, 2016	Philipps-Universität Marburg (Germany).
November 19, 2015	Università di Roma – La Sapienza (Italy).
September 30, 2015	Università degli Studi di Torino (Italy).
June 14, 2015	Justus-Liebig-Universität Giessen (Germany).
April 1, 2015	Università degli Studi di Torino (Italy).
March 25, 2015	Università di Pisa (Italy).
March 19, 2015	Universidade de Lisboa (Portugal).
March 10, 2015	Università di Roma Tor Vergata (Italy).
February 18, 2015	CAMS-EHESS Paris (France).
January 29, 2015	Goethe-Universität Frankfurt (Germany).
June 26, 2014	Justus-Liebig-Universität Giessen (Germany).
November 19, 2013	Università degli Studi di Milano-Bicocca (Italy).
October 24, 2013	Justus-Liebig-Universität Giessen (Germany).
April 9, 2013	Università Statale di Milano (Italy).
March 27, 2013	Università degli Studi di Torino (Italy).
February 27, 2012	Università degli Studi di Milano-Bicocca (Italy).
January 27, 2012	Politecnico di Milano (Italy).
December 22, 2011	Università degli Studi di Torino (Italy).

Research visits

April 15 - 19, 2019	KTH Royal Institut of Technology in Stockholm (Svezia), responsabile: Prof. Henrik Shahgholian.
February 10 - 15, 2019	Hausdorff Institut in Mathematics, Bonn (Germany), invited participant at the workshop "Geometric measure theory and free boundary problems", trimester program "Evolution of interfaces". Organizers: Prof. Emanuele Spadaro, László Székelyhidi Jr., Georg Weiss, .
February 18 - 24, 2018	University of Washington, Seattle (USA), responsible: Dr. Mariana Smit Vega Garcia.
October 23 - 27, 2017	Università della Calabria, Rende (Italy), responsible: Prof. Berardino Sciunzi.
November 15 - 20, 2015	Università di Roma – La Sapienza, Rome (Italy), responsible: Prof. Angela Pistoia.
September 21 - October 9, 2015	Università degli Studi di Torino, Turin (Italy), responsible: Prof. Susanna Terracini.
July 19 - August 1, 2015	Weierstrass Institute for Applied Analysis and Stochastics, Berlin (Germany), responsible: Prof. Enrico Valdinoci.
March 16 - 21, 2015	CAMGSD, Instituto Superior Técnico, Universidade de Lisboa (Portugal), responsible: Dr. Hugo Tavares.
February 16 - 21, 2015	CAMS - EHESS, Paris (France), responsible: Dr. Alessandro Zilio.
October 6 - 11, 2014	Weierstrass Institute for Applied Analysis and Stochastics, Berlino (Germany), responsible: Prof. Enrico Valdinoci.
February 2 - 20, 2014	Pacific Institute of Mathematical Science, University of British Columbia, Vancouver (Canada), responsible: Prof. Juncheng Wei.
January 27 - February 22, 2013	Institute Camille Jordan, Université Lyon I, Lyon (France), responsible: Prof. Alberto Farina.
September 9 - 14, 2012	Institute Camille Jordan, Université Lyon I, Lyon (France), responsible: Prof. Alberto Farina.
March 4 - April 13, 2012	Université de Picardie Jules Verne, Amiens (France), responsible: Prof. Alberto Farina.

Teaching

2017/2018 2019/2020	PhD courses Semilinear Elliptic Equations, with Prof. Gianmaria Verzini, PhD course in Mathematical Models and Methods in Engineering, Politecnico di Milano (Italy).
2019/2020	Holder of regular courses Calculus 1, Degree in Control Engineering, Computer Eng., Telecommunications Eng., Electric Eng., Electronic Eng., Politecnico di Milano (Italy).
2016/17, 2017/18 2018/19	Calculus 2, Degree in Civil Engineering, Politecnico di Milano (Italy).
2018/2019	Assistant Real and Functional Analysis, Master Degree in Mathematical Engineering, Politecnico di Milano (Italy).
2016/2017	Calculus 1, Degree in Physics, Justus-Liebig-Universität of Giessen (Germany).
2015/2016	Calculus 1, Degree in Physics, Justus-Liebig-Universität of Giessen (Germany).
2014/2015	Calculus 3 and Calculus 4, Degree in Mathematics, Justus-Liebig-Universität Giessen (Germany).
2013/2014	Partial Differential Equations, Degree in Mathematics, Justus-Liebig-Universität Giessen (Germany).
2011/2012	Calculus 2, Degree in Mathematics, Università degli Studi di Milano-Bicocca (Italy).
	Matematiche 1, Degree in Science and Technology for the Environment, Università degli Studi di Milano-Bicocca (Italy).

2015/2016	<p>Other activities</p> <p>Organizer of the reading course on Morse Theory, Master and PhD in Mathematics, Justus-Liebig-Universität Giessen (Germany).</p>
<p>Reviewer Activity</p> <p>Referee for</p>	<p>Reviewer for <i>MathReviews</i></p> <p><i>J. Functional Analysis; Comm. in Partial Differential Equations; Transactions AMS; Comm. in Mathematical Physics; SIAM J. of Mathematical Analysis; Calc. Var. and PDEs; J. Differential Equations; Nonlinear Analysis TMA; Proc. of the Royal Society of Edinburgh - Section A; Adv. in Differential Equations; Physics Letters A; Annali della Scuola Normale Superiore di Pisa, classe di Scienze; Discrete and Continuous Dynamical Systems; NoDEA; SIGMA; Complex Variables and Elliptic Equations; J. Math. Anal. and Appl.; Comm. in Pure and Applied Analysis; Computers and Math. with Applications.</i></p>
<p>Skill language</p> <p>Mother tongue</p> <p>Other languages</p>	<p>Italian</p> <p>English (advanced), German (intermediate), French (elementary).</p>