Simone Dovetta

Curriculum Vitae

Università La Sapienza
Dipartimento di Scienze di Base
e Applicate per l'Ingegneria
via Antonio Scarpa, 14
00161 Roma, Italy

CAREER & EDUCATION

Current position

1/2/2021–now **Non–tenure track Assistant Professor (RTDa)** of Mathematical Analysis at Università degli Studi "La Sapienza" Roma, Dipartimento di Scienze di Base e Applicate per l'Ingegneria.

Previous positions

1/11/2019–31/1/2021 **Postdoc** at Istituto di Matematica Applicata e Tecnologie Informatiche "Enrico Magenes", Consiglio Nazionale delle Ricerche, Pavia (Italy).

Supervisor: Laura V. Spinolo (IMATI – CNR Pavia).

Scientific visits

1/05–30/06/2019 Institut für Angewandte Mathematik, Rheinische Friedrich–Wilhelms Universität Bonn, Bonn (Germany). Invited by Sergio Conti.

Grants and projects

15/04/2020–now **Coordinator** of the INdAM–GNAMPA project 2020: *Modelli differenziali alle derivate parziali per fenomeni di interazione: problemi al bordo, potenziali singolari e domini non–standard.*

Awarded by Istituto Nazionale di Alta Matematica "F. Severi" (INdAM).

Members: Riccardo Adami (Politecnico di Torino), Raffaele Carlone (Università degli Studi di Napoli "Federico II"), Laura V. Spinolo (IMATI-CNR Pavia), Lorenzo Tentarelli (Politecnico di Torino), Davide Zucco (Università degli Studi di Torino).

24/03/2020–now **Member** of the working group *"WG4 - Variational methods on graphs and networks"* within the European COST ACTION *CA18232 - Mathematical models for interacting dynamics on networks.*

Awarded by EU Framework Programme Horizon 2020.

Action Chair: Marjeta Kramar Fijavz (University of Ljubljana).

Group Leader: Delio Mugnolo (University of Hagen).

01/01/2018–31/01/2020 **Member** of the project *PRIN 2015: Variational methods, with applications to problems in mathematical physics and geometry.*

Awarded by Italian Ministry of Education (MIUR).

Project Director: Andrea Malchiodi (SNS Pisa).

Local Director: Enrico Serra (Politecnico di Torino).

Education

1/10/2016 – 30/09/2019 **PhD Student** (with scholarship – XXXII cycle) in the joint *Doctoral School of Pure and Applied Mathematics*, Department of Mathematical Sciences "G.L. Lagrange", Politecnico di Torino, and Department of Mathematics "G. Peano", Università degli Studi di Torino.

Title of the thesis: *Variational problems for nonlinear Schrödinger equations on metric graphs.*

Supervisor: Riccardo Adami (Politecnico di Torino).

Date of the defense: October 25th, 2019.

Grade: summa cum laude.

2014 – 2016 **Master Student** in *Mathematics* at Università degli Studi di Torino.

Title of the thesis: Γ*-convergence of graph functionals.*

Supervisor: Paolo Cermelli (Università degli Studi di Torino).

Date of the defense: July 20th, 2016.

Grade: 110/110 cum laude and *menzione.*

2011 – 2014 **Bachelor Student** in *Mathematics* at Università degli Studi di Torino.

Title of the thesis: *Metodi di teoria dei grafi applicati all'analisi di reti criminali.*

Supervisor: Paolo Cermelli (Università degli Studi di Torino).

Date of the defense: July 14th, 2014.

Grade: 110/110 cum laude.

2006 – 2011 **High School Student** at Liceo Scientifico "G. Peano", Cuneo (Italy).

Final grade: 100/100 cum laude.

Prizes and Awards

10/2020 *Premio Qualità 2019*, awarded by Politecnico di Torino for the best Ph.D. students at the Politecnico di Torino in the academic year 2018/2019.

06/2020 *Premio Tullio Levi Civita*, awarded by Università degli Studi di Padova for the best Ph.D. thesis in Analytical Mechanics, Differential Geometry, Variational Problems, defended in Italy within December 2018–March 2020.

10/2019 *Premio Qualità 2018*, awarded by Politecnico di Torino for the best Ph.D. students at the Politecnico di Torino in the academic year 2017/2018.

06/2018 *Premio miglior Tesi* and *Premio Luciana Picco Botta*, awarded by Università degli Studi di Torino for the best master degree thesis in Mathematics at Università degli Studi di Torino in the academic year 2015/2016.

05/2015 *Premio per progetti di eccellenza*, awarded by "Scuola di Scienze della Natura", Università degli Studi di Torino.

SCIENTIFIC ACTIVITY

In preparation

[1] Conti S., Dovetta S., *Homogenisation of Data Driven problem in elasticity.*

[2] Dovetta S., Spinolo L.V., *A transport equation approach to multi–path models for traffic flows on road networks.*

[3] Dovetta S., Tentarelli L., *Symmetry breaking in two–dimensional quantum grids: effective and non–effective damages.*

[4] Ayuso de Dios B., Dovetta S., Spinolo L.V., *On the continuum limit of epidemiological models on graphs: convergence results and numerical simulations.*

Preprints

[1] Adami R., Boni F., Dovetta S., *Competing nonlinearities in NLS equations as source of threshold phenomena on star graphs.* ArXiv:2009.06424.

Publications

[1] Boni F., Dovetta S., *Prescribed mass ground states for a doubly nonlinear Schrödinger equation in dimension one*, J. Math. Anal. Appl. 496(1), (2021), 124797.

[2] Dovetta S., Serra E., Tilli P., *Uniqueness and non–uniqueness of prescribed mass NLS ground states on metric graphs*, Advances in Mathematics 374 (2020), 107352.

[3] Dovetta S., Serra E., Tilli P., *NLS ground states on metric trees: existence results and open questions*, J. London Math. Society 102(3), (2020), 1223-1240.

[4] Dovetta S., Ghimenti M., Micheletti A.M., Pistoia A., *Peaked and low action solutions of NLS equations on graphs with terminal edges*, SIAM J. Math. Anal. 52(3), (2020), 2874–2894.

[5] Braides A., Cermelli P., Dovetta S., $\Gamma-$*limit of the cut functional on dense graph sequences*, ESAIM: COCV 26 (2020) 26.

[6] Dovetta S., Tentarelli L., *Ground states of the* L^2-*critical NLS equation with localized nonlinearity on a tadpole graph*, Operator Theory: Advances and Applications 281 (2020), 113–125.

[7] Dovetta S., Tentarelli L., L^2*–critical NLS on noncompact metric graphs with localized nonlinearity: topological and metric features*, Calc. Var. PDE Vol. 58, Is. 3 (2019) 58:108.

[8] Adami R., Dovetta S., Ruighi A., *Quantum graphs and dimensional crossover: the honeycomb*, Comm. Appl. Ind. Math. 10(1), (2019), 109–122.

[9] Dovetta S., *Mass–constrained ground states of the stationary NLSE on periodic metric graphs*, Nonlinear Differ. Eq. Appl. NoDEA (2019) 26:30.

[10] Adami R., Dovetta S., Serra E., Tilli P., *Dimensional crossover with a continuum of critical exponents for NLS on doubly periodic metric graphs*, Analysis & PDE, Vol. 12 (2019), No. 6, 1597—1612.

[11] Adami R., Dovetta S., *One-dimensional versions of three-dimensional system: ground states for the NLS on the spatial grid*, Rendiconti di Matematica e delle sue applicazioni, 39(7) (2018), 181–194.

[12] Cacciapuoti C., Dovetta S., Serra E., *Variational and stability properties of constant solutions to the NLS equation on compact metric graphs*, Milan Journal of Mathematics, 86(2) (2018), 305–327.

[13] Dovetta S., *Existence of infinitely many stationary solutions of the* L^2*–subcritical and critical NLSE on compact metric graphs*, J. Differential Equations 264 (2018), no. 7, 4806–4821.

Scientific committee for scientific events

Member of the organizing committee of the following events:

29/11–3/12/2021 *Analytical Methods in Quantum and Continuum Mechanics*, Politecnico di Torino, Torino (Italy).

Co–organizers: Riccardo Adami (Politecnico di Torino), William Borrelli (SNS Pisa), Raffaele Carlone (Università degli Studi di Napoli "Federico II"), Sonia Mazzucchi (Università degli Studi di Trento), Lorenzo Tentarelli (Politecnico di Torino).

30/08–3/09/2021 *Trends in nonlinear PDEs and applications*, minisymposium within the Congress SIMAI2020, Parma (Italy).

Co–organizer: Lorenzo Tentarelli (Politecnico di Torino).

20–26/06/2021 *Analysis of PDEs on Networks*, minisymposium within the 8th European Congress of Mathematics, Portorož (Slovenia).

Co–organizer: Lorenzo Tentarelli (Politecnico di Torino).

27–29/09/2018 *Trails in Quantum Mechanics and Surroundings 2018*, Politecnico di Torino, Torino (Italy).

Co–organizers: Riccardo Adami (Politecnico di Torino), Raffaele Carlone (Università degli Studi di Napoli "Federico II"), Diego Noja (Università Milano Bicocca), Lorenzo Tentarelli (Politecnico di Torino).

Organization of scientific events

Staff member for the oganization of the following events:

9–13/09/2019 *ALFACLASS Summer School of Mathematics*, edition 2019, jointly organized by Università degli Studi di Torino and Politecnico di Torino.

10–14/09/2018 *ALFACLASS Summer School of Mathematics*, edition 2018, jointly organized by Università degli Studi di Torino and Politecnico di Torino.

11–15/09/2017 *ALFACLASS Summer School of Mathematics*, edition 2017, jointly organized by Università degli Studi di Torino and Politecnico di Torino.

Talks in conferences, workshops and schools

20–22/09/2021 (to be held) *Three days of PDEs, friendship, love and nonlinearities*, Università di Pisa, Pisa (Italy).

Title: *Variational problems for nonlinear Schrödinger equations on metric graphs.* (Invited speaker).

20–26/06/2021 (to be held) *Variational Methods and Equations on Graphs*, mynisimposium within the 8th European Congress of Mathematics, Portorož, June 20–26, 2021.

Title: *Uniqueness and non–uniqueness results for NLS ground states on graphs.* (Invited speaker).

15/09/2020 (online) *Online Mini–courses in Mathematical Analysis 2020*, Università degli Studi di Padova, Padova (Italy), September 14–17, 2020.

Title: *Uniqueness and non–uniqueness of prescribed mass NLS ground states on metric graphs.* (Contributed talk).

3/09/2019 *New Trends in Propagation of Linear and Nonlinear Phenomena*, Ettore Majorana Foundation and Centre for Scientific Culture, Erice (Italy), September 2–7, 2019.

Title: *NLS ground states on metric trees: existence results and open questions.* (Invited speaker).

10/10/2018 *Topics in Nonlinear Analysis: Calculus of Variations and PDEs*, Faculdade de Ciencias, Universidade de Lisboa, Lisboa (Portugal), October 10–12, 2018.

Title: *Solutions of the stationary NLSE on compact metric graphs: existence and properties.* (Contributed talk).

29/08/2018 *Nonlinear PDEs on Metric Graphs and Branched Networks*, Lorentz Center, Leiden (Holland), August 27–31, 2018.

Title: *Solutions of the stationary NLSE on compact metric graphs: existence and properties.* (Invited speaker).

23/02/2018 *Mathematical Challenges in Quantum Mechanics*, Università di Roma "Sapienza", Roma (Italy), February 19–24, 2018.

Title: *NLS ground states on the two-dimensional grid: dimensional crossover and a continuum of critical exponents* (Contributed talk).

22/06/2017 *Nonlinear Partial Differential Equations on Graphs*, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach (Germany), June 18–24, 2017.

Title: *NLS ground states on the two-dimensional grid: dimensional crossover and a continuum of critical exponents* (Invited speaker).

Talks in seminars

17/12/2020 (online) *PDE's: Italia vs España Seminars*, jointly organized by Università degli Studi "La Sapienza" Roma, Università degli Studi Roma Tre, Universidad Autonoma de Madrid.

Title: *Variational problems for nonlinear Schrödinger equations on metric graphs.*

9/12/2020 (online) Dipartimento di Matematica e Applicazioni "Renato Caccioppoli", Università degli Studi di Napoli "Federico II", Napoli (Italy).

Title: *Variational problems for nonlinear Schrödinger equations on metric graphs.*

12/11/2020 (online) Dipartimento di Scienze di Base Applicate e per l'Ingegneria, Università degli Studi "La Sapienza" Roma, Roma (Italy).

Title: *Variational problems for nonlinear Schrödinger equations on metric graphs.*

30/09/2020 (online) Departement Mathematik und Informatik, Universität Basel, Basel (Switzerland).
Title: *Variational problems for nonlinear Schrödinger equations on metric graphs.*

1/07/2020 (online) Instituto De Ciências Matemáticas e de Computação, Universidade de São Paulo, São Paulo (Brazil).

Title: *Nonlinear Schrödinger Equations on compact metric graphs.*

8/10/2019 IMATI–CNR and Dipartimento di Matematica "F. Casorati", Università di Pavia, Pavia (Italy).

Title: *NLS ground states on metric trees: existence results and open questions.*

5/02/2019 Dipartimento di Matematica, Università di Pisa, Pisa (Italy).

Title: *Periodicity as dimension: NLS ground states on periodic metric graphs.*

16/03/2017 Dipartimento di Matematica "G. Peano", Università degli Studi di Torino, Torino (Italy).

Title: *Nonlinear Schrödinger Equations on metric graphs: a variational approach.*

Posters in conferences, workshops and schools

28/11/2017 *Final conference: Discrete and Continuous Models in the Theory of Networks*, Zentrum für interdisziplinäre Forschung, Bielefeld (Germany), November 27–December 1, 2017.

Title: *NLS ground states on the two-dimensional grid: dimensional crossover and a continuum of critical exponents.*

Other attended conferences, workshops and schools

27–31/01/2020 *Winter School: Turbulence in fluids and PDEs*, EPFL, Lausanne (Switzerland).

7–8/11/2019 *Convegno informale su Meccanica Quantistica e Dintorni*, Università di Roma "Sapienza", Roma (Italy).

1–5/07/2019 *Summer School on Partial Differential Equations from theory to applications*, Università degli Studi di Milano, Milano (Italy).

14–17/01/2019 *ALESSIO FIGALLI, Fields medallist 2018*, Scuola Normale Superiore, Pisa (Italy).

28/10–3/11/2018 *Emergence of Structures in Particle Systems: Mechanics, Analysis and Computation*, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach (Germany).

16–20/07/2018 *Some new and old problems in the Calculus of Variations*, Riemann International School of Mathematics, Varese (Italy).

12–16/02/2018 *Variational Methods in Analysis, Geometry and Physics*, Scuola Normale Superiore, Pisa (Italy).

21–22/09/2017 *Nonlinear Days in Turin*, Politecnico di Torino, Torino (Italy).

18–27/07/2017 *Nonlinear dispersive PDE, quantum many particle systems and the world between Summer School*, Cortona (Italy).

8–10/02/2017 *Linear and Nonlinear Dirac Equation: advances and open problems*, Università degli Studi dell'Insubria, Como (Italy).

4–8/07/2016 *Partial Differential Equations Summer School*, Instituto Superior Tecnico, Lisboa (Portugal).

20–21/04/2015 *Networks and Criminality Workshop*, Oxford University, Oxford (England).

Attended Doctoral courses

- *Topological methods in nonlinear analysis.* Holders of the course: W. D'Ambrosio - A. Boscaggin, Università degli Studi di Torino, Torino (Italy).
- *Geometric Measure Theory.* Holders of the course: D. Mazzoleni - E. Cinti, Università degli Studi di Torino, Torino (Italy).
- *Rough Paths and Stochastic Differential Equations.* Holders of the course: F. Caravenna - G. Tessitore, Università di Milano-Bicocca, Milano (Italy).
- *Nonlinear Metric Graphs.* Holder of the course: R. Adami, Politecnico di Torino, Torino (Italy).
- *Applications of Rough Paths Theory.* Holder of the course: Enrico Priola, Università degli Studi di Torino, Torino (Italy).

- *Introduction to homogenization methods for multi-scale problems.* Holders of the course: V. Chiadò Piat - L. Lussardi, Politecnico di Torino, Torino (Italy).
- *Parabolic and hyperbolic evolution equations.* Holder of the course: A. Milani, Politecnico di Torino, Torino (Italy).
- *Plateau's problem in the Calculus of Variations.* Holder of the course: L. Lussardi, Politecnico di Torino, Torino (Italy).
- *ODEs and transport equations with rough coefficients.* Holder of the course: C. De Lellis, Institute for Advanced Study, Princeton, N.J. (U.S.A). [online course]

TEACHING ACTIVITY

Supporting teaching activity

2020/21 Università degli Studi di Milano:

- Teaching assistant “Quantitative Methods” (Linear algebra, discrete and continuous dynamical systems, optimization), for the master degree in Environmental Change and Global Sustainability (32 hours - Holder of the course: Giovanni Naldi).

Università degli Studi di Pavia:

- Teaching assistant “Analisi Matematica 3” (Differential equations, complex analysis), for the bachelor degree in Mathematics and the bachelor degree in Physics (8 hours - Holder of the course: Giulio Schimperna).

2018/19 Politecnico di Torino

- Teaching assistant “Mathematical Analysis I” (Differential and integral calculus for real functions of one variable), for the bachelor degree in Engineering (60 hours - Holder of the course: Riccardo Adami).

2017/18 Politecnico di Torino:

- Teaching assistant “Mathematical Analysis I” (Differential and integral calculus for real functions of one variable), for the bachelor degree in Engineering (60 hours - Holder of the course: Riccardo Adami).

2015/16 Università degli Studi di Torino:

- Tutoring of “Geometria UNO” for the bachelors in Mathematics (both class lessons and correction of exercises) (100 hours - Holder of the course: Cinzia Casagrande).
- Tutoring of "Analisi III" for the bachelor degree in Physics (class lessons) (40 hours - Holder of the course: Marco Cappiello)

2014/15 Università degli Studi di Torino:

- Tutoring of “Analisi Matematica” for the bachelors in Optics and Optometry (class lessons) (20 hours - Holders of the course: Vivina Barutello - Marco Cappiello).
- Tutoring of "Analisi Matematica DUE" for the bachelor degree in Mathematics (both class lessons and correction of exercises) (100 hours - Holder of the course: Susanna Terracini).

FURTHER INFORMATION

Referee for the following journals

Nonlinear Analysis
Proceedings of the Royal Society of Edinburgh Section A: Mathematics
Advances in Calculus of Variations
Calculus of Variations and PDEs

Scientific Interests

My research interests are mainly devoted to the analysis of PDEs, Nonlinear Analysis and the Calculus of Variations.

Variational methods for Nonlinear Problems: I have been working on Nonlinear Schrödinger Equations on metric graphs, with a specific focus on existence, uniqueness and stability of standing waves as critical points of suitable energy functionals. The main interest of this line of research is to understand how topological and metric properties of the graph determine the behaviour of the problem.

Functional Inequalities and PDEs: I have been dealing with different families of functional inequalities (Sobolev, Gagliardo-Nirenberg, Poincarè, Hardy,...), their optimal constants, optimizers and their applications to PDEs.

Data–driven problems in elasticity: I have been working on the mathematical theory of elasticity within the data–driven framework, with particular attention to homogenization problems for fine mixture of different materials.

Γ–**convergence of graph functionals:** I have been interested in the analysis of the asymptotic behaviour of sequences of discrete graph energies from the point of view of Γ–convergence and relaxation, combined with recent notions of convergence for graph sequences (graphons).

Transport equations with rough fields and traffic models: I have been working on transport equations and conservation laws with low regularity coefficients (typically BV) within the theory of renormalized solutions. Specifically, my focus has been mainly devoted to well–posedness results for PDEs arising in modelling traffic dynamics.

Languages

Italian	mother tongue.
English	advanced level.
French	intermediate level.
German	beginner level.

Roma, 2/2/2021

Simone Dovetta