Sara Sottile

Ph.D. in Mathematics

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sarasottile

Work Experience

Mar 2024-Present **Research Fellow**, *University of Bologna*, Department of Medical and Surgical Sciences.
Research project: "Data management and analysis for WP5 of Orchestra project"
Supervisor: Prof. Paolo Boffetta.

Feb 2023-Mar 2024 **Research Fellow**, *University of Trento*, Department of Mathematics.
Research project: "Analysis of epidemic models"
Supervisor: Prof. Andrea Pugliese.

Dec 2022-Present **Author and Reviewer**, *"Qui si Risolve"*.
Preparation of educational material for High School and University.

Jan-Jul 2022 **Research Collaboration**, *Evidera*.
Collaboration within the project "Preparation of HTA for new influenza vaccine in Spain".

Apr-Sep 2021 **Research Collaboration**, *VIHTALI-Value in Health Technology and Academy for Leadership and Innovation*.
Collaboration within the project "Economic evaluation of the introduction of the live attenuated influenza vaccine (Fluenz Tetra®) in the Italian pediatric population (2-6 years)".

Education

Nov 2019-Jan 2023 **Ph.D. in Mathematics**, *University of Trento*, Trento, Italy.
Research project: "mathematical models for epidemics".
Thesis: "Different approaches to epidemic modelling: from theoretical analysis to real data", Supervisor: Prof. Andrea Pugliese

Oct 2017-Jul 2019 **M.Sc. in Mathematics (Modelling Curriculum)**, *University of Turin*, Turin, Italy.
Thesis: "Epidemic Models: a Switch Control for Networks", Supervisor: Prof. Lorenzo Fatibene, Co-supervisor: Prof. Xinzhi Liu, Grade: 110/110 summa cum Laude

Jan 2019-Apr 2019 **Exchange program**, *University of Waterloo*, Waterloo, Ontario, Canada.
GPA: 86/100

Sep 2014-Oct 2017 **B.Sc. in Mathematics**, *University of Bari "A. Moro"*, Bari, Italy.
Thesis: "On the constitutive equations in Thermodynamics", Supervisor: Prof. Arcangelo Labianca, Grade: 107/110

Publications

1. **Kaklamanos, P., Pugliese, A., Sensi, M. and Sottile, S.**, *A geometric analysis of the SIRS model with secondary infections*, 2023, Accettato in "SIAM Journal on Applied Mathematics", `https://arxiv.org/pdf/2304.03793.pdf`
2. **Della Marca, R., d'Onofrio, A., Sensi, M. and Sottile, S.**, *A geometric analysis of the impact of large but finite switching rates on vaccination evolutionary games*, Nonlinear Analysis: Real World Applications (2024), Vol. 75, 103986, `https://doi.org/10.1016/j.nonrwa.2023.103986`.
3. **Cangiotti, N., Capolli, M., Sensi, M. and Sottile, S.**, *A survey on Lyapunov functions for epidemic compartmental models*, Bollettino dell'Unione Matematica Italiana (2023), `https://doi.org/10.1007/s40574-023-00368-6`.
4. **Ottaviano, S., Sensi, M. and Sottile, S.**, *Global stability of multi-group SAIRS epidemic models*, Mathematical Methods in the Applied Sciences (2023), `https://doi.org/10.1002/mma.9303`.
5. **Calabrò, G.E. et al.**, *Health Technology Assessment: a value-based tool for the evaluation*

of healthcare technologies. Reassessment of the cell-culture-derived quadrivalent influenza vaccine: Flucelvax Tetra® 2.0, Journal of Preventive Medicine and Hygiene (2022), Vol. 63, Issue 4 Suppl. 1, pp. E1-E138, https://doi.org/10.15167/2421-4248/jpmh2022.63.4S1.
Rizzo, C., Saraceno, G., Sottile, S., Abreha, F.M. and Pugliese A., Chapter 5: "*Valutazione economica dell'introduzione del nuovo vaccino antinfluenzale quadrivalente da coltura cellulare nel contesto di cura italiano (update da nuova indicazione)*".

6. **Fochesato, A., Sottile, S., Pugliese, A., Márquez-Peláez, S., Toro-Diaz, H., Gani, R., Alvarez, P. and Ruiz-Aragón, J.**, *An Economic Evaluation of the Adjuvanted Quadrivalent Influenza Vaccine Compared with Standard-Dose Quadrivalent Influenza Vaccine in the Spanish Older Adult Population*, Vaccines (2022), Vol. 10, pp. 1360, https://doi.org/10.3390/vaccines10081360.
7. **Sottile, S., Kahramanoğulları, O. and Sensi, M.**, *How network properties and epidemic parameters influence stochastic SIR dynamics on scale-free random networks*, Journal of Simulation (2022), https://doi.org/10.1080/17477778.2022.2100724.
8. **Ottaviano, S., Sensi, M. and Sottile, S.**, *Global stability of SAIRS epidemic models*, Nonlinear Analysis: Real World Applications (2022), Vol. 26, pp. 103501, https://doi.org/10.1016/j.nonrwa.2021.103501.
9. **Boccalini, S. et al.**, *Health Technology Assessment (HTA) of the introduction of influenza vaccination for Italian children*, Journal of Preventive Medicine and Hygiene (2021), Vol. 62, Issue 2 Suppl. 1, pp. E1-E128, https://doi.org/10.15167/2421-4248/jpmh2021.62.2s1.
Rizzo, C., Sottile, S. and Pugliese A., Chapter 6: "*Valutazione economica dell'introduzione del vaccino antinfluenzale vivo attenuato (Fluenz Tetra®) nella popolazione giovanile italiana (2-6 anni)*".
10. **Sottile, S. and Liu, X.**, *Time-varying epidemic transmission in heterogeneous networks and applications to measles*, Journal of Biological Systems (2020), Vol. 28, No. 4, pp. 1-26, https://doi.org/10.1142/S0218339020500217.

Preprints

1. **Bulai, I. M., Sensi, M. and Sottile, S.**, *A geometric analysis of the SIRS compartmental model with fast information and misinformation spreading*, 2023, Preprint, https://arxiv.org/pdf/2311.06351.pdf
2. **Pugliese, A. and Sottile, S.**, *Inferring the COVID-19 infection curve in Italy*, 2020, Preprint, https://arxiv.org/pdf/2004.09404.pdf

Teaching

1st semester A.Y. 2023-24 — **Teaching Assistant for the course "Geometry I"**, *BSc in Physics*, University of Trento, Trento, Italy.

1st semester A.Y. 2023-24 — **Teaching Assistant for the course "Calculus I"**, *BSc in Computer Science and BSc in Computer, Communication and Electronic Engineering, Department of Information Engineering and Computer Science*, University of Trento, Trento, Italy.
Taught in English.

Sept 2023 — **Teaching Assistant for the Mathematics pre-course**, *Department of Economics and Management*, University of Trento, Trento, Italy.
Taught in English.

2nd semester A.Y. 2022-23 — **Teaching Assistant for the course "Calculus II"**, *BSc in Computer Science and BSc in Computer, Communication and Electronic Engineering, Department of Information Engineering and Computer Science*, University of Trento, Trento, Italy.
Taught in English.

1st semester A.Y. 2022-23 — **Teaching Assistant for the course "Calculus I"**, *BSc in Computer Science and BSc in Computer, Communication and Electronic Engineering, Department of Information Engineering and Computer Science*, University of Trento, Trento, Italy.
Taught in English.

1st semester A.Y. 2022-23 — **Teaching Assistant for the course "Mathematical Analysis III"**, *BSc in Physics, Department of Physics*, University of Trento, Trento, Italy.

1st semester A.Y. 2022-23 — **Teaching Assistant for the course"Mathematical Modeling and Simulation"**, *MSc in Quantitative and Computational Biology*, University of Trento, Trento, Italy.
Taught in English.

Jan 2021-Mar 2022 — **Exam Supervision**, *Department of Economics and Management*, University of Trento, Trento, Italy.

1st semester A.Y. 2021-22 — **Teaching Assistant for the course "Calculus I"**, *BSc in Computer Science and BSc in Computer, Communication and Electronic Engineering, Department of Information Engineering and Computer Science*, University of Trento, Trento, Italy.
Taught in English.

1st semester A.Y. 2020-21 — **Teaching Assistant for the course "Mathematical Modeling/Mathematical Biology"**, *MSc in Quantitative and Computational Biology and MSc in Mathematics*, University of Trento, Trento, Italy.
Taught in English.

Mentoring

Michela D'Amario — *Parameters estimations for modelling the COVID-19 pandemic in Italy*, MSc Thesis, University of Trento. Defense: May 2021.

Claudio Meggio — *A stochastic SEIR household model for COVID-19 epidemic including lockdown effects*, MSc Thesis, University of Turin. Defense: June 2021.

Communications

6-9 Feb 2024 Caparica (PT) — **Organizer and speaker (Mini-Symposium) and poster presentation**, *15th Conference on Dynamical Systems Applied to Biology and Natural Sciences-DSABNS*.
Title of Mini-Symposium: "Slow-fast systems in biology: geometric singular perturbation theory applications and new perspectives"
Title of Poster: "A geometric analysis of the impact of large but finite switching rates on vaccination evolutionary games"

29-31 Jan 2024 Trento (IT) — **Organizer and speaker**, *WORKSHOP-Integrated Mathematical approaches to Socio-Epidemiological Dynamics*.
Title: "A geometric analysis of the SIRS compartmental model with fast information and misinformation spreading"

28 Aug-1 Sep 2023 Matera (IT) — **Invited speaker**, *Bi-annual congress of the Italian Society of Applied and Industrial Mathematics (SIMAI)*.
Title: "A geometric analysis of the SIRS model with secondary infections"
Part of the minisymposium "MS03: Recent Advances on the mathematical and numerical modeling of epidemics"

19-21 June 2023 Girona (ES) — **Poster presentation**, *Workshop on epidemic modelling: current challenges*.
Title: "A geometric analysis of the impact of large but finite switching rates on vaccination evolutionary games"

18-19 May 2023 Napoli (IT) — **Invited speaker**, *Workshop Modellistica Socio-Epidemiologica*.
Title: "A geometric analysis of the impact of large but finite switching rates on vaccination evolutionary games"

19-23 Sep 2022 Heidelberg (DE) — **Poster presentation:**, *12th European Conference on Mathematical and Theoretical Biology-ECMTB 2022*.
Title: "Global stability of SAIRS epidemic models"

26-29 July 2022 Wien (A) — **Contributed speaker**, *10th Vienna International Conference on Mathematical Modelling-MATHMOD 2022*.
Title: "Global analysis of SAIRS-type epidemic models"

7-8 Apr 2022 Pavia (IT) — **Invited speaker**, *Kick-off Meeting PRIN2020*.
Title: "Global stability of SAIRS epidemic models"

8-11 Feb 2022 online — **Cotributed speaker**, *13th Conference on Dynamical Systems Applied to Biology and Natural Sciences-DSABNS*.
Title: "Global stability of SAIRS epidemic models"

7 Feb 2022 online — **Oganizer and speaker**, *Ph.D. Opening Day 2022 at University of Trento*.
Title: "Global stability of SAIRS epidemic models"

10 June 2021 online — **Invited speaker**, *Ph.D. Seminars at University of Groningen*.
Title: "Time-varying epidemic transmission in heterogeneous networks"

4-7 Feb 2020 Trento (IT) — **Poster presentation**, *11th Conference on Dynamical Systems Applied to Biology and Natural Sciences-DSABNS*.
Title: "Time-varying epidemic transmission in heterogeneous networks"

Attended conferences and workshops

6-9 Feb 2024 Caparica (PT) — **15th Conference on Dynamical Systems Applied to Biology and Natural Sciences-DSABNS**.

29-31 Jan 2024 Trento (IT) — **WORKSHOP-Integrated Mathematical approaches to Socio-Epidemiological Dynamics**.

28 Aug-1 Sep 2023 Matera (IT) — **Bi-annual congress of the Italian Society of Applied and Industrial Mathematics (SIMAI)**.

19-21 June 2023 Girona (ES) — **Workshop on epidemic modelling: current challenges**.

18-19 May 2023 Naples (IT) — **Workshop Modellistica Socio-Epidemiologica**.

19-23 Sep 2022 Heidelberg (DE) — **12th European Conference on Mathematical and Theoretical Biology-ECMTB 2022**.

26-29 July 2022 Wien (A) — **10th Vienna International Conference on Mathematical Modelling-MATHMOD 2022**.

7-8 Apr 2022 Pavia (IT) — **Kick-off Meeting PRIN2020**.

8-11 Feb 2022 online — **13th Conference on Dynamical Systems Applied to Biology and Natural Sciences-DSABNS**.

5-10 July 2021 online — **Networks 2021: A Joint Sunbelt and NetSci Conference**.

2-5 Feb 2021 online — **12th Conference on Dynamical Systems Applied to Biology and Natural Sciences-DSABNS**.

7-11 Dec 2020 online — **Conference on Complex Systems 2020-CSS2020**.

4 Dec 2020 online — **Warm-up for CSS2020**.

18-20 May 2020 online — **Workshop Modeling the propagation of Covid-19**.

17-18 Feb 2020 Turin (IT) — **ISI Workshop on Learning, Algorithms and Networks**.

4-7 Feb 2020 Trento (IT) — **11th Conference on Dynamical Systems Applied to Biology and Natural Sciences-DSABNS**.

Attended schools

20-25 Nov 2023 Udine (IT) — **Advanced School on "Delays and structures in dynamical systems: modeling, analysis and numerical methods"**, *CISM (Internationl Centre for mechanical sciences*, Udine, Italy.

9-13 May 2022 Bonn (DE) — **Summer School "Stochastic modelling in the life sciences"**, *Hausdorff Research Institute for Mathematics*, Bonn, Germany.

29 Nov-1 Dec 2021 online — **Karlstad Autumn School "Interacting Particles meet Homogenization and Measure Theory"**, *Karlstad University*, Karlstad, Sweden.

30 Aug-3 Sep 2021 Trento (IT) — **High-Performance Computing summer school 2021, Project M&S: Modelling and Simulation**, *University of Trento*, Trento, Italy.

Responsibilities

2023 — **Scientific committee**, *Complex Networks 2023, Menton Riviera, France*.

Nov 2021-Dec 2022 — **Member of the Committee for the Open Science**, *University of Trento*.

Dec 2020-Dec 2022 — **Member of the Committee of PhD students and grant holders**, *University of Trento*.

Dec 2020-Dec 2022 — **Elected representative for PhD students of the Dept. of Mathematics**, *University of Trento*.

Organization

Sep 2020-Dec 2022 — **Doc in Progress**, *Periodic seminars at the Dept. of Mathematics, University of Trento*.
`https://docinprogressunitn.wordpress.com/`

7 Feb 2022 — **PhD Opening Day 2022**, *Dept. of Mathematics, University of Trento*.
`https://webmagazine.unitn.it/en/evento/drmath/104217/phd-opening-2022`

11 Mar 2021 — **PhD Opening Day 2021**, *Dept. of Mathematics, University of Trento*.
`https://webmagazine.unitn.it/en/evento/drmath/90585/phd-opening-2021`

Reviewing

2023 — Waves in Random and Complex Media, TWMS Journal of Applied and Engineering Mathematics, Mathematics and Computers in Simulation, Applied Mathematical Modelling, Physica D: Nonlinear Phenomena

2022 — Journal of Mathematical Biology, Rendiconti del Circolo Matematico di Palermo Series 2, Nonlinear Analysis: Real World Applications

2021 — Journal of Biological Dynamics, Rendiconti del Circolo Matematico di Palermo Series 2

Awards and Research funding

Feb 2024 — **Travel Support for EQUADIFF 2024**, *European Society for Mathematical and Theoretical Biology*.

Feb 2024 — **Research Fellowship within the project Progetto H2020-ORCHESTRA**, *University of Bologna*, Bologna, Italy.

Feb 2023 — **Research Fellowship within the project Grant PRIN-MIUR No. 2020JLWP23 (CUP:E15F21005420006)**, *University of Trento*, Trento, Italy.

July 2022 — **Travel Support for ECMTB 2022**, *European Society for Mathematical and Theoretical Biology*.

June 2022 — **Full Grant for the school "Mathematical modeling for epidemiology: analysis, simulation and forecasting"**, *Fondazione CIME*.

Apr 2022 — **Travel support for the school "Stochastic modelling in the life sciences"**, *Hausdorff Research Institute for Mathematics*.

Dec 2020 — **Scholarships for Events on Complex Systems (SECS)**, *Young Researchers of the Complex Systems Society*.

Nov 2019 — **3 years PhD Research Fellowship MUR-funded Department of Excellence**, *University of Trento*, Trento, Italy.

Dec 2019 — **Financial support for the Extra-Erasmus mobility**, *University of Turin*, Turin, Italy.
Exchange program at University of Waterloo (CA)

Membership

Jan 2022-Present **"GNAMPA" Indam**, *Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni*.

June 2022-Present **ESMTB**, *European Society for Mathematical and Theoretical Biology*.

Dec 2020-Dec 2021 **Complex Systems Society**.

IT skills

Programming Python, R, MATLAB, Maple, HTML, Bash

Operative systems Windows, Linux

Softwares LaTeX, Word, Excel, PowerPoint

Languages

Mother tongue Italian

Other languages English (B2), Spanish (A2)

Certificates

June 2018 **English IELTS Academic**, Band Score 6.5 (CEFR Level B2).

June 2009 **ECDL Certification**, European Computer Driving Licence.