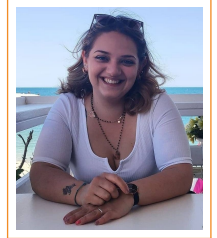


# Sara Sottile

Ph.D.

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## About me

My research interests lie in the field of mathematical models for infectious diseases. I have focused on different approaches to the development and analysis of such models, using both theoretical and computational tools. My major expertise covers several areas in dynamical systems, including classical differential equations, complex dynamical networks, hybrid systems and systems evolving on multiple time scales. I have also worked on the cost-benefit analysis of the introduction of new influenza vaccines. I am an advanced user of Matlab and LaTeX, and a competent user of R and Python.

## Employment and Academic Positions

- Feb 2023 - Present **Postdoctoral Research**, *University of Trento*, Departments of Mathematics.  
Research fellowship in "Analysis of epidemic models"  
Tutor: Prof. Andrea Pugliese
- Dec 2022 - Present **Author and reviewer**, "*Qui si risolve*".  
Preparation of teaching material for High School and University.
- Jan 2022 - Jul 2022 **Research collaboration**, *Evidera*.  
Collaboration for the project "*Preparation of HTA for new influenza vaccine in Spain*".
- Apr 2021 - Sep 2021 **Research collaboration**, *VIHTALI -Value in Health Technology and Academy for Leadership and Innovation*.  
Collaboration for the project "*Economic evaluation of the introduction of the live attenuated influenza vaccine (Fluenz Tetra®) in the Italian pediatric population (2-6 years)*".
- Nov - Dec 2018 **Administration activities**, *Research Area of School of Science of Nature*, Turin, Italy.
- Sep 29, 2017 **Scientific Entertainer**, *European Researchers' Night 2017*, Bari, Italy.

## Education

- Nov 2019 - Jan 2023 **Ph.D. in Mathematics**, *University of Trento*, Trento, Italy.  
Research fellowship in "Mathematical models of epidemics"  
Thesis: "Different approaches to epidemics modelling: from theoretical analysis to real data"  
Supervisor: Prof. Andrea Pugliese.
- Oct 2017 - Jul 2019 **M.Sc. in Mathematics (Modellistic 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 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 Constitutive Equations in Thermodynamics"  
Supervisor: Prof. Arcangelo Labianca, Grade: 107/110.

## Publications

1. 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>.
2. Cangioti, 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>.
3. 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>.
4. 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)".

5. **Fochesato, A., Sottile, S., Pugliese, A., Márquez-Peláez, S., Toro-Díaz, H., Gani, R., Álvarez, 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>.
6. **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>.
7. **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>.
8. **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)".
9. **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. **Kaklamanos, P., Pugliese, A., Sensi, M. and Sottile, S.,** *A geometric analysis of the SIRS model with secondary infections*, 2023, Preprint, <https://arxiv.org/pdf/2304.03793.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 experience

- Fall 2023 **Teaching assistant for the course Calculus II**, *B.Sc. in Architectural Sciences*, University of Trento, Trento, Italy.
- Fall 2023 **Teaching assistant for the course Calculus I**, *Joint course for B.Sc. in Computer Science and B.Sc. in Information Engineering*, University of Trento, Trento, Italy.  
*Taught in English.*
- Sep 2023 **Teaching assistant for the Mathematical pre-course**, *B.Sc. in Economics and Management*, University of Trento, Trento, Italy.  
*Taught in English.*
- Spring 2023 **Teaching assistant for the course Calculus II**, *Joint course for B.Sc. in Computer Science and B.Sc. in Information Engineering*, University of Trento, Trento, Italy.  
*Taught in English.*
- Fall 2022 **Teaching assistant for the course Calculus I**, *Joint course for B.Sc. in Computer Science and B.Sc. in Information Engineering*, University of Trento, Trento, Italy.  
*Taught in English.*
- Fall 2022 **Teaching assistant for the course Calculus III**, *B.Sc. in Physics*, University of Trento, Trento, Italy.
- Fall 2022 **Teaching assistant for the course Mathematical Modeling and Simulation**, *M.Sc. in Quantitative and Computational Biology*, University of Trento, Trento, Italy.  
*Taught in English.*
- Jan 2021 - Mar 2022 **Exams Supervisor**, *Department of Economics and Management*, University of Trento, Trento, Italy.
- Fall 2021 **Teaching assistant for the course Calculus I**, *Joint course for B.Sc. in Computer Science and B.Sc. in Information Engineering*, University of Trento, Trento, Italy.  
*Taught in English.*
- Fall 2020 **Teaching assistant for the course Mathematical Modeling/Mathematical Biology**, *Joint course for M.Sc. in Mathematics, M.Sc. in Data science and M.Sc. in Quantitative and Computational Biology*, University of Trento, Trento, Italy.  
*Taught in English.*

## Mentoring

- Michela D'Amario *Parameters estimations for modelling the COVID-19 pandemic in Italy*, Master Thesis, University of Trento, graduated in May 2021.
- Claudio Meggio *A stochastic SEIR household model for COVID-19 epidemic including lockdown effects*, Master Thesis, University of Turin, graduated in Jun 2021.

## Presentations

- 29 Aug 2023 **Bi-annual congress of the Italian Society of Applied and Industrial Mathematics (SIMAI)**,  
Matera (IT) *"A geometric analysis of the SIRS model with secondary infections"*, Invited Speaker.
- 20 Jun 2023 **Workshop on epidemic modelling: current challenges**, *"A geometric analysis of the impact of large but finite switching rates on vaccination evolutionary games"*, Poster Presentation.  
Girona (ES)
- 19 May 2023 **Workshop Modellistica Socio-Epidemiologica**, *"A geometric analysis of the impact of large but finite switching rates on vaccination evolutionary games"*, Invited Speaker.  
Naples (IT)
- 20 Sep 2022 **12th European Conference on Mathematical and Theoretical Biology - ECMTB 2022**, *"Global stability of SAIRS epidemic models"*, Poster Presentation.  
Heidelberg (DE)
- 28 Jul 2022 **10th Vienna International Conference on Mathematical Modelling - MATHMOD 2022**,  
Wien (A) *"Global analysis of SAIRS-type epidemic models"*, Contributed Speaker.
- 8 April 2022 **Kick-off Meeting PRIN2020**, *"Global stability of SAIRS epidemic models"*, Invited Speaker.  
Pavia (IT)
- 11 Feb 2022 **13th Conference on Dynamical Systems Applied to Biology and Natural Sciences - DSABNS**,  
online *"Global stability of SAIRS epidemic models"*, Contributed Speaker.
- 7 Feb 2022 **Ph.D. Opening Day 2022 at University of Trento**, *"Global stability of SAIRS epidemic models"*,  
online Invited Speaker.
- 10 Jun 2021 **Ph.D. Seminars at University of Groningen**, *"Time-varying epidemic transmission in heterogeneous networks"*, Invited Speaker.  
online
- 6 Feb 2020 **11th Conference on Dynamical Systems Applied to Biology and Natural Sciences - DSABNS**,  
Trento (IT) *"Time-varying epidemic transmission in heterogeneous networks"*, Poster Presentation.

## Participations

- 28 Aug - 1 Sep 2023 **Bi-annual congress of the Italian Society of Applied and Industrial Mathematics (SIMAI)**.  
Matera (IT) Invited Speaker
- 19-21 Jun 2023 **Workshop on epidemic modelling: current challenges**.  
Girona (ES) Poster Presentation
- 18-19 May 2023 **Workshop Modellistica Socio-Epidemiologica**.  
Naples (IT) Invited Speaker
- 19-23 Sep 2022 **12th European Conference on Mathematical and Theoretical Biology - ECMTB 2022**.  
Heidelberg (DE) Poster Presentation
- 26-29 Jul 2022 **10th Vienna International Conference on Mathematical Modelling - MATHMOD 2022**.  
Wien (A) Contributed Speaker
- 7-8 Apr 2022 **Kick-off Meeting PRIN2020**.  
Pavia (IT) Invited speaker
- 8-11 Feb 2022 **13th Conference on Dynamical Systems Applied to Biology and Natural Sciences - DSABNS**.  
online Contributed speaker
- 5-10 Jul 2021 **Networks 2021: A Joint Sunbelt and NetSci Conference**.  
online
- 2-5 Feb 2021 **12th Conference on Dynamical Systems Applied to Biology and Natural Sciences - DSABNS**.  
online Presented a contributed abstract entitled *"Susceptibility pockets at the end of an epidemic may allow for subsequent epidemic outbreaks"*.
- 7-11 Dec 2020 **Conference on Complex Systems 2020 - CSS2020**, *Complex Systems Society*.  
online
- 4 Dec 2020 **Warm-up for CSS2020**, *Young Researchers of the Complex Systems Society*.  
online
- 18-20 May 2020 **Workshop Modeling the propagation of Covid-19**, *AMS, CNRS – EHESS*, Paris.  
online
- 17-18 Feb 2020 **ISI Workshop on Learning, Algorithms and Networks**, *I.S.I. Foundation*, Turin.  
Turin (IT)
- 4-7 Feb 2020 **11th Conference on Dynamical Systems Applied to Biology and Natural Sciences - DSABNS**.  
Trento (IT) Poster Presentation

## Schools

- 9 - 13 May 2022 **Summer School “Stochastic modelling in the life sciences”**, *Hausdorff Research Institute for Mathematics*, Bonn, Germany.
- 29 Nov - 1 Dec 2021 **Karlstad Autumn School “Interacting Particles meet Homogenization and Measure Theory”**, *Karlstad University*, Karlstad, Sweden.
- 30 Aug - 3 Sep 2021 **High-Performance Computing summer school 2021, Project M&S: Modelling and Simulation**, *University of Trento*, Trento, Italy.

## Responsibilities

- Nov 2021 - Dec 2022 **Member of the “Open Science Commission”**, *University of Trento*.
- Dec 2020 - Dec 2022 **Member of the Committee of Ph.D. students and grant holders**, *University of Trento*.
- Dec 2020 - Dec 2022 **Elected representative of the Ph.D. students at the Department of Mathematics**, *University of Trento*.

## Organization

- Sep 2020 - Dec 2022 **Doc in Progress**, *University of Trento*, Department of Mathematics.  
Periodic seminars organized at Department of Mathematics of University of Trento.  
<https://docinprogressunitn.wordpress.com/>
- 7 Feb 2022 **PhD Opening Day 2022**, *University of Trento*, Department of Mathematics.  
<https://webmagazine.unitn.it/en/evento/drmath/104217/phd-opening-2022>
- 11 Mar 2021 **PhD Opening Day 2021**, *University of Trento*, Department of Mathematics.  
<https://webmagazine.unitn.it/en/evento/drmath/90585/phd-opening-2021>

## Referee activity

- 2023 Waves in Random and Complex Media, TWMS Journal of Applied and Engineering Mathematics, Mathematics and Computers in Simulation
- 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

- Feb 2023 **MUR PRIN 2020 Fellowship**, *University of Trento*, Trento, Italy.  
Topic: Analysis of epidemic models. Duration: two years.
- Jul 2022 **Travel Support for ECMTB 2022**, *European Society for Mathematical and Theoretical Biology*.
- Jun 2022 **Full Grant for attending the School “Mathematical modeling for epidemiology: analysis, simulation and forecasting”**, *Fondazione CIME*.
- Apr 2022 **Financial Support for attending 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 **Departments of Excellence Ph.D. Fellowship**, *University of Trento*, Trento, Italy.  
Topic: Mathematical models of epidemics. Duration: three years.
- Dec 2019 **Financial support “Extra Erasmus”**, *University of Turin*, Turin, Italy.  
Financial support for the exchange program at University of Waterloo (CA)

## Memberships

- Jan 2022 - Present **“GNAMPA” Indam**, *Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni*.
- Jun 2022 - Jun 2023 **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

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## Languages

Mother tongue Italian  
Other languages English (B2), Spanish (A2)

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## Certificates

Jun 2018 **English IELTS Academic**, Band Score 6.5 (CEFR Level B2).  
Jun 2009 **ECDL Certification**, European Computer Driving Licence.