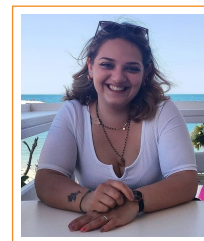# Sara Sottile

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About me

My research interests lie in the field of 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*, Deparments 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**, *Astra Zeneca*.
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. **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)*".

2. **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`.

3. **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`.

4. **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`.

5. **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)*".

6. **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. **Cangiotti, N., Capolli, M., Sensi, M. and Sottile, S.**, *A survey on Lyapunov functions for epidemic compartmental models*, 2023, Preprint, `https://arxiv.org/pdf/2301.11947.pdf`

2. **Ottaviano, S., Sensi, M. and Sottile, S.**, *Global stability of multi-group SAIRS epidemic models*, 2022, Preprint, `https://arxiv.org/pdf/2202.02993.pdf`

3. **Pugliese, A. and Sottile, S.**, *Inferring the COVID-19 infection curve in Italy*, 2020, Preprint, `https://arxiv.org/pdf/2004.09404.pdf`

Teaching experience

Mar 2023 - present	**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.*
Sep 2022 - Jan 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 2022 - Jan 2023	**Teaching assistant for the course Calculus III**, *B.Sc. in Physics*, University of Trento, Trento, Italy.
Sep 2022 - Dec 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.
Sep 2021 - Feb 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.*
Sep 2020 - Feb 2021	**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.

Talks

28 Jul 2022 Wien (A)	**10th Vienna International Conference on Mathematical Modelling - MATHMOD 2022**, *"Global analysis of SAIRS-type epidemic models"*, Contributed Speaker.
8 April 2022 Pavia (IT)	**Kick-off Meeting PRIN2020**, *"Global stability of SAIRS epidemic models"*, Invited Speaker.
11 February 2022 online	**13th Conference on Dynamical Systems Applied to Biology and Natural Sciences - DSABNS**, *"Global stability of SAIRS epidemic models"*, Contributed Speaker.
7 February 2022 online	**Ph.D. Opening Day 2022 at University of Trento**, *"Global stability of SAIRS epidemic models"*, Invited Speaker.

10 Jun 2021 online	**Ph.D. Seminars at University of Groningen**, *"Time-varying epidemic transmission in heterogeneous networks"*, Invited Speaker.

Participations

19-23 Sep 2022 Heidelberg (DE)	**12th European Conference on Mathematical and Theoretical Biology - ECMTB 2022**. Poster presentation titled *"Global stability of SAIRS epidemic models"*
26-29 Jul 2022 Wien (A)	**10th Vienna International Conference on Mathematical Modelling - MATHMOD 2022**. Contributed Speaker
7-8 Apr 2022 Pavia (IT)	**Kick-off Meeting PRIN2020**. Invited speaker
8-11 Feb 2022 online	**13th Conference on Dynamical Systems Applied to Biology and Natural Sciences - DSABNS**. Contributed speaker
5-10 Jul 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**. Presented a contributed abstract entitled *"Susceptibility pockets at the end of an epidemic may allow for subsequent epidemic outbreaks"*.
7-11 Dec 2020 online	**Conference on Complex Systems 2020 - CSS2020**, *Complex Systems Society*.
4 Dec 2020 online	**Warm-up for CSS2020**, *Young Researchers of the Complex Systems Society*.
18-20 May 2020 online	**Workshop Modeling the propagation of Covid-19**, *AMS, CNRS – EHESS*, Paris.
17-18 Feb 2020 Turin (IT)	**ISI Workshop on Learning, Algorithms and Networks**, *I.S.I. Foundation*, Turin.
4-7 Feb 2020 Trento (IT)	**11th Conference on Dynamical Systems Applied to Biology and Natural Sciences - DSABNS**. Poster presentation titled *"Time-varying epidemic transmission in heterogeneous networks"*.

Schools

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

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
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.

Memberships

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

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

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

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

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