

# Mattia Sensi

Postdoctoral researcher at Politecnico di Torino

Politecnico di Torino  
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## RESEARCH INTERESTS

Mathematical modelling, mathematical biology, mathematical epidemiology, dynamical systems, Geometric Singular Perturbation Theory (GSPT), qualitative theory of ordinary differential equations, partial differential equations, delay differential equations.

## EDUCATION

**Ph.D. in Mathematics**, *cum laude*, Università degli Studi di Trento. November 2017 – January 2021

Thesis: “A Geometric Singular Perturbation approach to epidemic compartmental models”

Supervisor: [Prof. Andrea Pugliese](#)

**M.Sc. in Mathematics**, Universiteit van Amsterdam. September 2015 – June 2017

Thesis: “Homoclinic vegetation stripes in a Klausmeier-Gray-Scott model”

Supervisor: [Prof. Dr. Arjen Doelman](#)

**B.Sc. in Mathematics**, Università degli Studi di Padova. September 2011 – September 2014

Thesis: “Portfolio optimization for quadratic utility function with partial information”

Supervisor: [Prof. Wolfgang J. Runggaldier](#)

## RESEARCH EXPERIENCE

**Postdoctoral researcher in Mathematics**, Politecnico di Torino. March 2023 – present

Postdoctoral researcher in the group of [Prof. Andrea Tosin](#).

**Postdoctoral researcher in Mathematics**, Inria at Université Côte d’Azur. December 2021 – February 2023

Postdoctoral researcher in the group [MathNeuro](#), led by [Prof. Mathieu Desroches](#).

**Postdoctoral researcher in Mathematics**, TUDelft. March – November 2021

Postdoctoral researcher in the group [NAS](#), led by [Prof. Piet Van Mieghem](#).

## PUBLICATIONS

8. **S. Ottaviano, M. S. and S. Sottile.** *Global stability of SAIRS epidemic models*. Nonlinear Analysis: Real World Applications, Volume 65, June 2022, 103501
7. **S. Sottile, O. Kahramanogullari and M. S..** *How network properties and epidemic parameters influence stochastic SIR dynamics on scale-free random networks*. Journal of Simulation, Volume 16, Issue 4 (2022)
6. **B. Chang, L. Yang, M. S., M. A. Achterberg, F. Wang, M. Rinaldi and P. Van Mieghem.** *Markov Modulated Process to model human mobility*. Complex Networks & Their Applications X. Studies in Computational Intelligence, vol 1015, Springer (2022)
5. **N. Cangiotti and M. S..** *A geometric characterization of VES and Kadiyala-type production functions*. Filomat, Volume 35, No 5 (2021)
4. **N. Cangiotti and M. S..** *Notes on a conformal characterization of 2-dimensional Lorentzian manifolds with constant Ricci scalar curvature*. U.P.B. Sci. Bull., Series A, Vol. 83, Iss. 2, 2021
3. **T. Lorenzi, A. Pugliese, M. S. and A. Zardini.** *Evolutionary dynamics in an SI epidemic model with phenotype-structured susceptible compartment*. Journal of Mathematical Biology 83, 72 (2021)
2. **H. Jardón-Kojakhmetov, C. Kuehn, A. Pugliese and M. S..** *A geometric analysis of the SIRS epidemiological model on a homogeneous network*. Journal of Mathematical Biology 83, 37 (2021)
1. **H. Jardón-Kojakhmetov, C. Kuehn, A. Pugliese and M. S..** *A geometric analysis of the SIR, SIRS and SIRWS epidemiological models*. Nonlinear Analysis: Real World Applications, Volume 58, April 2021, 103220

## PREPRINTS

7. **M. S., M. Desroches and S. Rodrigues.** *Slow-fast dynamics in a neurotransmitter release model: delayed response to a time-dependent input signal*. [Preprint on arXiv](#)
6. **N. Cangiotti, M. Capolli, M. S. and S. Sottile.** *A survey on Lyapunov functions for epidemic compartmental models*. [Preprint on arXiv](#)
5. **M. A. Achterberg and M. S..** *A minimal model for adaptive SIS epidemics*. [Preprint on arXiv](#)
4. **P. Kaklamanos, C. Kuehn, N. Popovic and M. S..** *Entry-exit functions in fast-slow systems with intersecting eigenvalues*. [Preprint on arXiv](#)
3. **N. Cangiotti, M. Capolli and M. S..** *A Generalization of Lanchester’s Model of Warfare*. [Preprint on arXiv](#)
2. **S. Ottaviano, M. S. and S. Sottile.** *Global stability of multi-group SAIRS epidemic models*. [Preprint on arXiv](#)
1. **M. Aguiar, B. Kooi, A. Pugliese, M. S. and N. Stollenwerk.** *Time scale separation in the vector borne disease model SIRUV via center manifold analysis*. [Preprint on medRxiv](#)

## TEACHING EXPERIENCE

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### At Inria – Université Côte d’Azur:

- Teacher of Mathematics for *Linear Algebra Bootcamp*, for first year students of Master’s Degree in Computational Neuroscience, September – October 2022

### At Università degli Studi di Trento:

- Assistant teacher for [Prof. Alberto Valli](#)’s course *Analisi 1*, for first year students of Bachelor’s Degree in Civil, Environmental and Mechanical Engineering, September 2018 – February 2019, September 2020 – February 2021, September – December 2022
- Tutor for [Prof. Andrea Pugliese](#)’s course *Probabilità e Statistica 2*, for second year students of Bachelor’s Degree in Biotechnologies, February – May 2018

### At Università Popolare Trentina (CFP-UPT):

- Teacher of Mathematics, October 2019 – June 2020

### At Universiteit van Amsterdam:

- Assistant teacher for [Prof. Dr. Rob Stevenson](#)’s course *Numerieke Analyse*, for third year students of Bachelor’s Degree in Mathematics, February – June 2017
- Assistant teacher for [Dr. Han Peters](#)’ course *Wiskunde 3*, for third year students of Bachelor’s Degree in Physics, November – December 2015

### Other:

- Private tutor for [WisMon / Bèta onderwijsinstituut](#), Amsterdam and Utrecht, April 2016 – June 2017
- Freelance private teacher of Mathematics and Physics, for high-school and university students, 2008 – present

## MENTORING

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### Master thesis:

- Brian Chang, February – June 2021. [Modeling the Spread of Epidemics](#)
- Liufei Yang, February – June 2021. [Developing a Markov-Modulated Process Model for Mobility Processes](#)

## VISITING PERIODS

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### Visiting postdoc:

- Trento, Italy, 5 – 8 December 2022. At University of Trento, working with [Prof. Andrea Pugliese](#) and [Sara Sottile](#)
- Amsterdam and Groningen, the Netherlands, 21 – 25 November 2022. At VU Amsterdam and Rijksuniversiteit Groningen, working with [Prof. Bob Rink](#) and [Prof. Hildeberto Jardón-Kojakhmetov](#)

### Visiting Ph.D. student:

- München, Germany, 15 April – 15 June 2019. At Technische Universität München (TUM), working with [Prof. Christian Kuehn](#) and [Dr. Hildeberto Jardón-Kojakhmetov](#)

## COMMUNICATIONS

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|   |                        |
|---|------------------------|
| <b>Invited speaker</b> , University of Trento.  | 7 December 2022        |
| <a href="#">Mathematics Seminar</a> , title: “ <i>Delayed loss of stability in multiple time scale models of natural phenomena</i> ”                    |                        |
| <b>Invited speaker</b> , Rijksuniversiteit Groningen.   | 23 November 2022       |
| <a href="#">Floris Takens Seminar</a> , title: “ <i>Entry-exit functions in fast-slow systems with intersecting eigenvalues</i> ”                       |                        |
| <b>Invited speaker</b> , Rijksuniversiteit Groningen.   | 21 November 2022       |
| <a href="#">Extra Dynamics Seminar</a> , title: “ <i>A Geometric Singular Perturbation approach to epidemic compartmental models</i> ”                  |                        |
| <b>Invited speaker</b> , University of Edinburgh.   | 14 October 2022        |
| <a href="#">Applied and Computational Mathematics</a> , title: “ <i>Delayed loss of stability in multiple time scale models of natural phenomena</i> ”  |                        |
| <b>Minisymposium organizer and contributed speaker</b> , <a href="#">ECMTB 2022</a> , Heidelberg.   | 19–23 September 2022   |
| Title: “ <i>A generalization of the full SNARE-SM model</i> ”.  |                        |
| Minisymposium: “Recent advances in mathematical modelling in neuroscience”  |                        |
| <b>Contributed speaker</b> , <a href="#">ENOC 2022</a> , Lyon.  | 17 – 22 July 2022      |
| Title: “ <i>Delayed loss of stability in multiple time scale models of natural phenomena</i> ”.   |                        |
| Part of the minisymposium “MS-05 Slow-Fast Systems and Phenomena”   |                        |
| <b>Contributed speaker</b> , <a href="#">100 UMI - 800 UniPD</a> , Padova.  | 23 – 27 May 2022       |
| Title: “ <i>A Geometric Singular Perturbation approach to epidemic compartmental models</i> ”   |                        |
| <b>Seminar organizer</b> , Inria – Université Côte d’Azur.  | April – September 2022 |
| <a href="#">MathNeuro seminars</a> , cycle of seminars on mathematical models in neuroscience   |                        |
| <b>Invited speaker</b> , University of Edinburgh.   | 11 March 2022          |
| <a href="#">Edinburgh Dynamical Systems Study Group</a> , title: “ <i>Entry-exit functions: beyond eigenvalue separation</i> ”                          |                        |
| <b>Invited speaker</b> , University of Edinburgh.   | 18 June 2021           |
| <a href="#">Edinburgh Dynamical Systems Study Group</a> , title: “ <i>A Geometric Singular Perturbation approach to epidemic compartmental models</i> ” |                        |
| <b>Organizer, scientific committee and contributed speaker</b> , <a href="#">DSABNS 2020</a> , Trento.  | 4 – 7 February 2020    |
| Title: “ <i>A GSPT approach to epidemics on homogeneous graphs</i> ”  |                        |
| <b>Invited speaker</b> , University of Trento.  | 12 September 2019      |
| <a href="#">Doc in Progress</a> , title: “ <i>An introduction to Geometric Singular Perturbation Theory</i> ”   |                        |
| <b>Contributed speaker</b> , <a href="#">Edinburgh Slow-Fast-Ival</a> , Edinburgh.  | 4 – 5 July 2019        |
| Title: “ <i>A GSPT approach to perturbed SIR and SIRWS models</i> ”   |                        |
| <b>Contributed speaker</b> , <a href="#">DSABNS 2019</a> , Naples.  | 3 – 6 February 2019    |
| Title: “ <i>A GSPT approach to perturbed SIR and SIRWS models</i> ”   |                        |
| <b>Invited speaker</b> , Technische Universität München (TUM).  | 21 January 2019        |
| <a href="#">Oberseminar Dynamics</a> , title: “ <i>A GSPT approach to perturbed SIR and SIRWS models</i> ”  |                        |

## REVIEWING

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### Journals:

- [Journal of Mathematical Biology](#)
- [Advances in Difference Equations](#)
- [Mathematical Methods in the Applied Sciences](#)
- [Journal of Complex Networks](#)
- [Mathematical Biosciences and Engineering](#)
- [Journal of Biological Systems](#)
- [International Journal of Biomathematics](#)
- [Mathematics and Computers in Simulation](#)

## ATTENDED CONFERENCES, SCHOOLS AND WORKSHOPS

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| <b>Selected participant</b> , <a href="#">NeuroMod Meeting 2022</a> , Antibes.   | 30 June – 1 July 2022 |
| <b>Selected participant</b> , <a href="#">MoDiS – Modelling Diffusive Systems: Theory &amp; Biological Applications</a> , Edinburgh. | 6 – 9 September 2021  |
| <b>Selected participant</b> , online Hausdorff School: <a href="#">Diffusive Systems</a> , Bonn.                                     | 12 – 15 April 2021    |
| <b>Selected participant</b> , <a href="#">Mathematical Biology on the Mediterranean Conference</a> , Samos.                          | 1 – 8 September 2019  |
| <b>Selected participant</b> , <a href="#">Multiscale Phenomena in Geometry and Dynamics</a> , München.                               | 22 – 26 July 2019     |
| <b>Selected participant</b> , <a href="#">Mathematics for BioMedicine</a> , Rome.  | 8 – 11 October 2018   |
| <b>Selected participant</b> , <a href="#">The Helsinki Summer School on Mathematical Ecology and Evolution 2018</a> , Turku.         | 19 – 26 August 2018   |

## MEMBERSHIP

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### GNAMPA - INdAM.

2017–2021

Member of the group [Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni](#), of the [Istituto Nazionale di Alta Matematica](#)

## SOFTWARE

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$\text{\LaTeX}$ , Matlab, Wolfram Mathematica, Python, Microsoft Office tools.

## LANGUAGES

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Italian (mother tongue), English (C1).