Dr.

Rossella Della Marca

Postdoctoral fellow
SISSA – International School for Advanced Studies, Trieste (Italy)

Personal details

27/07/1993
Italian
Married (2022), 1 child (2023)
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Italian (mother tongue); English (fluent); Deutsch (basic)
SISSA, via Bonomea 265, room 547, 5th floor, 34136 Trieste (Italy)

Research interests

- Dynamical Systems theory and applications
- Mathematical Epidemiology and Ecology: control and optimal control problems, socio-behavioural aspects, agent-based models
- Kinetic models of infectious and autoimmune diseases

Programming languages

C++, Fortran, Pascal

Mathematical software packages

MATLAB, Wolfram Mathematica

Employment

12/2021 – current	Postdoctoral fellow – SISSA, Trieste (Italy) International School for Advanced Studies, Mathematics Area Mathematical Analysis, Modelling and Applications Group Coordinator: Prof. Rozza G
09/2021 – 11/2021	INdAM Postdoctoral fellow – University of Naples Federico II (Italy) Funding institution: Istituto Nazionale di Alta Matematica, Roma (Italy) Host institution: University of Naples Federico II, Dept. Mathematics and Applications Supervisor: Prof. Buonomo B
01/2021 – 08/2021	Research fellow – IZSLER, Parma (Italy) Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna Risk Analysis and Genomic Epidemiology Unit Supervisor: Dr. Pongolini S

Habilitations

06/02/2023 – 06/02/2033	Italian National Scientific Habilitation as Associate Professor in Mathematical Physics (ASN, 01/A4)

Education

26/02/2021	PhD in Mathematics *cum laude* – University of Parma (Italy) In convention with University of Ferrara and University of Modena and Reggio Emilia Thesis: Some Challenging Control Problems in Mathematical and Behavioral Epidemiology Supervisor: Prof. Groppi M
18/07/2017	MSc in Mathematics (110/110 *cum laude*) – University of Naples Federico II (Italy) Thesis: Optimal Control of Periodic Epidemic Models Advisor: Prof. Buonomo B
27/10/2015	BSc in Mathematics (110/110 *cum laude*) – University of Naples Federico II (Italy) Thesis: Archi in PG(2,Q) e Calotte in PG(3,Q) Advisor: Prof. Durante N

Visiting periods

01/03/2020 – 15/04/2020	Visiting PhD student – CMAT-UMinho, Guimarães (Portugal) Universidade do Minho, Centro de Matemática Local advisor: Prof. Soares AJ

14/02/2019 – 17/04/2019 Visiting PhD student – iPRI, Lyon (France)
International Prevention Research Institute
Local advisor: Dr. d'Onofrio A

Research grants

Fellowships

02/2020 Travel fellowship to support the visiting at CMAT-UMinho (Portugal)
Awarded by University of Modena and Reggio Emilia, €1,000

01/2019 Travel fellowship to support the visiting at iPRI (France)
Awarded by Laboratory Ypatia of Mathematical Sciences, €1,836

Projects

03/2023 – 02/2026 FCT Grant for Scientific Research and Technological Development Projects
Project: Mathematical Modeling of Multi-scale Control Systems: applications to human diseases
Role: participant (PI: Prof. Silva C), €249,756

03/2023 – 02/2025 University of Parma – MUR Grant for Research 2022
Project: Collective and self-organised dynamics: kinetic and network approaches
Role: participant (PI: Prof. Groppi M), €56,892

01/2023 – 12/2023 INdAM GNFM Grant for Young Researchers 2023
Project: Systems of PDEs for the interaction of epidemics, individual behaviour and mobility patterns
Role: PI, €2,500

02/2021 – 07/2022 INdAM GNFM Grant for Young Researchers 2020
Project: Kinetic models for the transmission of infectious diseases through interactions among individuals
Role: participant (PI: Dr. Loy N), €2,800

Awards

28/07/2023 UMI-MSE prize 2023 for the best PhD thesis concerning research in mathematical epidemiology, social and population dynamics
Awarded by UMI group 'Modellistica Socio-Epidemiologica', €350 voucher for Springer books as a gift

05/06/2015 Faculty prize 2015 for the most meritorious students
Awarded by University of Naples Federico II, electronic device as a gift

Papers

20. Della Marca R, Menale M. Modelling the impact of opinion flexibility on the vaccination choices during epidemics. *Ric Mat* 2024 (In press)
19. Buonomo B, Della Marca R. A behavioural vaccination model with application to meningitis spread in Nigeria. *Appl Math Model* 2024; 125:334-350
18. Della Marca R, d'Onofrio A, Sensi M, Sottile S. A geometric analysis of the impact of large but finite switching rates on vaccination evolutionary games. *Nonlinear Anal Real World Appl* 2024; 75:103986 [Preprint: arXiv:2303.14248]
17. Della Marca R, Loy N, Tosin A. An SIR model with viral load-dependent transmission. *J Math Biol* 2023; 86:61 [Preprint: arXiv:2208.12004v1]
16. Della Marca R, Loy N, Menale M. Intransigent vs. volatile opinions in a kinetic epidemic model with imitation game dynamics. *Math Med Biol* 2023; 40(2):111-140
15. Della Marca R, Groppi M, Soares AJ. Human-induced oscillations in a network landscape model. *Commun Nonlinear Sci Numer Simul* 2022; 115:106722
14. Buonomo B, Della Marca R, Rionero S. Oscillation thresholds via the novel MBR method with application to oncolytic virotherapy. *Nonlinear Anal: Model Control* 2022; 27(5):948-963
13. Buonomo B, Della Marca R, Sharbayta SS. A behavioral change model to assess vaccination-induced relaxation of social distancing during an epidemic. *J Biol Syst* 2022; 30(1):1-25
12. Della Marca R, Machado Ramos MP, Ribeiro C, Soares AJ. Mathematical modelling of oscillating patterns for chronic autoimmune diseases. *Math Methods Appl Sci* 2022; 45(11):7144-7161 [Preprint: 10.22541/au.163571651.16943259/v1]

11. Della Marca R, Loy N, Tosin A. An SIR-like kinetic model tracking individuals' viral load. *Netw Heterog Media* 2022; 17(3):467-494 [Preprint: arXiv:2106.14480]
10. Buonomo B, Della Marca R, d'Onofrio A, Groppi M. A behavioural modelling approach to assess the impact of COVID-19 vaccine hesitancy. *J Theor Biol* 2022; 534:110973 [Preprint: arXiv:2106.11745]
9. Bolzoni L, Della Marca R, Groppi M. On the optimal control of SIR model with Erlang-distributed infectious period: isolation strategies. *J Math Biol* 2021; 83:36
8. Della Marca R, d'Onofrio A. Volatile opinions and optimal control of vaccine awareness campaigns: chaotic behaviour of the forward-backward sweep algorithm vs. heuristic direct optimization. *Commun Nonlinear Sci Numer Simul* 2021; 98:105768
7. Buonomo B, Della Marca R. Effects of information-induced behavioural changes during the COVID-19 lockdowns: the case of Italy. *R Soc Open Sci* 2020; 7:201635 [Preprint: medRxiv 2020.05.20.20107573]
6. Bolzoni L, Della Marca R, Groppi M, Gragnani A. Dynamics of a metapopulation epidemic model with localized culling. *Discrete Contin Dyn Syst Ser B* 2020; 25(6):2307-2330
5. Bolzoni L, Bonacini E, Della Marca R, Groppi M. Optimal control of epidemic size and duration with limited resources. *Math Biosci* 2019; 315:108232
4. Buonomo B, Della Marca R. Oscillations and hysteresis in an epidemic model with information-dependent imperfect vaccination. *Math Comput Simul* 2019; 162:97-114
3. Buonomo B, Della Marca R, d'Onofrio A. Optimal public health intervention in a behavioural vaccination model: the interplay between seasonality, behaviour and latency period. *Math Med Biol* 2019; 36(3):297-324
2. Groppi M, Della Marca R. Modelli epidemiologici e vaccinazioni: da Bernoulli a oggi. *Mat Cult Soc Riv Unione Mat Ital* 2018; 3(1):45-59
1. Buonomo B, Della Marca R. Optimal bed net use for a dengue disease model with mosquito seasonal pattern. *Math Methods Appl Sci* 2018; 41(2):573-592

Scientific communications

Seminars

06/02/2023 University of Addis Ababa (Ethiopia)
18/06/2021 MCMslot – Online Series of Seminars 2021
24/07/2020 Universidade do Minho, Braga (Portugal) [webinar]
29/05/2020 Universidade de Aveiro (Portugal) [webinar]

Invited talks

07/09/2023 XXII Congress of the 'Unione Matematica Italiana', Pisa (Italy)
11/07/2023 MS 'Control theory perspectives on mathematical epidemiology' within the World Congress of the 'International Federation of Automatic Control', Yokohama (Japan)
29/06/2023 Kick off Meeting on 'Collective and Self-Organised Dynamics: Kinetic and Network Approaches', Parma (Italy)
18/05/2023 Workshop on 'Modellistica Socio-Epidemiologica', Naples (Italy)
09/02/2023 Ethio-Italy Colloquium on 'Applied Mathematics', Hawassa (Ethiopia)
15/12/2021 Young Researchers Conference on 'Numerical Aspects of Hyperbolic Balance Laws and Related Problems', Verona (Italy)
03/09/2021 MS 'Novel approaches in the mathematical understanding of COVID-19 epidemic' within the Congress of the 'Italian Society of Applied and Industrial Mathematics', Parma (Italy)
30/08/2021 MS 'Mathematical models in ecology and epidemiology' within the Congress of the 'Italian Society of Applied and Industrial Mathematics', Parma (Italy)
02/07/2020 Online Workshop on 'Stochastic Modeling on Complex Systems'
04/04/2020 Electronic Workshop on 'Collective Models, Control and Uncertainty Quantification for Infectious Diseases and Related Problems'

Contributed talks

11/07/2022 SIAM Conference on 'Life Sciences', Pittsburgh (Pennsylvania, US)

15/06/2022	International Conference on 'Models in Population Dynamics, Ecology and Evolution', Turin (Italy)
10/06/2022	XXI International Conference on 'Waves and Stability in Continuous Media', Catania (Italy)
27/05/2022	Conference for the 100 years of the 'Unione Matematica Italiana' and 800 years of the University of Padova, Padova (Italy)
26/11/2021	Naples one-day Workshop on 'Recent Advances in Mathematical Physics', Naples (Italy)
07/09/2021	XLVI Summer School on 'Mathematical Physics', Ravello (Italy)
06/02/2020	11th Workshop on 'Dynamical Systems Applied to Biology and Natural Sciences', Trento (Italy)
04/09/2019	XLIV Summer School on 'Mathematical Physics', Ravello (Italy)
20/09/2018	XLIII Summer School on 'Mathematical Physics', Ravello (Italy)
04/09/2018	2nd Erice International Conference on 'Mathematical and Computational Epidemiology', Erice (Italy)
29/08/2018	CIME-EMS Summer School on 'The Mathematics of Mechanobiology', Cetraro (Italy)

Posters

05/02/2019	10th Workshop on 'Dynamical Systems Applied to Biology and Natural Sciences', Naples (Italy)
15/06/2018	9th Summer School on 'Methods and Models of Kinetic Theory', Porto Ercole (Italy)
07/02/2018	9th Workshop on 'Dynamical Systems Applied to Biology and Natural Sciences', Turin (Italy)

Events organization

2021 – 2022 Online Series of Seminars 'Divulgazioni Notturne di Fisica Matematica'

Schools attendance

06 – 15/09/2021	XLVI Summer School on 'Mathematical Physics', Ravello (Italy)
13 – 15/01/2020	Winter School on 'Reaction Diffusion PDE's and Optimization', Brescia (Italy)
02 – 14/09/2019	XLIV Summer School on 'Mathematical Physics', Ravello (Italy)
08 – 12/07/2019	Summer School on 'Data Science and Epidemic Models', Trento (Italy)
26 – 30/11/2018	Autumn School on 'From Interacting Particle Systems to Kinetic Equations: Modelling, Control, and Numerical Methods', Verona (Italy)
10 – 22/09/2018	XLIII Summer School on 'Mathematical Physics', Ravello (Italy)
27 – 31/08/2018	CIME-EMS Summer School on 'The Mathematics of Mechanobiology', Cetraro (Italy)
10 – 16/06/2018	9th Summer School on 'Methods and Models of Kinetic Theory', Porto Ercole (Italy)

Memberships

07/2022 – current	SIAM (Society for Industrial and Applied Mathematics)
01/2018 – current	INdAM GNFM (Italian National Group of Mathematical Physics)

Editorial activity

Review Editor for	*Front Appl Math Stat*
Reviewer for	*Sci Rep; Appl Math Model*; *PLoS ONE*; *Commun Nonlinear Sci Numer Simul; J Theor Biol*; *Math Biosci*; *J Optim Theory Appl*; *Math Comput Simul*; *Math Methods Appl Sci*; *J Biol Syst; J Appl Math Comput*; *Ric Mat; Adv Differ Equ*; *Math Comput Model Dyn Syst; Decis Econ Finance*

Teaching activity

Lecturer

2022 – 2023 PhD in Mathematical Analysis, Modelling, and Applications, course 'Topics in Mathematical Epidemiology' – SISSA

Teaching assistant

2018 – 2020 BSc in Chemistry, course 'Mathematics 1 and exercises', Prof. Lorenzi LFG – University of Parma

Tutoring

2019 – 2020	BSc in Engineering – University of Parma
2018 – 2020	BSc in Chemistry – University of Parma

2018 – 2019 BSc in Biology; MSc in Biomolecular, Genomic and Cellular Sciences; MSc in Genomic, Molecular and Industrial Biotechnologies – University of Parma

2016 – 2017 BSc in Mathematics – University of Naples Federico II (student-to-student tutoring)

Mentoring activity

Co-advisor of BSc thesis in Mathematics

17/12/2020 *Modelli matematici per malattie trasmesse da vettore e applicazione al West Nile virus* (Alinovi A), University of Parma

26/09/2019 *Analisi di modelli epidemiologici con vaccinazione dipendente dalla scelta* (Ongari C), University of Parma

14/12/2017 *Analisi qualitativa di un modello SIS con esenzione razionale dalla vaccinazione* (Martani S), University of Parma

Dissemination activity

Seminars

07/06/2021 'Stage di Matematica e Informatica', University of Parma

10/05/2021 'Campus di Matematica, Intelligenza Artificiale e Crittografia', University of Turin

10/06/2019 'Stage di Matematica e Informatica', University of Parma

Books

2020 Della Marca R. *La vaccinazione nei modelli epidemiologici: da Bernoulli a oggi – Con una prefazione di Paolo Linati*. Amazon Publishing

Events

27/09/2019 Participation to '2019 European Researchers' Night', University of Parma

Miscellaneous

03/11/2015 Goethe Zertifikat A2 Start Deutsch 2

05/07/2012 High school diploma (100/100 *cum laude*) – Liceo Classico AM de' Liguori, Acerra (Italy)

20/06/2011 ESOL Certificate Level B2 Vantage

14/05/2010 ECDL – European Computer Driving Licence

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