Lorenzo Rimella

Assegnista (Research Associate)

ESOMAS, Università degli studi di Torino and Collegio Carlo Alberto, Torino, IT

lorenzo.rimella@unito.it | lorenzorimella.github.io | LorenzoRimella | lorenzo-rimella-3b5100132

Professional Experience

Università degli studi di Bergamo — *Bergamo, IT*
Ricercatore a tempo determinato in tenure-track (Assistant Professor) — *07/25 – present*

Università degli studi di Torino — *Torino, IT*
Assegnista (Research Associate) - Dipartimento di Scienze economico-sociali e matematico-statistiche (ESOMAS) — *04/24 – 06/25*
Line manager: Dr. G. Rebaudo-Bayesian methods for interpretable random structures

Collegio Carlo Alberto — *Torino, IT*
Affiliation - Statistics Initiative — *04/24 – 03/25*

Università degli studi di Bergamo — *Bergamo, IT*
Professore a contratto (Temporary lecturer) - Department of Management — *02/25 – 09/25*

Lancaster University — *Lancaster, UK*
Senior Research Associate - Mathematics And Statistics — *04/21 – 03/24*
Line manager: Prof. P. Fearnhead-Bayesian Data Science for Health Research (Bayes4Health)

Education

University of Bristol — *Bristol, UK*
PhD in Mathematics (Statistics) — *09/17 – 06/21*
- Supervisor: Prof. N. Whiteley
- Thesis: High-dimensional Hidden Markov Models

Collegio Carlo Alberto — *Torino, IT*
Master in Statistics and Applied Mathematics — *09/15 – 07/17*
- Final mark: Pass with distinction (full mark)

Università degli studi di Torino — *Torino, IT*
M. Sc. in Stochastics and Data Science — *09/15 – 07/17*
- Final mark: 110/110 cum laude and special mention

Università degli studi di Torino — *Torino, IT*
B. Sc. in Mathematics for Finance and Insurance — *09/12 – 07/15*
- Final mark: 110/110 cum laude

Teaching Experience

02/25 – 09/25	**Statistica (Statistics)**, Professore a contratto (Temporary Lecturer) **B. Sc. in Management**, 2nd year course on basic Statistics and Probability **Università degli studi di Bergamo**, 72 contact hours, 230 enrolled students	*Bergamo, IT*
01/19 – 05/19	**Bayesian Modelling**, Teaching Assistant **B. Sc. in Mathematics**, 3rd year course **University of Bristol**, 53 contact hours	*Bristol, UK*
09/18 – 12/18	**Statistics 2**, Teaching Assistant **B. Sc. in Mathematics**, 2nd year course **University of Bristol**, 53 contact hours	*Bristol, UK*
01/18 – 05/18	**Statistics 1**, Teaching Assistant **B. Sc. in Mathematics**, 1st year course **University of Bristol**, 53 contact hours	*Bristol, UK*
03/18 – 05/18	**Analysis**, Exam Marking **B. Sc. in Mathematics**, 1st year course **University of Bristol**, 10 contact hours	*Bristol, UK*
09/16 – 01/17	**Probability and Statistics**, Tutor **B. Sc. in Mathematics for Finance and Insurance**, 2nd year course **University of Turin**, 50 contact hours	*Torino, IT*

Supervision and advising

05/23-04/24	**Max Howell**, PhD student co-supervision with Prof. C. Sherlock and Prof. R. McCrea **Title:** Statistical Solutions for the Open Challenges of Integrated Population Models	*Lancaster University*
05/21-09/21	**Katie Law**, Master's thesis advisor **Title:** Modelling the COVID-19 Epidemic and Non-pharmaceutical Interventions in England with Approximate Bayesian Computation	*Lancaster University*

Publications

Articles in Peer-Reviewed Journals

[10] Battiston M, **Rimella L**. 2025. Disclosure risk assessment with Bayesian non-parametric hierarchical modelling. To appear in Statistics and Computing (arXiv:2408.12521 [stat.AP]).

[9] **Rimella L**, Jewell C, Fearnhead P. 2025. Simulation Based Composite Likelihood. Statistics and Computing.

[8] Rimella N, **Rimella L**, Osello A. 2025. Machine Learning Method for As-Is Tunnels Information Model Reconstruction. Automation in Construction.

[7] **Rimella L**, Whiteley N. 2025. Hidden Markov Neural Networks. Entropy.

[6] Duffield S, Power S, **Rimella L**. 2024. A State-Space Perspective on Modelling and Inference for Online Skill Rating. Journal of the Royal Statistical Society: Series C.

[5] Mwapasa T, Chidziwisano K, Mphasa M, Cocker D, **Rimella L**, Amos S, Feasey N, Morse T. 2024. Key environmental exposure pathways to antimicrobial resistant bacteria in southern Malawi: A SaniPath approach. Science of the Total Environment

[4] Whitehouse M, Whiteley N, **Rimella L**. 2023. Consistent and fast inference in compartmental models of epidemics using Poisson Approximate Likelihoods. Journal of the Royal Statistical Society: Series B.

[3] **Rimella L**, Jewell C, Fearnhead P. 2023. Inference on Extended-Spectrum Beta-Lactamase *Escherichia coli* and *Klebsiella pneumoniae* data through SMC^2. Journal of the Royal Statistical Society: Series C.

[2] **Rimella L**, Jewell C, Fearnhead P. 2023. Approximating optimal SMC proposal distributions in individual-based epidemic models. Statistica Sinica.

[1] **Rimella L**, Whiteley N. 2022. Exploiting locality in high-dimensional factorial hidden Markov models. Journal of Machine Learning Research.

International Conference Proceedings (Peer-Reviewed) and Discussions

[11] Whitehouse M, Whiteley N, **Rimella L**. 2025. Discussion of "Statistical aspects of the Covid-19 response' by Wood et al.". Journal of the Royal Statistical Society: Series A.

[12] Fasano A, Rebaudo G, **Rimella L**. 2025. Empirical Bayes for the Ridge Penalty in Probit Models. Italian Statistical Society Series on Advances in Statistics (SIS 2025).

[13] Whiteley N, **Rimella L**. 2021. Inference in Stochastic Epidemic Models via Multinomial Approximations. International Conference on Artificial Intelligence and Statistics, 1297-1305.

Preprints and Submitted Articles

[14] **Rimella L**, Whiteley N, Jewell C, Fearnhead P, Whitehouse M. 2025. Scalable calibration for partially observed individual-based epidemic models through categorical approximations. Arxiv paper (arXiv:2501.03950 [stat.ME]).

Open-source Software

Rimella L. 2025. CAL: https://github.com/LorenzoRimella/CAL.

Rimella L. 2025. SimBa-CL: https://github.com/LorenzoRimella/SimBa-CL.

Rimella L. 2025. HiddenMarkovNeuralNetwork: https://github.com/LorenzoRimella/HiddenMarkovNeuralNetwork.

Rimella N, **Rimella L**. 2025. ML_tunneling: https://github.com/LorenzoRimella/ML_tunneling.

Rimella L. 2024. BNP_DR: https://github.com/LorenzoRimella/BNP_DR.

Duffield S, **Rimella L**. 2024. abile: https://github.com/SamDuffield/abile.

Whitehouse M, **Rimella L**. 2023. PAL: https://github.com/LorenzoRimella/PAL.

Rimella L. 2022. SMC2-ILM: https://github.com/LorenzoRimella/SMC2-ILM.

Rimella L. 2022. Optimal_IBM_proposal: https://github.com/LorenzoRimella/Optimal_IBM_proposal.

Rimella L. 2021. GraphFilter-GraphSmoother: https://github.com/LorenzoRimella/GraphFilter-GraphSmoother.

Rimella L. 2020. Multinomial-Approximations-for-compartmental-models: https://github.com/LorenzoRimella/Multinomial-Approximations-for-compartmental-models.

Awards & Grants

07/24– 07/24 **Travel Award**, International Society for Bayesian Analysis
Travel award for the conference 2024 ISBA World Meeting (400USD tot.)

10/19– 10/20 **Enrichment Scheme**, The Alan Turing Institute
Competitively awarded placement, including a stipend top-up (2500GBP tot.)

10/17– 04/21 **Excellence Award**, Heilbronn Institute for Mathematical Research
Award giving extra financial support (8750GBP tot.)

10/17– 04/21 **PG Scholarship**, EPSRC Doctoral Training Partnerships
Award covering tuition fees, maintenance, stipend

09/15– 09/17 **Allievi Honors Program**, Collegio Carlo Alberto
Award covering tuition fees of outstanding students enrolled in Torino's universities

Presentations

Invited Presentations

Jun. 2025. *Scalable calibration of individual-based epidemic models through categorical approximations*. Invited talk at StaTalk 2025. Milan, IT.

Dec. 2024. *Consistent and fast inference in compartmental models of epidemics using Poisson Approximate Likelihoods*. Invited talk at the "Advances in Bayesian methods" session of CMStatistics 2024. London, UK.

Jun. 2024. *Consistent and fast inference in compartmental models of epidemics using Poisson Approximate Likelihoods*. Invited talk at the Satellite workshop to International Society for Bayesian Analysis (ISBA) world meeting. Lugano, Switzerland.

Mar. 2023. *Approximating optimal SMC proposal distributions in individual-based epidemic models*. Invited talk at the Satellite event of BayesComp2023. Levi, Finland.

Mar. 2023. *Approximating optimal SMC proposal distributions in individual-based epidemic models*. Invited talk at the Bayes4Health annual workshop at the University of Oxford. Oxford, UK.

Jun. 2022. *Exploiting locality in high-dimensional factorial hidden Markov models*. Invited talk at the ISBIS Conference 2022. Naples, Italy.

Mar. 2022. *Inference on Extended-Spectrum Beta-Lactamase Escherichia coli and Klebsiella pneumoniae data through SMC*^{2}. Invited talk at the DRUM Stakeholder meeting. Lilongwe, Malawi.

Sept. 2021. *Exploiting locality in high-dimensional factorial hidden Markov models*. Presentation for the Bayes4Health annual workshop at the University of Cambridge. Cambridge, UK.

Contributed Presentations

Jul. 2024. *Simulation Based Composite Likelihood*. Presentation for the conference ISBA 2024 in the Multi-track session 4F "Simulation-Based inference". Venice, IT.

Oct. 2023. *Lecture on parallel computing for epidemiological modelling*. Lecture for the Parallel computing masterclass at Lancaster University. Lancaster, UK.

Sept. 2023. *Simulation Based Composite Likelihood*. Presentation for the conference IDDconf2023. Ambleside, UK.

Apr. 2022. *Lecture on the SMC*^{2} *algorithm*. Lecture for the Sequential Monte Carlo masterclass at the University of Bristol. Bristol, UK.

Dec. 2022. *Approximating optimal SMC proposal distributions in individual-based epidemic models*. Presentation for the Welcome Home 2022 workshop at the University of Turin. Torino, Italy.

Dec. 2021. *Inference on Extended-Spectrum Beta-Lactamase Escherichia coli and Klebsiella pneumoniae data through SMC*^{2}. Presentation for the Welcome Home 2021 workshop at the University of Turin. Torino, Italy.

Dec. 2020. *Inference in Stochastic Epidemic Models via Multinomial Approximations*. Presentation for the Welcome Home 2020 workshop at the University of Turin. Torino, Italy.

Invited Departmental Seminars

Jun. 2025. *Scalable calibration of individual-based epidemic models through categorical approximations*. Seminar at The University of Warwick (Department of Statistics). Coventry, UK.

Mar. 2024. *Consistent and fast inference in compartmental models of epidemics using Poisson Approximate Likelihoods*. Seminar at University of Nottingham (School of Mathematical Sciences). Nottingham, UK.

Dec. 2023. *Consistent and fast inference in compartmental models of epidemics using Poisson Approximate Likelihoods*. Seminar at Durham University (Department of Mathematical Sciences). Durham, UK.

Nov. 2023. *Mini-Workshop on Epidemiological Modeling*. A 3h workshop at the University of the Philippines Diliman (Institute of Mathematics). Manila, Philippines.

Sep. 2023. *Inference in stochastic compartmental models: a Pharmacokinetics and Epidemiology perspective*. Seminar at the Università della Svizzera italiana (Faculty of Biomedical Sciences). Online.

Feb. 2022. *Inference on Extended-Spectrum Beta-Lactamase Escherichia coli and Klebsiella pneumoniae data through SMC*^{2}. Seminar for the Bayes4Health and CoSInES grants seminars series. Online.

Apr. 2022. *Inference on Extended-Spectrum Beta-Lactamase Escherichia coli and Klebsiella pneumoniae data through SMC*^{2}. Seminar at the University of Padova (Department of Statistics). Padova, Italy.

Dec. 2021. *Inference in Stochastic Epidemic Models via Multinomial Approximations*. Seminar at the Postgraduate seminars series of Lancaster University (Department of Mathematics and Statistics). Online.

Apr. 2021. *Inference in Stochastic Epidemic Models via Multinomial Approximations*. Seminar for the Bayes4Health and CoSInES grants seminars series. Online.

Sept. 2019. *Exploiting locality in high-dimensional factorial hidden Markov models*. Seminar at the University of Bristol (Institute for Statistical Science). Bristol, UK.

Poster Presentations

Jul. 2024. *Simulation Based Composite Likelihood*. Poster presentation at ISBA 2024. Venice, IT.

Jul. 2023. *Exploiting locality in high-dimensional Factorial hidden Markov models*. Poster presentation at G-Research. London, UK.

Jul. 2023. *Exploiting locality in high-dimensional Factorial hidden Markov models*. Poster presentation at the ICML2023 conference. Online.

Mar. 2021. *Inference in Stochastic Epidemic Models via Multinomial Approximations*. Poster presentation at the AISTAT2021 conference. Online.

Services to profession

Events organiser

06/23 – 10/23	**Masterclass on Parallel computing organiser**, Lancaster University	*Lancaster, UK*
09/22 – 08/23	**CSML reading group organiser**, Lancaster University	*Lancaster, UK*
12/21 – 04/22	**Masterclass on Sequential Monte Carlo co-organiser**, University of Bristol	*Bristol, UK*
09/17 – 08/18	**Monte Carlo reading group organiser**, University of Bristol	*Bristol, UK*

Referee

I serve as a reviewer for the following journals:

- Axioms; Biometrika; Mathematics; Journal of Machine Learning Research ; Journal of the Royal Statistical Society: Series B; Journal of Statistical Planning and Inference; Proceedings of Machine Learning Research; Statistics and Computing; Symmetry.

Professional Profile

Research interests

Epidemiology: mathematical design and statistical inference of compartmental models and individual-based models for epidemiological data; computation and approximation of the basic/effective reproduction number.

State-space models: computation of filtering distribution, smoothing distribution and likelihood; development of approximate and scalable methods for high-dimensional scenarios; composite likelihood; applications to real data (e.g. competitive sports and traffic data).

Machine Learning/Deep Learning: development and training of deep neural networks in both frequentist and Bayesian frameworks; development and training of Machine Learning algorithms in both supervised and unsupervised learning scenarios with a focus on engineering applications (e.g. tunnelling).

Monte Carlo: implementation and theoretical properties of Monte Carlo algorithms, with a particular focus on Sequential Monte Carlo and the construction of optimal/quasi-optimal proposal distributions and resampling schemes.

Coding skills

Operating system: advanced knowledge of Windows and Linux (e.g. Ubuntu, Fedora).

Programming Languages: advanced knowledge of Python; good knowledge of R, MATLAB, C /C++.
Python: epidemiological modelling and calibration; state-space modelling with Numpy, JAX and TensorFlow; development of inference algorithms (e.g. EM, MCMC, SMC^2) using Numpy, JAX and TensorFlow; Machine Learning using

scikit-learn; Deep Learning using PyTorch and TensorFlow; database management using pandas; graph operations using NetworkX; GPU computations and automatic differentiation with JAX, PyTorch and TensorFlow.

Others: High-performance computing with PBS and SLURM; SQL; Git and version control; LaTeX; Microsoft Office.

Development

Autumn 2020. **Deep Learning Specialization**, 5 courses on deep learning with assessments to learn about neural networks (e.g. CNN, RNN, LSTM), regularization techniques (e.g. DropOut) and implementation using Python (e.g. TensorFlow). Coursera.

Languages

- Italian (spoken and written)
- English (spoken and written)