

Francesca Romana Crucinio

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<https://francescacrucinio.github.io/>

Research Interests

Computational statistics, in particular: interacting particle methods, sequential Monte Carlo, Markov chain Monte Carlo, optimal transport applications to sampling.

Academic Positions

2025–	Research Affiliate, “de Castro” Statistics Initiative, Collegio Carlo Alberto.
2024–	Ricercatrice in Tenure Track, ESOMAS, Università di Torino.
2024	Lecturer in Statistics, King’s College London.
2023	CREST Postdoctoral Fellow, ENSAE Paris. Advisor: Nicolas Chopin. Funded by the French National Research Agency (ANR).
2021 – 2022	Research Fellow, Department of Statistics, University of Warwick. Advisors: Gareth O. Roberts and Adam M. Johansen. Funded by the Computational Statistical Inference for Engineering and Security EPSRC grant (CoSinES).

Education

2017 – 2021	Ph.D. in Statistical Science , University of Warwick and University of Oxford (UK). Supervisors: Arnaud Doucet and Adam M. Johansen. Thesis: <i>Some interacting particle methods with non-standard interactions</i> . Awarded the John Copas Award for the best PhD thesis in the Department of Statistics.
2015	Erasmus+ Student Exchange Program , Queen Mary University of London (UK).
2014 – 2016	M.Sc. in Mathematical Engineering , Politecnico di Torino (Italy). Grade: 110/110 cum laude
2011 – 2014	B.Sc. in Mathematics for Engineering , Politecnico di Torino (Italy). Grade: 110/110 cum laude

Awards

Nov 2024	Blackwell-Rosenbluth Award, International Society for Bayesian Analysis (ISBA & j-ISBA).
Sep 2022	John Copas Award for the best PhD thesis in the Department of Statistics, University of Warwick.
Dec 2021	Teaching Excellence Award, Warwick Business School.
Mar 2019	STEM for Britain Bronze Award, Houses of Parliament, London.

Publications

▷ PREPRINTS

1. **Crucinio F.R.**, Johansen, A.M. *Solving Fredholm Equations of the Second Kind via Wasserstein Gradient Flows*, arXiv pre-print: 2409.19642
2. Cordero Encinar P., **Crucinio F.R.**, Akyildiz Ö. D. *Proximal Interacting Particle Langevin Algorithms*, arXiv pre-print: 2406.14292
3. Chopin N., **Crucinio F.R.**, Singh S. S. *Towards a turnkey approach to unbiased Monte Carlo estimation of smooth functions of expectations*, arXiv pre-print: 2403.20313
4. Akyildiz Ö. D., **Crucinio F.R.**, Girolami M., Johnston T., Sabanis S. *On Interacting Particle Systems for Expectation Maximization*, arXiv pre-print: 2303.13429

▷ PEER-REVIEWED JOURNALS

1. **Crucinio F.R.**, Durmus A., Jiménez P., Roberts, G. O. *Optimal Scaling Results for Moreau-Yosida Metropolis-adjusted Langevin Algorithms*, Bernoulli, 2024+
2. **Crucinio F.R.**, De Bortoli V., Doucet A., Johansen, A.M. *Solving Fredholm Equations of the First Kind via Wasserstein Gradient Flows*, Stochastic Processes and Their Applications, Volume 173, July 2024, 104374, 2024
3. Kuntz J., **Crucinio F.R.**, Johansen, A.M. *The divide-and-conquer sequential Monte Carlo algorithm: theoretical properties and limit theorems*, Annals of Applied Probability, 34(1B): 1469-1523, 2024
4. **Crucinio F.R.**, Johansen, A.M. *A divide and conquer sequential Monte Carlo approach to high dimensional filtering*, Statistica Sinica, Volume 34, Online Special Issue I, 2024
5. **Crucinio F.R.**, Johansen, A.M. *Properties of Marginal Sequential Monte Carlo Methods*, Statistics and Probability Letters, Volume 203, 109914, 2023
6. **Crucinio F.R.**, Doucet A., Johansen, A.M. *A Particle Method for Solving Fredholm Equations of the First Kind*. Journal of the American Statistical Association, 118:542, 937-947, 2023
7. Kuntz J., **Crucinio F.R.**, and Johansen A.M. *Product-form estimators: exploiting independence to scale up Monte Carlo*. Statistics and Computing 32, 12, 2022
8. Fontana R., **Crucinio F. R.**, *Orbit-based conditional tests. A link between permutations and Markov bases*. Journal of Statistical Planning and Inference 205:(23-33), 2020

▷ CONFERENCE PROCEEDINGS AND BOOK CHAPTERS

1. Chopin N., **Crucinio F.R.**, Korba A. *A connection between Tempering and Entropic Mirror Descent*, In R. Salakhutdinov, Z. Kolter, K. Heller, A. Weller, N. Oliver, J. Scarlett, and F. Berkenkamp, editors, Proceedings of the 41st International Conference on Machine Learning (ICML), volume 235 of Proceedings of Machine Learning Research, pages 8782–8800. PMLR, 21–27 Jul 2024.
2. **Crucinio F.R.**, Fontana R., *Speeding up algebraic-based sampling via permutations*. In: La Rocca M., Liseo B., Salmaso L. (eds) Nonparametric Statistics. ISNPS 2018. Springer Proceedings in Mathematics & Statistics 339(145-155), 2020
3. Fontana R., **Crucinio F.R.**, *Comparison of conditional tests on Poisson data*. Statistics and Data Science: new challenges, new generations. SIS 2017 Proceedings, Firenze University Press, 2017

▷ BOOKS

1. Bonino D., **Crucinio F.R.**, Fontana R., Pellerey F., *Elementi di Statistica per l'Ingegneria e l'Architettura. Teoria ed esercizi svolti*. Società Editrice Esculapio, 2017

▷ OTHER

1. **Crucinio F.R.** *Some interacting particle methods with non-standard interactions*, PhD Thesis, University of Warwick, 2021
2. **Crucinio F.R.**, *Microthesis: A Novel Algorithm for Solving Fredholm Integral Equations*, LMS Newsletter (493), 2021

Teaching & Supervision

▷ TEACHING

PhD level: Sequential Monte Carlo methods (CoSinES+Bayes4Health masterclass, University of Bristol, 2022), Statistical Computing (Academy for PhD Training in Statistics, 2020)

Master's level: Statistics for Data Science, Computational Statistics (King's College London, 2024), Numerical and Statistical Methods for Finance – Simulation Part (Unito 2025)

Undergraduate level: Statistica (Unito, 2025)

Teaching assistant (MSc & BSc): Simulations and Monte-Carlo (ENSAE Paris, 2023), Business Statistics (Warwick Business School, 2019–2020), Probability, Mathematical Techniques, Mathematical Statistics, Mathematical Methods (Warwick, 2018–2021), Probability and Statistics, Statistical Lab (Politecnico di Torino , 2014–2016)

▷ SUPERVISION

Reserach Interns: Aryan Kotwal (University of Warwick), Mohamed Keteb (King’s College London – ENSAE Paris)

MSc Projects: Kenneth Martin (King’s College London), Yichen Wang (King’s College London), Zihao Yan (King’s College London)

BSc Projects: Angela Wang (King’s College London)

Funding

Jul 2023	Travel and subsidence grant, SMC Down Under Workshop, Brisbane, Australia.
Mar 2023	Travel grant, BayesComp2023, Levi, Finland.
Jun 2022	Travel and subsidence grant, ATI Workshop on Accelerating generative models and nonconvex optimisation, London, UK.
Dec 2021	Travel and subsidence grant, Heilbronn Workshop on Interaction Mechanisms in Monte Carlo, Bristol, UK.
Jan 2020	Travel grant, BayesComp2020, Gainesville, Florida.
Jun 2018	Travel grant, St Peter’s College, University of Oxford, UK.
Oct 2017	EPSRC-MRC OxWaSP Ph.D. scholarship (4 years), University of Warwick, UK.
Jan 2015	Erasmus+ Scholarship (6 months), Politecnico di Torino.

Research Visits

INRIA Bordeaux, France (Sep 2024), Isaac Newton Institute, Cambridge, UK (Jul 2024), Sydney Mathematical Research Institute, Sydney, Australia (Jul 2023)

Seminars, Talks and Posters

▷ SEMINARS

Sep 2024	Internal Colloquium, King’s College London (London, UK).
Sep 2024	Mostly Monte Carlo seminar, PariSanté (Paris, France).
May 2024	Newcastle University, (Newcastle, UK).
May 2024	Imperial College London, (London, UK).
May 2024	One World ABC seminar (virtual).
Apr 2024	Ca’ Foscari (Venice, Italy).
Apr 2024	Institut de recherche mathématique avancée (Strasbourg, France).
Jan 2024	Collegio Carlo Alberto (Torino, Italy).
Jul 2023	NIASRA Seminar, University of Wollongong, (Wollongong, Australia).
May 2023	Computational Statistics and Machine Learning Reading Group, Lancaster University (virtual).
Mar 2023	All About That Bayes Seminar, AgroParisTech (Paris, France).
Mar 2023	Séminaire Parisien de Statistique, Institut Henri Poincaré (Paris, France).
Feb 2023	CREST-CMAP Statistics Seminar, ENSAE (Paris, France).
Nov 2022	Young Researchers Meeting, University of Warwick (Coventry, UK).
Oct 2022	Algorithms and Computationally Intensive Statistics Seminar, University of Warwick (Coventry, UK).
May 2022	CoSInES+Bayes4Health Seminar (virtual).
Nov 2021	Young Researchers Meeting, University of Warwick (Coventry, UK).
Oct 2021	EC Bayes Seminar, Queensland University of Technology (Brisbane, Australia).
May 2021	CoSInES+Bayes4Health Seminar (virtual).
Mar 2021	Department of Mathematics, Newcastle University (Newcastle, UK).
Feb 2021	Statistics, Probability, Analysis, Applied Mathematics Seminar, University of Warwick (Coventry, UK).
May 2020	SMC Reading Group, University of Warwick (Coventry, UK).
Mar 2020	Algorithms and Computationally Intensive Statistics Seminar, University of Warwick (Coventry, UK).
Feb 2020	Young Researchers Meeting, University of Warwick (Coventry, UK).

▷ INVITED PRESENTATIONS

Apr 2025	Bayesian Young Statisticians Meeting (virtual).
May 2025	CRiSM relaunch workshop (Warwick, UK).
Sep 2024	RSS/MathRad rare event simulation workshop (Warwick, UK).
Jul 2024	International workshop on diffusions in machine learning (London, UK).
Jul 2024	ISBA 2024 (Venice, Italy).
Jul 2024	Satellite workshop to ISBA 2024 (Lugano, Switzerland).
May 2024	6th Workshop on Sequential Monte Carlo Methods (Edinburgh, UK).
Dec 2023	Gradient Flows For Sampling, Inference, and Learning (RSS London, UK).
Sep 2023	23rd European Young Statisticians Meeting (virtual, Ljubljana, Slovenia).
Jul 2023	SMC Down Under: AMSI-AustMS Workshop on Sequential Monte Carlo (Brisbane, Australia).
Mar 2023	ATI Closing Workshop on Accelerating generative models and nonconvex optimization (London, UK).
Mar 2023	BayesComp 2023 (Levi, Finland).
Jun 2022	Third Italian Meeting on Probability and Mathematical Statistics (Bologna, Italy).
Dec 2021	Heilbronn Workshop on Interaction Mechanisms in Monte Carlo: Beyond Resampling (Bristol, UK).
Oct 2021	OxWaSP Annual Workshop (virtual).
Sep 2019	10th International Workshop on Simulation and Statistics (Salzburg, Austria).
Jun 2018	4th Conference of the International Society for Non-Parametric Statistics (Salerno, Italy).

▷ CONTRIBUTED PRESENTATIONS

Jun 2024	4th Italian Meeting on Probability and Mathematical Statistics (Rome, Italy).
Feb 2024	SIAM Uncertainty Quantification (Trieste, Italy).
Oct 2023	Bayes at CIRM (Marseille, France).
Sep 2022	Warwick Statistics 50th Anniversary Conference (Coventry, UK).
Jul 2022	15th International Conference on Monte Carlo and Quasi-Monte Carlo Methods (Linz, Austria).
Apr 2022	Warwick Statistics Conference (Gregynog, UK).
Sep 2021	Bayesian Young Statisticians Meeting (virtual).
Jul 2021	SIAM Student Conference, (Coventry, UK).
May 2021	ENBIS 2021 Online Spring Meeting: Data Science in Process Industries (virtual).

▷ POSTERS

Jun 2023	14th International Conference on Monte Carlo methods and Applications (Paris, France).
May 2022	5th workshop on sequential Monte Carlo (Madrid, Spain).
Jan 2020	BayesComp 2020 (Gainesville, Florida).
Aug 2019	Greek Stochastics (Corfu, Greece)
May 2019	Warwick Statistics Conference (Gregynog, Wales)
Mar 2019	Amazon OxWaSP Workshop (Berlin, Germany)
Mar 2019	STEM for Britain (London, UK)

Professional Activities

▷ EDITORIAL WORK

Reviewer for *Annals of Statistics*, *Applied Probability Journals*, *Journal of Applied Statistics*, *Journal of Computational and Graphical Statistics*, *Journal of Machine Learning Research*, *Journal of Statistical Planning and Inference*, *Journal of the Royal Statistical Society B*, *Mathematics and Computers in Simulation*, *Statistical Papers*, *Statistica Sinica*.

▷ PHD EXAMINER

Imke Botha (QUT, 2024).

▷ ORGANIZING COMMITTEE MEMBER

Mar 2025	RSS workshop on Gradient flow, Alan Turing Institute (UK).
Nov 2022	CoSInES+Bayes4Health masterclass on Variational Inference, University of Cambridge (UK).
Apr 2022	CoSInES+Bayes4Health masterclass on sequential Monte Carlo, University of Bristol (UK).
Jul 2018	Young Statisticians' Meeting, University of Oxford (UK).
▷ SCIENTIFIC COMMITTEE MEMBER	
May 2025	BayesComp2025, Singapore.
▷ SESSIONS ORGANIZER	
Jun 2024	4th Italian Meeting on Probability and Mathematical Statistics, Rome, Italy.
Feb 2024	Minisymposium at SIAM Conference on Uncertainty Quantification, Trieste, Italy.
▷ SOCIETIES	
Sep 2020 – Sep 2021	Secretary of the SIAM-IMA Student Chapter, University of Warwick (UK).
▷ MEMBERSHIPS	
Society for Industrial and Applied Mathematics (SIAM), Royal Statistical Society (RSS), International Society for Bayesian Analysis (ISBA).	

Outreach

- ▷ Panellist at Warwick Women in Maths, University of Warwick (2021).
- ▷ Panellist at A Statistician's Job, University of Genova (2021).
- ▷ STEM for Britain poster competition, Houses of Parliament, London (2019).
- ▷ Mathematical tour guide at Oxford Maths festival, University of Oxford (2018).