CURRICULUM VITAE: Omiros Papaspiliopoulos

Born 26/08/1977, Athens, Greece
Nationality Greek
Address Department of Decision Sciences, Bocconi, via Roentgen 1, Milano 20136
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ORCID 0000-0003-4452-6154
Researcher ID Q-3328-2017
SCOPUS 6505671525
Languages Greek (mother tongue), English (fluent), Spanish (fluent), Italian (fluent), Catalan (intermediate), German (basic)

University Degrees

2003: **PhD**, "Non-centered parameterisations for hierarchical models and data augmentation (*with applications to Lévy-based stochastic volatility models*)", supervised by G.O. Roberts, Department of Mathematics and Statistics, Lancaster University, funded by Lancaster University and Onassis foundation (examined by N. Shephard and C. Fernández).

1999: **B.Sc.**, first class honours degree in Statistics, Department of Statistics, Athens University of Economics (final mark 97%).

Academic posts

February 2021- Full Professor, Bocconi University

September 2012 - February 2021 ICREA Research Professor at the Department of Economics, Universitat Pompeu Fabra

March 2012 - September 2012, Full Professor, Department of Economics, Universitat Pompeu Fabra

January 2008 - March 2012, Assistant Professor and Ramon y Cajal Fellow, Universitat Pompeu Fabra

October 2006 - January 2008, (CRiSM) Assistant Professor in Statistics, University of Warwick

February 2004 - August 2006, Research Associate under the EPSRC Grant GR/S61577/01 for "Inference for Partially Observed Diffusion Processes", Lancaster University and Nuffield College, Oxford

February 2004 - March 2004, Research Associate within the DYNSTOCH European Network, Universidad Politécnica de Cartagena, Spain

May 2003 - February 2004, Assistant Professor in Medical Statistics, Lancaster University

November 2002 - April 2003, Research Associate under the EPSRC Grant M62723, Lancaster University

Prizes and other esteem indicators

- DeGroot Prize for our book "An Introduction to Sequential Monte Carlo" by ISBA, 2022
- Royal Statistical Society's Guy Medal in Bronze, 2010
- Savage award finalist for the best PhD dissertation in Bayesian Statistics, 2004
- Onassis Foundation scholarship, 2000-2003

Academic leadership

- Director of undergraduate program BEMACS (Economics, Management and Computer Science), Bocconi (2022 -)
- Director of the Master in Data Science, Barcelona Graduate School of Economics (2013 - 2021)
- Director of the Data Science Center at Barcelona Graduate School of Economics (2016 - 2021)
- Director of the Data Science summer school (2016 - 2021), Data Science winter school (2019-2021) and of all Data Science executive courses at Barcelona Graduate School of Economics

Scientific leadership

Editorial work

- **Deputy Editor**:
    - ▷ Biometrika (2017-present)
- **Associate Editor**:
    - ▷ Journal of the Royal Statistical Society, series B (2008-2012)
    - ▷ Biometrika (2008-2012 & 2015-2017)
    - ▷ SIAM Journal of Uncertainty Quantification (2017-present)
    - ▷ Statistics and Computing (2013-2017)

Advisor to funding bodies

- **Finnish Academy of Sciences**:
    - ▷ During 2018-2021 member of a six-people panel (and chair of the panel in 2021) that decides on the whole funding program of the Academy for the scientific fields of Statistics and Applied Mathematics. This is Finland's main funding program for research in these fields
- **Reviewer for:** ESF Community of Experts, European Research Council (ERC), Swiss National Science Foundation (SNSF), Dutch Research Council (NWO), Dutch National Research Agenda, Helmholtz Foundation, Spanish National Evaluation and Foresight Agency (ANEP), Isaac Newton Institute

Organiser of major international events

- Scientific Committee:
    - ▷ (member) ISBA world meeting, Montreal, July 2022
    - ▷ (member) Conference of the International Society of Non Parametric Statistics (ISNPS), Cyprus, June 2020
    - ▷ (member) European Meeting of Statisticians, Palermo, July 2019
    - ▷ (president) BayesComp, Barcelona, March 2018
    - ▷ (president) Barcelona Data Science Meeting, Barcelona, March 2016
    - ▷ (co-organiser with David Rossell) Barcelona Biomedical Conference 2012 (theme: Bayesian methods in biostatistics and bioinformatics)
- Area Chair:
    - ▷ AISTAT (Artificial Intelligence and Statistics) 2010

Publications

Books

- An introduction to Sequential Monte Carlo, with Nicolas Chopin, Springer Series in Statistics, 2020, ISBN: 978-3-030-47845-2
  Offers a general and gentle introduction to all aspects of particle filtering: the algorithms, their uses in different areas, their computer implementation in Python and the supporting theory. Awarded the DeGroot Prize by ISBA in 2022

Papers in Journals

1. Roberts, G.O., Papaspiliopoulos, O. and Dellaportas, P. (2004). Bayesian inference for non-Gaussian Ornstein-Uhlenbeck stochastic volatility processes, **J. R. Statist. Soc. B**, 66, 369-393.

2. Beskos, A., Papaspiliopoulos, O., Roberts, G.O. and Fearnhead, P. (2006) Exact and computationally efficient likelihood–based inference for discretely observed diffusions, **J. R. Statist. Soc. B**, 68, 333-382. Presented at the Ordinary Meeting of the Research Section of the Royal Statistical Society on the 12/10/2005.

3. Beskos, A., Papaspiliopoulos, O. and Roberts, G.O. (2006). Retrospective Exact Simulation of Diffusion Sample Paths with Applications **Bernoulli**, 12, 1077-1098.

4. Papaspiliopoulos, O., Roberts, G.O. and Sköld, M. (2007) A general framework for parametrisation of hierarchical models **Statistical Science**, 22, 59–73.

5. Papaspiliopoulos, O. and Roberts, G.O. (2008) Stability of the Gibbs sampler for Bayesian hierarchical models **Annals of Statistics**, 36, 95–117.

6. Beskos, A. Papaspiliopoulos, O. and Roberts, G.O. (2008) A factorization of diffusion measure and finite sample path constructions **Methodol. Comput. Appl. Probab.** 10:1, 85–104.

7. Papaspiliopoulos O. and Roberts, G.O, (2008). Retrospective MCMC for Dirichlet process hierarchical models **Biometrika**, 95, 169–186.

8. Fearnhead, P. Papaspiliopoulos, O. and Roberts, G.O. (2008). Particle filters for partially observed diffusions, **J.R.Statist. Soc. B**, 70, 755–777.

9. Beskos, A. Papaspiliopoulos, O. and Roberts G.O. (2009) Monte Carlo maximum likelihood estimation for discretely observed diffusion processes, **Annals of Statistics**, 37, 223–245

10. Fearnhead, P., Papaspiliopoulos, O., Roberts, G.O. and Stuart, A.M. (2010). Random weight particle filtering of continuous-time processes, **J.R.Statist. Soc. B**, 72:4, 497–513

11. Yau, C, Papaspiliopoulos, O., Roberts, G.O. and Holmes, C. (2011) Bayesian nonparametric Hidden Markov Models with applications in genomics **J.R.Statist. Soc. B**, 73:1, 37–58

12. Łatuszyński, K., Kosmidis, I., Papaspiliopoulos, O. and Roberts, G.O. (2011) Simulating Events of Unknown Probabilities via Reverse Time Martingales. **Random Structures and Algorithms**, 38, 441–452

13. Papaspiliopoulos, O., Roberts, G.O. and Sermaidis, G. (2011) Whether 'tis nobler in the mind to suffer the slings and arrows of outrageous mixing problems, or to take arms against a sea of troubles, and by opposing end them? (Discussion to Meng and Yu's "To Center or Not to Center, That is Not the Question: An Ancillarity-Sufficiency Interweaving Strategy (ASIS) for Boosting MCMC Efficiency"), **Journal of Computational and Graphical Statistics**, 20:3, 592–602

14. Papaspiliopoulos, O., Pokern, Y., Roberts, G.O. and Stuart, A.M. (2012) Nonparametric estimation of diffusions: a differential equations approach **Biometrika**, 99:3, 511–531

15. Ditlevsen, S., Jensen, A.C., Kessler, M. and Papaspiliopoulos, O. (2012) A Markov Chain Monte Carlo approach to parameter estimation in the FitzHugh-Nagumo model, **Physical Review E - Statistical, Nonlinear, and Soft Matter Physics**, 86:4, art. no. 041114

16. Sermaidis, G., Papaspiliopoulos, O., Roberts, G., Beskos, A. and Fearnhead, P. (2013) Markov chain Monte Carlo for exact inference for diffusions **Scandinavian Journal of Statistics**, 40:2, 294 – 321

17. Chopin, N., Jacob, P. and Papaspiliopoulos, O. (2013) SMC^2: an efficient algorithm for sequential analysis of state-space models **J.R.Statist. Soc. B**, 75:3, 397–426

18. Papaspiliopoulos, O., Roberts, G.O, Stramer, O. (2013) Data augmentation for diffusions **Journal of Computational and Graphical Statistics**, 22:3, 665–688

19. Papaspiliopoulos, O. and Ruggiero, M. (2014) Optimal filtering and the dual process, **Bernoulli** 20:4, 1999-2019

20. Agapiou, S., Bardsley, J., Papaspiliopoulos, O., and Stuart, A. (2014) Analysis of the Gibbs sampler for hierarchical inverse problems. **SIAM Journal of Uncertainty Quantification** 2-1, 511–544

21. Papaspiliopoulos, O., Roberts, G.O., and Taylor, K. (2016) Exact sampling of diffusions with a discontinuity in the drift. **Advances in Applied Probability**, 48(A), 249–259

22. Papaspiliopoulos, O., Ruggiero, M., and Spanò, D. (2016) Conjugacy properties of time-evolving Dirichlet and gamma random measures **Electronic Journal of Statistics**, 10:2, 3452–3489

23. Agapiou, S. Papaspiliopoulos, O., Sanz-Alonso, D., and Stuart, A.M. (2017) Importance Sampling: Intrinsic Dimension and Computational Cost **Statistical Science**, 32:3, 405–431

24. Papaspiliopoulos, O. and Rossell, D. (2017) Bayesian block-diagonal variable selection and model averaging **Biometrika**, 104:2, 343–359

25. Titsias, M. and Papaspiliopoulos, O. (2018) Auxiliary gradient-based sampling algorithms **J.R.Statist. Soc. B**, 80:4, 749–767

26. Montalvo, J.G., Papaspiliopoulos, O. and Stumpf-Fetizon T. (2019) Bayesian forecasting of electoral outcomes with new parties' competition. **European Journal of Political Economy**, 59, 52–70

27. Papaspiliopoulos, O., Roberts, G.O. and Zanella, G. (2020) Scalable inference for crossed random effect models, **Biometrika**, 107:1, 25–40

28. Kon Kam King, G., and Papaspiliopoulos, O. and Ruggiero, M. (2021) Exact inference for a class of non-linear hidden Markov models on general state spaces, **Electronic Journal of Statistics**, 15, 2832–2875

29. Alexopoulos, A., Dellaportas, P. and Papaspiliopoulos, O. (2022) Bayesian prediction of jumps in large panels of time series, **Bayesian Analysis**, 17:2, 651–683

30. Papaspiliopoulos, O., Stumpf-Fetizon, T. and Zanella, G. (2023) Scalable Bayesian computation for crossed and nested hierarchical models, **Electronic Journal of Statistics**

Selected papers in conference proceedings (refereed)

31. Papaspiliopoulos, O., Roberts, G.O. and Sköld, M. (2003). Non-centered parameterisations for hierarchical models and data augmentation (*with discussion*). In **Bayesian Statistics 7** (eds. J. Bernardo, M. Bayarri, J. Berger, A. Dawid, D. Heckerman, A.F.M. Smith and M. West), 307–327. Oxford: Oxford University Press.

32. Lugosi, G., Papaspiliopoulos, O. and Stoltz, G. (2009) Online multi-task learning with hard constraints. In **Computational Learning Theory (COLT) 2009**

Book chapters

33. Papaspiliopoulos, O. (2011). Monte Carlo Probabilistic Inference for Diffusion Processes: A Methodological Framework. In Bayesian Time Series Models, 82-99, Cambridge University Press. Available *here*

34. Papaspiliopoulos, O. and Roberts, G.O. (2012). Importance sampling techniques for estimation of diffusion models. In Statistical Methods for Stochastic Differential Equations, Monographs on Statistics and Applied Probability, 311–337, Chapman & Hall. Available *here*

Selected technical Reports

35. Papaspiliopoulos, O. (2008) A note on posterior sampling from Dirichlet mixture models. Available from *here*

36. Papaspiliopoulos, O. and Zanella, G. (2017) A note on MCMC for nested multilevel regression models via belief propagation, `https://arxiv.org/abs/1704.06064`

37. Chen, V. Dunlop, M.M., Papaspiliopoulos, O. and Stuart, A.M. (2020) Dimension-Robust MCMC in Bayesian Inverse Problems

Book reviews

38. "High-Dimensional Probability" by R. Vershynin, **Quantitative Finance**, 2020, 20, 1591–1594 `https://doi.org/10.1080/14697688.2020.1813475`

Outreach and general media publications

39. Majo-Vazquez, S., Nielsen, R., Verdu, J., Rao, N., de Domenico, N., Papaspiliopoulos, O. (2020) Volume and patterns of toxicity in social media conversations during the COVID-19 pandemic, Reuters institute for the study of journalism

40. Durante, D. and Papaspiliopoulos, O. (2023) Recycled, augmented but not yet human, Medium

Extended academic visits

1. Berlin Mathematical School, Freie Universität, Bio-Computing group, May-June 2009
2. Collegio Carlo Alberto, Turin, July 2009, July 2013
3. Graduate School of Engineering Sciences, Osaka University, June-July 2010
4. CRiSM at Warwick University, May 2010, September 2010, July 2012
5. Groupe des Écoles nationales d'économie et statistique, ENSAE, Paris, March-April 2013
6. Isaac Newton Institute, Cambridge, April-May 2014
7. Big Data Institute, University College London, December 2016

Invited Courses

20 invited courses in several institutions around the world, including CEMFI (2018), University of Turin (2018), ENSAE (2010-2013), University of Copenhagen (2013, 2015), Osaka University (2010), Berlin Mathematical School (2009), Warwick (2009, 2015), Milan Bicocca (2022)

Presentations

More than 50 invited talks at conferences and 60 departmental seminars since 2001. In recent years:

1. Seminars at Harvard (2012), Chicago (2013, 2023), Duke (2023), San Diego (2019), and departments in 13 European countries
2. Plenary/Keynote speaker at European Meeting of Statisticians (2015), Congress of Greek Mathematician (2022), ISBA World Meeting (2024)
3. Invited short courses at ICMS Research program on Computational methods for statistical mechanics (2014), Objective Bayes (2022)

Outreach activities

I have made several presentations to diverse audiences, in diverse contexts and different languages. Among those:

1. Presentations about machine learning, causal inference and network science to various events organized at Bocconi for high-school students (in English and Italian)
2. Roundtable for the "Power of Data", joint SDA-Bocconi and Amazon Web Services program on the digital transformation in the public sector (in Italian), Rome 2023
3. "What is Data Science", Huawei-sponsored event "Tech with Her", online 2022
4. "Twitter debates: is attention focused to the extremes?" (in Greek), Pint of Science Athens 2019
5. "What are neural networks and why is everyone talking about them" (in Greek), Pasteur Institute Athens 2017

I have been fellow of the the Institute for European Policymaking at Bocconi University

Track record of research funding

- EPSRC, 2004: 3-year grant GR/S61577/01 for "Bayesian inference for discretely observed continuous-time processes". Named Research Associate and proposal co-writer. Other members of the projects: G.O. Roberts, N. Shephard, S. Godsill, G. Young. Total of £173,098.

- Ministry of Science, Spain, 2008: "Ramon y Cajal" 5-year research fellowship RYC-2008-02395 in the field of Mathematics. Project title "Monte Carlo methods and relevant probabilistic constructions". Principal Investigator. Total of €192.480.

- Ministry of Science, Spain, research group grants: 2009-2012 MTM2009-0906, €59,290, 2012-2015 MTM2012-37195, €34,000. PI: G. Lugosi, 2015-2018 MTM2015-67304-P €43,000 (PI, jointly with Lugosi), 2018-2021 PGC2018-101643-B-I00 €141,000 (PI, Lugosi)

- Aristeia, Ministry of Education, Greece, 2012: 3-year research grant for "Likelihood methods for jump diffusions and related Markov processes" (co-PI) Total of €200,000.

- BBVA foundation, "High-dimensional problems in structured probabilistic models", 2018-2019, €100000 (co-PI)

Reviewer/examiner

• **Journals: Statistics/Machine Learning:** Journal of the American Statistical Association, Journal of the Royal Statistical Society, series B and C, Annals of Statistics, Biometrika, Statistical Science, Scandinavian Journal of Statistics, Statistics and Computing, Electronic Journal of Statistics, Journal of Machine Learning Research, Foundations and Trends in Machine Learning, Statistics in Medicine, Journal of Time Series Analysis, Computational Statistics and Data analysis, Journal of Statistical Planning and Inference, Statistica Sinica, Bayesian Analysis, American Statistician; **Applied Probability:** Annals of Applied Probability, Bernoulli, Stochastic Processes and their Applications, Methodology and Computing in Applied Probability, ESAIM P & S; **Economics/Econometrics:** Journal of Econometrics, Journal of Economic Theory, Journal of Financial Econometrics, Journal of Economic Dynamics and Control, Journal of European Political Economy;**Political Science** European Political Science, Journal of Politics; **Applied Mathematics & Engineering:** IEEE Transactions on Information Theory, IEEE Transactions on Signal Processing, SIAM Journal on Scientific Computing, SIAM Multiscale Modeling and Simulation, SIAM Uncertainty Quantification,

Inverse Problems (IOP), Numerische Mathematik, ESAIM: Mathematical Modelling and Numerical Analysis, Proceedings of the Royal Society; **Biology:** Journal of Theoretical Biology
• **Machine Learning conferences:** AISTAT 2010 (area chair), ICML 2017
• **PhD thesis examiner:** Drovandi, 2012, Queensland University of Technology; Guy, Paris V, 2014; Suda, Lancaster, 2014, Lindenlaub, European University Institute, 2014; Schauer, Delft, 2015, Billfeld, Haifa, 2018; Mider, Warwick, 2019

Teaching experience

PhD Courses

Statistical foundations of Deep Neural Networks (PhD in Statistics, Bocconi, 2021, PhD in Statistics, 2021 Milano-Bicocca)
Computational Statistics (PhD in Statistics and Computer Science, Bocconi, 2021-present)
High-dimensional Statistics (PhD in Statistics and Computer Science, Bocconi, 2022)

Several ad-hoc courses including at CEMFI (2018), University of Turin (2018), ENSAE (2010-2013), University of Copenhagen (2013, 2015), Warwick (2009, 2015)

Undergraduate Teaching

Modelling and likelihood inference with stochastic differential equations (4th year MORSE/MSc in Statistics, Warwick, 2006).
Statistics for Economics (UPF, in Spanish and English, 2008, 2009, 2012)
Prediction with Time Series (UPF, 2010, 2011, 2013)
Introductory Statistics (BEMACS, Bocconi, 2022-present)
Foundations of Data Science (Bocconi, 2023-present)

Graduate Teaching

Bayesian Statistics (Msc in Medical Statistics, Lancaster, 2003)
Computer intensive statistical methods (Msc in Medical Statistics, Lancaster 2004, 2005)
Stochastic Processes and Mathematical Finance (Barcelona GSE, 2008-2013).
Statistical modelling and inference (a course on modern Statistics and Machine Learning, MSc in Data Science, BGSE, 2014-2019)
Text Mining for Social Sciences (MSc in Data Science, BGSE, 2018,2019)
Computational Machine Learning (a course on neural networks, MSc in Data Science, BGSE, 2020)
Machine Learning (MSc in Data Science, Bocconi, 2023)

Executive education: SDA Bocconi School of Management

Foundations of Data Science (AXA, 2022,2023) Deep Learning (AXA, 2022)

Executive education: Barcelona Graduate School of Economics

Foundations of Data Science (CAIXABANK executive program, 2019) Probabilistic inference and Machine Learning (CAIXABANK executive program, 2019) Foundations of Data Science (BGSE summer and winter schools, 2018,2019) Computing for Data Science (BGSE summer and winter schools, 2018,2019)

Executive education: UDEP - Lima (Peru)

Foundations of Data Science (2018,2019) Computing for Data Science (2018,2019)