

Dr. Abdul-Lateef Haji-Ali

CONTACT INFORMATION	Colin Maclaurin Building, T.12 Heriot-Watt University Edinburgh Campus Edinburgh, Scotland, EH14 4AS	+44 (0) 782 368 2130 a.hajiali@hw.ac.uk https://www.macs.hw.ac.uk/~ah180/ https://www.randomoid.com
SUMMARY	<p>Applied mathematician and computer scientist, working at the interface of uncertainty quantification, numerical analysis, and machine learning, with a with a strong record of publications and grant funding in stochastic algorithms, uncertainty quantification, and statistical analysis.</p> <p>Research interests: Uncertainty Quantification, Numerical Analysis, Machine Learning, Stochastic Differential Equation, Numerical methods for SDEs and SPDEs, Multilevel Monte Carlo, Particle systems, Crowd modelling, Mean-field theory, Sparse Grids, Combination techniques, Multi-index techniques, Inverse problems.</p>	
EDUCATION	<p>King Abdullah University of Science and Technology (KAUST), Saudi Arabia</p> <p>PhD, Applied Mathematics, December 2012 to May 2016 Thesis Title: <i>Efficient Multilevel and Multi-index Sampling Methods in Stochastic Differential Equations</i></p> <p>MSc, Applied Mathematics, September 2010 to December 2012 Thesis Title: <i>Pedestrian Flow in the Mean-field Limit</i></p> <p>Arab International University, Damascus, Syria</p> <p>BSc, Informatics Engineering (Major in Artificial Intelligence), September 2005 to August 2010</p>	
EMPLOYMENT HISTORY	<p>Maxwell Institute for Mathematical Sciences and School of Mathematical and Computer Sciences, Heriot-Watt University, Edinburgh, United Kingdom</p> <ul style="list-style-type: none">• Associate Professor, 01 August 2022, ongoing.• Assistant Professor, 03 January 2019 to 31 July 2022. <p>Mathematical Institute, University of Oxford, United Kingdom</p> <ul style="list-style-type: none">• Hooke Research Fellowship, 05 September 2016 to 31 December 2018. <p>St. Anne's College, University of Oxford, United Kingdom</p> <ul style="list-style-type: none">• College Association, January 2017 to 31 December 2018.	
REFEREED JOURNAL PUBLICATIONS	<ol style="list-style-type: none">1. A.-L. Haji-Ali and A. Stein. "An Antithetic Multilevel Monte Carlo-Milstein Scheme for Stochastic Partial Differential Equations with non-commutative noise". In: <i>ESAIM: Mathematical Modelling and Numerical Analysis</i> 59.3 (2025). DOI: 10.1051/m2an/2025031.2. A.-L. Haji-Ali, M. Pereyra, L. Shaw, and K. Zygalakis. "Bayesian computation with generative diffusion models by Multilevel Monte Carlo". In: <i>Philosophical Transactions A</i> (2024). accepted. DOI: 10.48550/arxiv.2409.15511. arXiv: 2409.15511 [stat.CO].3. N. B. Rached, A.-L. Haji-Ali, M. Shyam, and R. Tempone. "Multilevel Importance Sampling for McKean-Vlasov Stochastic Differential Equation". In: <i>Statistics and Computing</i> 35.1 (Nov. 2024), p. 1. ISSN: 1573-1375. DOI: 10.1007/s11222-024-10508-3.	

4. N. Ben Rached, A.-L. Haji-Ali, S. M. Subbiah Pillai, and R. Tempone. “Double-loop importance sampling for McKean–Vlasov stochastic differential equation”. In: *Statistics and Computing* 34.6 (2024), pp. 1–25. DOI: [10.1007/s11222-024-10497-3](https://doi.org/10.1007/s11222-024-10497-3).
5. M. B. Giles and A.-L. Haji-Ali. “Multilevel Path Branching for Digital Options”. In: *Annals of Applied Probability* 34.5 (2024), pp. 4836–4862. ISSN: 1050-5164. DOI: [10.1214/24-AAP2083](https://doi.org/10.1214/24-AAP2083).
6. E. Ben Amar, N. Ben Rached, A.-L. Haji-Ali, and R. Tempone. “State-dependent importance sampling for estimating expectations of functionals of sums of independent random variables”. In: *Statistics and Computing* 33.2 (Feb. 2023). ISSN: 0960-3174, 1573-1375. DOI: [10.1007/s11222-022-10202-2](https://doi.org/10.1007/s11222-022-10202-2).
7. M. B. Giles and A.-L. Haji-Ali. “Subsampling and other considerations for efficient risk estimation in large portfolios”. In: *Journal of Computational Finance* 26.1 (June 2022). ISSN: 1460-1559, 1755-2850. DOI: [10.21314/jcf.2022.019](https://doi.org/10.21314/jcf.2022.019).
8. A.-L. Haji-Ali, J. Spence, and A. L. Teckentrup. “Adaptive Multilevel Monte Carlo for Probabilities”. In: *SIAM Journal on Numerical Analysis* 60.4 (Aug. 2022), pp. 2125–2149. ISSN: 0036-1429, 1095-7170. DOI: [10.1137/21m1447064](https://doi.org/10.1137/21m1447064).
9. N. Ben Rached, A.-L. Haji-Ali, G. Rubino, and R. Tempone. “Efficient importance sampling for large sums of independent and identically distributed random variables”. In: *Statistics and Computing* 31.6 (Oct. 2021). ISSN: 0960-3174, 1573-1375. DOI: [10.1007/s11222-021-10055-1](https://doi.org/10.1007/s11222-021-10055-1).
10. A.-L. Haji-Ali, F. Nobile, R. Tempone, and S. Wolfers. “Multilevel weighted least squares polynomial approximation”. In: *ESAIM: Mathematical Modelling and Numerical Analysis* 54.2 (Mar. 2020), pp. 649–677. ISSN: 0764-583X, 1290-3841. DOI: [10.1051/m2an/2019045](https://doi.org/10.1051/m2an/2019045).
11. M. B. Giles and A.-L. Haji-Ali. “Multilevel Nested Simulation for Efficient Risk Estimation”. In: *SIAM/ASA Journal on Uncertainty Quantification* 7.2 (Jan. 2019), pp. 497–525. ISSN: 2166-2525. DOI: [10.1137/18m1173186](https://doi.org/10.1137/18m1173186).
12. A.-L. Haji-Ali, H. Harbrecht, M. Peters, and M. Siebenmorgen. “Novel results for the anisotropic sparse grid quadrature”. In: *Journal of Complexity* 47 (Aug. 2018), pp. 62–85. ISSN: 0885-064X. DOI: [10.1016/j.jco.2018.02.003](https://doi.org/10.1016/j.jco.2018.02.003).
13. A.-L. Haji-Ali and R. Tempone. “Multilevel and Multi-index Monte Carlo methods for the McKean–Vlasov equation”. In: *Statistics and Computing* 28.4 (Sept. 2017), pp. 923–935. ISSN: 0960-3174, 1573-1375. DOI: [10.1007/s11222-017-9771-5](https://doi.org/10.1007/s11222-017-9771-5).
14. A.-L. Haji-Ali, F. Nobile, L. Tamellini, and R. Tempone. “Multi-Index Stochastic Collocation for random PDEs”. In: *Computer Methods in Applied Mechanics and Engineering* 306 (July 2016), pp. 95–122. ISSN: 0045-7825. DOI: [10.1016/j.cma.2016.03.029](https://doi.org/10.1016/j.cma.2016.03.029).
15. A.-L. Haji-Ali, F. Nobile, L. Tamellini, and R. Tempone. “Multi-index Stochastic Collocation Convergence Rates for Random PDEs with Parametric Regularity”. In: *Foundations of Computational Mathematics* 16.6 (Aug. 2016), pp. 1555–1605. ISSN: 1615-3375, 1615-3383. DOI: [10.1007/s10208-016-9327-7](https://doi.org/10.1007/s10208-016-9327-7).

16. A.-L. Haji-Ali, F. Nobile, and R. Tempone. “Multi-index Monte Carlo: When sparsity meets sampling”. In: *Numerische Mathematik* 132.4 (June 2015), pp. 767–806. ISSN: 0029-599X, 0945-3245. DOI: 10.1007/s00211-015-0734-5.
17. A.-L. Haji-Ali, F. Nobile, E. von Schwerin, and R. Tempone. “Optimization of mesh hierarchies in multilevel Monte Carlo samplers”. In: *Stochastics and Partial Differential Equations Analysis and Computations* 4.1 (June 2015), pp. 76–112. ISSN: 2194-0401, 2194-041X. DOI: 10.1007/s40072-015-0049-7.
18. N. Collier, A.-L. Haji-Ali, F. Nobile, E. von Schwerin, and R. Tempone. “A continuation multilevel Monte Carlo algorithm”. In: *BIT Numerical Mathematics* 55.2 (Sept. 2014), pp. 399–432. ISSN: 0006-3835, 1572-9125. DOI: 10.1007/s10543-014-0511-3.

PREPRINTS

19. A.-L. Haji-Ali, H. Hoel, and A. Petersson. *The multi-index Monte Carlo method for semilinear stochastic partial differential equations*. 2025. DOI: 10.48550/arxiv.2502.00393. arXiv: 2502.00393 [math.NA].
20. N. B. Rached, A.-L. Haji-Ali, R. Tempone, and L. Wilkosz. *Forward Propagation of Low Discrepancy Through McKean-Vlasov Dynamics: From QMC to MLQMC*. 2024. DOI: 10.48550/arxiv.2409.09821. arXiv: 2409.09821 [math.NA].
21. M. B. Giles, A.-L. Haji-Ali, and J. Spence. *Efficient Risk Estimation for the Credit Valuation Adjustment*. 2023. DOI: 10.48550/arxiv.2301.05886. arXiv: 2301.05886 [q-fin.CP].
22. A.-L. Haji-Ali, H. Hoel, and R. Tempone. *Weak convergence analysis in the particle limit of the McKean-Vlasov equations using stochastic flows of particle systems*. 2023. DOI: 10.48550/arxiv.2101.00886. arXiv: 2101.00886 [math.PR].
23. N. B. Rached, A.-L. Haji-Ali, S. M. S. Pillai, and R. Tempone. *Multi-index Importance Sampling for McKean-Vlasov Stochastic Differential Equation*. 2023. DOI: 10.48550/arxiv.2307.05149. arXiv: 2307.05149 [math.NA].

AWARDS AND FELLOWSHIPS

- Alexander von Humboldt Fellowship for Experienced Researchers, April 2025.
- Second-place Leslie Fox Prize, June 2019.
- Fulford Non-stipendiary Junior Research Fellowship, Somerville College, University of Oxford, October 2017 to December 2019.
- Hooke Research Fellowship, Mathematical Institute, University of Oxford, September 2016 to December 2019.
- King Abdullah University of Science and Technology Fellowship 2010.
- Academic Excellence Award, King Abdullah University of Science and Technology 2010.

GRANTS

- Principal Investigator, Alexander von Humboldt Fellowship for Experienced Researchers, Project: “Advanced Sampling Techniques to Approximate Statistics of the McKean-Vlasov SDE”, 1 July 2025 to 30 September 2027.
- Co-Investigator, Knowledge Transfer Partnership and Scottish Whisky Research Institute, Project: “Whisky Colour: correlating human perception and UV-vis spectroscopy”, 1 January 2025 to 31 December 2026. Cost to funders: £147K.
- Principal Investigator, Project Grant, Defence Science and Technology Laboratory, Project: “DSTL: Maths for Defence – Recreating Time Series from Alan Deviation”, 1 December 2023 to 20 March 2024. Cost to funder: £47K.

- Co-Investigator, Knowledge Transfer Partnership, Project: “Putting the Smart into Sensing and Imaging”, 24 July 2023 to 23 July 2026. Cost to funder: £295K.
- Co-Investigator, Medical Research Council, Project: “Project: Reliable and Efficient Estimation of the Economic Value of medical Research (REEEVR)”, 1 Apr 2022 - 30 Sep 2023, Cost to funder: £337K.
- Co-Investigator, Medical Research Council, Project: “What is the value of adaptive designs? Estimating expected value of sample information for adaptive trial designs”, 1 Dec 2019 to 31 May 2022, Cost to funder: £408K.
- Principal Investigator, Royal Society of Edinburgh Research Grant, Project: “Accelerating the Monte Carlo Method for Detecting Orbital Collisions”, 1 May 2019 to 30 April 2020. Cost to funder: £65K.

PHD
SUPERVISION

First supervisor:

- Jonathan Spence, 2019–2023, Thesis title: “*Hierarchical and adaptive methods for accurate and efficient risk estimation*”, Maxwell Institute, Heriot-Watt University. Currently working in University of Edinburgh.
- Ian Powell, 2022-ongoing, Maxwell Institute, Heriot-Watt University.
- Songyi Zhou, 2025-ongoing, Maxwell Institute, Heriot-Watt University.

Co-supervisor:

- Anastasia Istratuca, 2021-ongoing, Maxwell Institute, University of Edinburgh, First supervisor: Dr. Aretha Teckentrup.
- Nida Siddiqui, 2021-ongoing, First supervisor: Dr. Haslifah Hasim, Heriot-Watt University.
- Sara Helal, 2022-ongoing, Maxwell Institute, University of Edinburgh, First supervisor: Dr. Victor Elvira.
- Bernhard Heinzlreiter, 2023-ongoing, Maxwell Institute, University of Edinburgh, First supervisor: Prof. John Pearson.

SELECTED
TEACHING
EXPERIENCE

- **Designed and proposed MSc programme** “Mathematics of Sustainable Finance”, Heriot-Watt University, 2024.
- **Project supervision** for PhD and MSc students, Heriot-Watt University and University of Edinburgh.
- **MSc course.** “Advanced Derivative Pricing”, Heriot-Watt University, 2025–ongoing.
- **MSc course.** “Statistical Machine Learning”, Heriot-Watt University, 2024.
- **MSc course.** “Risk Theory”, Heriot-Watt University, 2021-2023.
- **MSc course.** “Machine Learning for Risk and Insurance II”, Heriot-Watt University, 2021-2023.
- **Short course.** “Specialist 03: Monte Carlo simulations”, InFoMM CDT, University of Oxford, March 2018.
- **Tutor** “Stochastic Differential Equations”, Mathematical Institute, University of Oxford, October to November 2017 and 2018.
- **Tutor** “Differential Equations”, St. Anne’s College, University of Oxford, October to November 2017.
- **Tutor** “Constructive Maths”, St. Anne’s College, University of Oxford, May 2017.
- **Tutor** “Martingale Through Measure Theory”, Mathematical Institute, University of Oxford, May 2017 and October to November 2018.
- **Tutor** “Differential Equations II”, St. Anne’s College, University of Oxford, January to July 2017 and 2018.
- **Tutor** “Numerical Analysis”, St. Anne’s College, University of Oxford, January to July 2017 and 2018.
- **Project supervisor** “Multilevel Hierarchical Markov Chain Monte Carlo”, Centre for Doctoral Training in Mathematical Institute, University of Oxford, January

	<p>2017.</p> <ul style="list-style-type: none"> • Short course. “mimclib: A Python library for MLMC and MIMC”, UQ School, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia, May 2016.
ACADEMIC LEADERSHIP	<ul style="list-style-type: none"> • Academic Cohort Director of MAC-MIGS Centre for Doctoral Training, 2019-ongoing. • Associate Editor for Springer’s Statistics and Computing, 2023-ongoing. • Heriot-Watt Coordinator for Centre of Statistics in University of Edinburgh, 2024-ongoing. • Member of the Applied Probability Section Committee of the Royal Statistical Society, 2024-ongoing. • Programme Director for Financial Mathematics MSc in School of Mathematical and Computer Science, Heriot-Watt University, 2022-2024. • EDI officer for MAC-MIGS Centre for Doctoral Training, 2019-2021. • Applied Computational Mathematics deputy group leader in School of Mathematical and Computer Sciences (MACS), 2024-ongoing. • MINDS (Mathematics of Information and Data Science) group leader in MACS, 2022-2024.
TECHNICAL SKILLS	<p>Proficient in C, C++, Python, \TeX, UNIX shell scripting, GNU make, Lisp, MySQL, MATLAB. Basic experience in C#, Javascript and Mathematica.</p>
RESEARCH VISITS	<ul style="list-style-type: none"> • Chair of Numerical Analysis and UQ, Heidelberg University, September 2024. • Junior Research Group on Uncertainty Quantification, Karlsruhe Institute of Technology, September 2024. • UQ Chair, RWTH Aachen, December 2023. • Isaac Newton Institute, Cambridge, United Kingdom, June 2023. • Heilbronn Focused Research Group, “UQ For SciML”, Dundee, United Kingdom, May 2022. • UQ Chair, RWTH Aachen, December 2022. • Isaac Newton Institute, Cambridge, United Kingdom, April 2022. • University of Dundee, United Kingdom, May 2022. • Isaac Newton Institute, Cambridge, United Kingdom, April 2018. • École Polytechnique Fédérale de Lausanne, Switzerland, July 2017. • RWTH Aachen University, Germany, June 2017. • École Polytechnique Fédérale de Lausanne, Switzerland, April 2016. • École Polytechnique Fédérale de Lausanne, Switzerland, August 2015. • University of Pavia, Pavia, Italy, July 2015. • Königlich Technische Hochschule, Stockholm, Sweden, June 2015. • University of Texas at Austin, USA, July 2014. • Universidad de la República, Montevideo, Uruguay, December 2013. • University of Texas at Austin, USA, June 2013.
SELECTED OUTREACH	<p>Mini-symposia organization</p> <ul style="list-style-type: none"> • “Nested Expectations: models and estimators” in International Conference on Monte Carlo Methods and Applications (MCM), July 2025 (Upcoming). • “Decision making under uncertainty” in British Applied Mathematics Colloquium, Loughborough University, April 2022. • “Monte Carlo methods for discontinuous functions” in International Conference on Monte Carlo Methods and Applications (MCM), Mannheim, Germany, August 2021. • “Theory and Applications of Particle Systems” in International Conference on

Monte Carlo Methods and Applications (MCM), Mannheim, Germany, August 2021.

Invited Talks in Conferences/Workshops

- **Plenary** talk. [Stochastic Numerics and Inverse Problems in Sweden](#), Linnaeus University, Växjö, August 2025 (Upcoming).
- In mini-symposium. [International Conference on Monte Carlo Methods and Applications](#), Chicago, USA, July 2025 (Upcoming).
- [Uncertainty Quantification for Dynamical Modelling](#), Edinburgh, UK, July 2025 (Upcoming).
- In mini-symposium. [The 30th Biennial Numerical Analysis Conference](#), University of Strathclyde, Glasgow, UK, June 2025 (Upcoming).
- [CfS Annual Conference 2025](#), Edinburgh, UK, June 2025 (Upcoming).
- [Stochastic Numerics and Statistical Learning: Theory and Applications Workshop 2025](#), King Abdullah University of Science and Technology, May 2025 (Upcoming).
- [Stochastic Numerics and Statistical Learning: Theory and Applications Workshop](#), King Abdullah University of Science and Technology, May 2024.
- In mini-symposium. [SIAM Conference on Uncertainty Quantification](#), Trieste, Italy, February 2024.
- Third workshop on Monte Carlo methods, December 2023.
- [The Linnaeus University Workshop on S\(P\)DEs, their numerics and applications](#), December 2023.
- In mini-symposium. [International Conference on Monte Carlo and Quasi-Monte Carlo Methods in Scientific Computing \(MCQMC\)](#), July 2022.
- [Stochastic Numerics and Statistical Learning: Theory and Applications Workshop](#), King Abdullah University of Science and Technology, May 2022.
- [Multilevel and multifidelity sampling methods in UQ for PDEs](#), May 2022.
- In mini-symposium. [British Applied Mathematics Colloquium](#), Online, April 2022.
- In mini-symposium. [International Conference on Monte Carlo Methods and Applications \(MCM\)](#), Mannheim, Germany, August 2021.
- In mini-symposium. [International Conference on Monte Carlo Methods and Applications \(MCM\)](#), Mannheim, Germany, August 2021.
- [LMS/MAC-MIGS Workshop on Inverse Problems and Optimisation for PDEs](#), May 2020.
- [Workshop on Multilevel and multifidelity sampling methods in UQ for PDEs](#), Online, May 2020.
- [International Conference on Monte Carlo and Quasi-Monte Carlo Methods in Scientific Computing \(MCQMC\)](#), Renne, France, July 2018.
- [Reducing dimensions and cost for UQ in complex systems \(UNQW03\)](#), Isaac Newton Institute, Cambridge, March 2018.
- [Computational Uncertainty Quantification](#), BIRS, Banff, Canada, October 2017.
- [LMS-EPSRC Symposium - Model Order Reduction](#), Durham, August 2017.
- [International Conference on Monte Carlo Methods and Applications \(MCM\)](#) 2017, Montreal, July 2017.
- [UQ Summer School](#), WIAS Berlin, September 2016.
- [SIAM Conference on Uncertainty Quantification](#), Lausanne, April 2016.
- [SRI UQ](#), King Abdullah University of Science and Technology, January 2016.
- [UQ15](#), WIAS Berlin, November 2015.
- [SciCADE](#), Potsdam, September 2015.
- [ICIAM](#), Beijing, August 2015.
- [International Conference on Monte Carlo Methods and Applications \(MCM\)](#), Johannes Kepler University, Linz, July 2015.
- [FoCM](#), Universidad de la República in Montevideo, December 2014.
- [SGA](#), Universität Stuttgart, September 2014.
- [NASPDE](#), EPFL, September 2014.

- ENUMATH, EPFL, August 2013.

Invited Talks in Seminars

- Scientific Computing and Uncertainty Quantification, EPFL, June 2025 (Upcoming).
- [Computational Mathematics and Applications Seminar](#), Mathematical Institute, Oxford, January 2025.
- Mathematical Physics and Harmonic Analysis Seminar, Texas A&M University, December 2024.
- Probability Seminar at the University of Leeds, University of Leeds, November 2024.
- [Modern Applied and Computational Mathematics \(MACM\) Seminar](#), Karlsruhe Institute of Technology, September 2024.
- [Engineering Risk Analysis Seminar](#), Technical University of Munich, December 2022.
- Dundee Mathematics Seminar, University of Dundee, School of Science and Engineering, October 2021.
- Applied Maths Seminar, University of Leicester, February 2021.
- AvH RWTH UQ: hybrid seminar, Online, February 2021.
- [One World Stochastic Numerics and Inverse Problems](#), Online, May 2020.