Leandro
Sánchez-Betancourt

Curriculum vitae

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Last updated: January, 2024

Academic posts

2023–present	**Senior Research Fellow**, *Mathematical Institute, University of Oxford and Oxford-Man Institute of Quantitative Finance*, Mathematical and Computational Finance research group.
2022–2023	**Lecturer in Financial Mathematics**, *Department of Mathematics, King's College London*, Financial Mathematics research group.
2022–2023	**Academic visitor**, *Oxford-Man Institute of Quantitative Finance, University of Oxford*.
2021	**Research Associate**, *Department of Mathematics, Imperial College London*, Mathematical Finance research group.
2019–2021	**Graduate Teaching and Research Scholar**, *Oriel College, Oxford*.

Education

2017–2021	**DPhil in Mathematics** **University of Oxford**, Mathematical Institute. Dissertation: Uncertain execution in order-driven markets. Supervisor: Professor Álvaro Cartea. Prize: Bruti Liberati prize for best PhD thesis in Quantitative Finance.
2016–2017	**MSc in Financial Mathematics** **King's College London**, Department of Mathematics. Dissertation: Stochastic control for optimal dynamic trading strategies. Overall mark: Distinction (94/100). Prize: Best overall performance student award.
2010–2014	**BSc in Actuarial Sciences** **Universidad Nacional Autónoma de México**, Facultad de Ciencias. Overall mark: 10/10. Prize: Gabino Barreda Medal (for top student).

Awards, accomplishments, and scholarships

2023	Bruti Liberati Prize for best PhD thesis in Quantitative Finance € 3,000. Awarded by the Bachelier Finance Society and the Politecnico di Milano, in cooperation with Springer. Committee: Prof. E. Barucci, Prof. J. Cvitanić, Prof. M. Grasselli, Prof. X. Guo, Prof. H. Xing
2021–2023	Co-investigator in the AFM-ATI collaboration. Funding for the project £ 249,000.
2019–2021	Graduate Teaching and Research Scholar in Mathematics, Oriel College, Oxford.
2019	Winner of the Financial Mathematics Team Challenge, Rio de Janeiro, Brazil.
2018–2021	Scholarship for doctoral studies at Oxford, awarded by Consejo Nacional de Ciencia y Tecnología, México (CONACyT) ∼ £ 50,000.
2017–2020	Mathematical Finance Scholarship, awarded by the Mathematical Institute, Oxford £ 24,000.
2017	Best overall performance student award, for the highest marks in the MSc in Financial Mathematics, Department of Mathematics, King's College London.
2016	Scholarship for graduate studies at King's College London, awarded by CONACyT ∼ £ 22,000.
2016	Scholarship for graduate studies at King's College London, awarded by Secretaría de Educación Pública, México (SEP) ∼ £ 3,000.
2016	Gabino Barreda medal, for top student in four-year undergraduate program, awarded by Universidad Nacional Autónoma de México (UNAM).
2011/12/13	Excellence Scholarship, awarded by SEP.

2008/09	Winner of the Mathematical Olympiad of México, at state level.
2007/08/09	Winner of the Mathematical Competition, over all schools of UNAM.
2004/05	Winner of the Mathematical Olympiad of Cuba, at national level.

Professional memberships

Society for Industrial and Applied Mathematics (SIAM); London Mathematical Society (LMS); Institute of Mathematics and its Applications (IMA).

Publications* and submitted*/working+ papers

⋆ S. Jaimungal, S. Pesenti, and L. Sánchez-Betancourt (2024). *Minimal Kullback-Leibler for Constrained Lévy-Itô Processes*. SIAM Journal on Control and Optimization (forthcoming) ⊕

∗ C. Bellani, D. Brigo, M. S. Pakkanen, and L. Sánchez-Betancourt (2024). *Price impact without averaging*. Applied Mathematical Finance (forthcoming) ⊕

⋆ J. Jerome, L. Sánchez-Betancourt, R. Savani, and M. Herdegen (2023). *Model-based gym environments for limit order book trading*. 4th ACM International Conference on AI in Finance (ICAIF, forthcoming), New York, USA. ⊕

⋆ M. Höglund, E. Ferrucci, C. Hernández, A. Muguruza Gonzalez, C. Salvi, L. Sánchez-Betancourt, Y. Zhang (2023). *A Neural RDE approach for continuous-time non-Markovian stochastic control problems*. Workshop on New Frontiers in Learning, Control, and Dynamical Systems at the International Conference on Machine Learning (ICML). ⊕

⋆ Á. Cartea and L. Sánchez-Betancourt (2023). *Optimal Execution with Stochastic Delay*. Finance and Stochastics **27** (1), 1-47 ⊕

⋆ Á. Cartea, S. Jaimungal, and L. Sánchez-Betancourt (2023). *Reinforcement Learning for Algorithmic Trading*. In Machine Learning and Data Sciences for Financial Markets: A Guide to Contemporary Practices. Edited by C.-A. Lehalle and A. Capponni. Cambridge University Press. ⊕

⋆ Á. Cartea, I. Perez Arribas, and L. Sánchez-Betancourt (2022). *Double-Execution Strategies using Path Signatures*. SIAM Journal on Financial Mathematics **13** (4), 1379–1417. ⊕

⋆ M. Forde, L. Sánchez-Betancourt, and B. Smith (2022). *Optimal Trade Execution for Gaussian Signals with Power-law Resilience*. Quantitative Finance **22** (3), 585–596. ⊕

⋆ Á. Cartea, S. Jaimungal, and L. Sánchez-Betancourt (2021) *Latency and Liquidity Risk*. International Journal on Theoretical and Applied Finance **24** (06n07), 2150035. ⊕

⋆ G. Bouzianis, L. P. Hughston, S. Jaimungal, and L. Sánchez-Betancourt (2021). *Lévy-Ito Models in Finance*. Probability Surveys **18**, 132-178. ⊕

⋆ Á. Cartea and L. Sánchez-Betancourt (2021). *The Shadow Price of Latency: Improving Intraday Fill Ratios in Foreign Exchange Markets*. SIAM Journal on Financial Mathematics **12** (1), 254–294. ⊕

⋆ L. P. Hughston and L. Sánchez-Betancourt (2020). *Pricing with Variance Gamma Information*. Risks **8** (4), 105:1-22. ⊕

∗ G. Bouzianis, L. P. Hughston, and L. Sánchez-Betancourt (2022). *Information-based Trading*. ⊕

∗ Á. Cartea and L. Sánchez-Betancourt (2022). *Brokers and Informed Traders: dealing with toxic flow and extracting trading signals*. ⊕

+ Á. Cartea, S. N. Cohen, R. Graumans, S. Labyad, L. Sánchez-Betancourt, and L. van Veldhuijzen (2023). *Statistical Predictions of Trading Strategies in Electronic Markets*. ⊕

∗ L. P. Hughston, and L. Sánchez-Betancourt (2023). *Valuation of a Financial Claim Contingent on the Outcome of a Quantum Measurement*. ⊕

∗ Á. Cartea, F. Drissi, L. Sánchez-Betancourt, D. Siska, and L. Szpruch (2023). *Automated Market Makers Designs Beyond Constant Functions*. ⊕

∗ Á. Cartea, G. Duran-Martin, L. Sánchez-Betancourt (2023). *Detecting Toxic Flow*. ⊕

∗ P. Bergault and L. Sánchez-Betancourt (2024). *A Mean Field Game between Informed Traders and a Broker*. ⊕

Industry experience

2017–present   **Researcher**, *LMAX Exchange*, London.
Researcher in topics regarding latency, high-frequency trading, and FX trading.
Micro-structure comparison between trading-on-firm venues against those with last look.

2015–2016   **Consultant**, *Indra Business Consulting*, Mexico City.
Mathematical support for migration of Santander's risk-management platform.
Analysis of methodological changes in derivative pricing in Murex.

2014–2015   **Risk analyst**, *Citigroup*, Mexico City.
Development of internal debt rating model in collaboration with Citigroup New York.
Responsible for monthly calculations of the regulatory reserves.

Teaching experience

2022–2023   **Lecturer**, *King's College London*.
Mathematical Finance II: Continuous Time

2021   **Research associate**, *Imperial College London*.
Quantitative Risk Management (Core module for the MSc Mathematics and Finance)

2019–2021   **Graduate teaching and research scholar**, *Oriel College, Oxford*.
Probability, Probability prelims (Michaelmas term 2019, 2020), Integration, Statistics, Integral transforms (Hillary term 2020, 2021), Statistics and data analysis (Trinity term 2020, 2021).

2018-2019   **Teaching appointments**, *Queen's College, Oxford*.
Probability (Michaelmas term 2018), Statistics and data analysis (Trinity term 2019).

2018-2021   **Tutor**, *Mathematical Institute, University of Oxford*.
Graduate courses: Algorithmic trading, Asset pricing, Stochastic control, Market micro-structure.

2018-2021   **Teaching assistant**, *Mathematical Institute, University of Oxford*.
Graduate courses: Stochastic control, Market micro-structure, Algorithmic trading, Asset pricing.
Undergraduate courses: Stochastic differential equations, Mathematical models for financial derivatives.

2016   **Diploma lecturer**, *Universidad Marista*, Mexico City.
Lecturer for "Diploma on Financial Derivatives", Equity, FX and commodity derivatives module.

2015   **Diploma lecturer**, *Universidad Marista*, Mexico City.
Lecturer for "Diploma on Financial Risks", Market risk module.

2014–2016   **Lecturer**, *Universidad Marista*, Mexico City.
Undergraduate lecturer position: Stochastic processes, Statistics, Probability.

Presentations at conferences, seminars, and summer schools
(both contributed talks and invited*)

2024   IMS Young Mathematical Scientist Forum in Applied Mathematics, Singapore.*

2023   4th ACM International Conference on AI in Finance, New York.
Berlin Seminar on Stochastic Analysis and Stochastic Finance, Humboldt University of Berlin.*
Mathematical Finance Internal Seminar, University of Oxford.*
Financial and Actuarial Mathematics at UCLA, Los Angeles.*
Politecnico di Milano, financial engineering seminar, Milan.*
Mathematical finance seminar at Columbia, New York.*
Blockchain@X-OMI – Workshop on Blockchain and Decentralized Finance, Paris.*
European Finance Association annual meeting, Amsterdam.*
11th AMaMeF Conference, Bielefeld.*
SIAM Conference on Financial Mathematics, Philadelphia.
Man Group research seminar, London.*
Financial Technology conference, Oxford-Man Institute of Quantitative Finance, Oxford.*
University of Edinburgh Quantitative Finance seminar, Edinburgh.*

2022	Quantitative Finance Seminar, Fields Institute, Toronto.*
	Finance and Economics, Alan Turing Institute, London.*
	Stochastic Finance at Warwick seminar, Coventry.*
	SIAM Conference on Mathematics of Data Science, San Diego.
	11th World Congress of Bachelier Finance Society, Hong Kong.
	CFM-EconophysiX lab seminar, Paris.*
	University of Edinburgh Quantitative Finance seminar, Edinburgh.*
	1st London/Oxford/Warwick Financial Mathematics Workshop, London.*
2021	CFE 2021, King's College London.*
	Big Data and Machine Learning in Finance Conference, Politecnico di Milano, Milan.
	SIAM Conference on Financial Mathematics, virtual.
	IEOR seminar, Berkeley.
2020	Mathematical Finance Internal Seminar, University of Oxford.
2019	21st Actuarial Congress: "un modelo a seguir", Universidad Marista, Mexico City.*
	12th European Summer School on Financial Mathematics, Padova.
	SIAM Conference on Financial Mathematics, Toronto.
	1st Oxford-ETH Workshop on Financial Mathematics, Oxford.
2018	11th European Summer School on Financial Mathematics, Paris.
	10th World Congress of the Bachelier Finance Society, Dublin.
	Actuarial Sciences Conference, Universidad Marista, México City.
	Mathematical Finance Internal Seminar, University of Oxford.
	Market Microstructure, Imperial-CFM workshop, London.
2017	LMAX Seminar, London.

Service to the community

Refereeing	SIAM Journal on Financial Mathematics (SIFIN); Operations Research (OR); Mathematical Finance (MAFI); Quantitative Finance (QF); Applied Mathematical Finance (AMF); International Conference on AI in Finance (ICAIF); Probability, Uncertainty and Quantitative Risk (PUQR).
Conferences	Workshop Co-Chair for 2023 International Conference on AI in Finance (ICAIF).

Academic visits, outreach, and team projects

Sept 2022	**Autoriteit Financiële Markten, Amsterdam, The Netherlands**. *Team project: Research on agent-based market simulators, clustering of trading algorithms, and detection of market manipulation.*
Jul 2019	**Financial Mathematics Team Challenge, Rio de Janeiro, Brazil**. *Team project: Hedging derivatives with price impact. Mentor: Dr Ryan Donnelly.* My role was that of team leader in this outreach project. Our team won the competition.
Jun 2019	**Fields-China Joint Industrial Problem Solving Workshop in Finance, Fields Institute, Toronto**. *Team project: Deep Machine Learning and Volatility Prediction.*
Jun 2018	**Academic visit to University of Toronto, Canada.** *Collaboration with Professor Sebastian Jaimungal.*
2018–2020	**Christopher Hatton School, London**. *I led a weekly Math Club meeting for two years. I coached the students on Mathematical Olympiad problems for their age group.*

Languages

Spanish	**Native speaker**
English	**Fluent**

References

1. **Professor Álvaro Cartea**.
   The Mathematical Institute, Oxford OX2 6GG, United Kingdom.
   alvaro.cartea@maths.ox.ac.uk

2. **Professor Samuel N. Cohen**.
   The Mathematical Institute, Oxford OX2 6GG, United Kingdom.
   samuel.cohen@maths.ox.ac.uk

3. **Professor Lane P. Hughston**.
   Department of Computing, Goldsmiths University of London,
   New Cross, London SE14 6NW, United Kingdom.
   l.hughston@gold.ac.uk

4. **Professor Sebastian Jaimungal**.
   Department of Statistical Sciences, University of Toronto,
   Toronto, Ontario M5T 1P5, Canada.
   sebastian.jaimungal@utoronto.ca