Elia Bɪsɪ, PhD

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[Last update: 24th September 2024]

Wᴏʀᴋ ᴇxᴘᴇʀɪᴇɴᴄᴇ

Sᴇᴘ 2024–Pʀᴇsᴇɴᴛ	Assistant Professor ('Ricercatore Tenure Track'), **University of Florence**, Department of Mathematics and Computer Science *Research group*: Probability
Sᴇᴘ 2020–Aᴜɢ 2024	Postdoc University Assistant ('Universitätsassistent'), **TU Wien**, Institute of Statistics and Mathematical Methods in Economics *Research unit*: Probability *Head of the research unit*: Fabio Toninelli
Jᴜʟ 2018–Aᴜɢ 2020	Research Scientist, **University College Dublin**, School of Mathematics and Statistics *Funding*: ERC grant "Integrable random structures" *Supervisor*: Neil O'Connell
Mᴀʀ 2014–Sᴇᴘ 2014	Research intern, **STMicroelectronics**, Agrate Brianza, Italy Advanced System Technology, Security Lab, Cryptography group

Hɪɢʜᴇʀ ᴇᴅᴜᴄᴀᴛɪᴏɴ

Oᴄᴛ 2014–Jᴜʟ 2018	Ph.D. in Sᴛᴀᴛɪsᴛɪᴄs, **University of Warwick** *Thesis*: "Random polymers via orthogonal Whittaker and symplectic Schur functions" (http://wrap.warwick.ac.uk/121448/) *Award date*: 18 December 2018 *Supervisor*: Prof. Nikos Zʏɢᴏᴜʀᴀs
Oᴄᴛ 2011–Nᴏᴠ 2013	MSc. in Mᴀᴛʜᴇᴍᴀᴛɪᴄs, **Università di Milano-Bicocca** *Erasmus* exchange year, **Universidad Autónoma de Madrid**, 2012-2013 *Thesis*: "Large deviations" *Supervisor*: Prof. Francesco Cᴀʀᴀᴠᴇɴɴᴀ *Final mark*: 110/110 *cum laude*
Oᴄᴛ 2008–Nᴏᴠ 2011	BSc. in Mᴀᴛʜᴇᴍᴀᴛɪᴄs, **Università di Milano-Bicocca** *Final mark*: 110/110 *cum laude*

Grants

2023	Co-investigator of the Focused Research Grant "A graph-theoretic approach to the Jacobian conjecture: Part II" Awarded by the Heilbronn Institute for Mathematical Research. *Principal investigator*: Dr Samuel G. G. Johnston. *Other co-investigators*: Dr Piotr Dyszewski, Prof. Nina Gantert, Prof. Joscha Prochno, Dr Dominik Schmid.
2022	Co-investigator of the Focused Research Grant "A graph-theoretic approach to the Jacobian conjecture" Awarded by the Heilbronn Institute for Mathematical Research. *Principal investigator*: Dr Samuel G. G. Johnston. *Other co-investigators*: Dr Piotr Dyszewski, Prof. Nina Gantert, Prof. Joscha Prochno, Dr Dominik Schmid.

Scholarships

Oct 2014–Mar 2018	EPSRC scholarship, **University of Warwick** Covering PhD fees. Awarded by the Engineering and Physical Sciences Research Council (EPSRC).
Oct 2014–Mar 2018	PhD maintenance bursary, **University of Warwick** Awarded by the Department of Statistics at Warwick.

Awards

2017	Prize *Giving to Warwick*, **University of Warwick** Awarded for an "outstanding contribution by PhD students to the Statistics Department's teaching programme".

Publications and preprints

[1] E. Bisi and F. D. Cunden. **λ-shaped random matrices, λ-plane trees, and λ-Dyck paths** (2024). Submitted. arXiv: 2403.07418.

[2] E. Bisi, P. Dyszewski, N. Gantert, S. G. G. Johnston, J. Prochno, and D. Schmid. **Random planar trees and the Jacobian conjecture** (2023). Submitted. arXiv: 2301.08221.

[3] J. Arista, E. Bisi, and N. O'Connell. **Matsumoto-Yor and Dufresne type theorems for a random walk on positive definite matrices**. *Ann. Inst. H. Poincaré (B) Probab. Statist.* 60.2 (2024). url: https://doi.org/10.1214/22-AIHP1338.

[4] J. Arista, E. Bisi, and N. O'Connell. **Matrix Whittaker processes**. *Probability Theory and Related Fields* 187 (2023), pp. 203–257. url: https://doi.org/10.1007/s00440-023-01210-y.

[5] E. Bɪsɪ, Y. Lɪᴀᴏ, A. Sᴀᴇɴᴢ, and N. Zʏɢᴏᴜʀᴀs. **Non-intersecting path constructions for TASEP with inhomogeneous rates and the KPZ fixed point**. *Communications in Mathematical Physics* 402 (2023), pp. 285–333. URL: https://doi.org/10.1007/s00220-023-04723-8.

[6] E. Bɪsɪ and N. Zʏɢᴏᴜʀᴀs. **Transition between characters of classical groups, decomposition of Gelfand-Tsetlin patterns and last passage percolation**. *Advances in Mathematics* 404.B (2022), p. 108453. URL: https://doi.org/10.1016/j.aim.2022.108453.

[7] E. Bɪsɪ, F. D. Cᴜɴᴅᴇɴ, S. Gɪʙʙᴏɴs, and D. Rᴏᴍɪᴋ. **The oriented swap process and last passage percolation**. *Random Structures and Algorithms* 60.4 (2022), pp. 690–715. URL: https://doi.org/10.1002/rsa.21055.

[8] E. Bɪsɪ, N. O'Cᴏɴɴᴇʟʟ, and N. Zʏɢᴏᴜʀᴀs. **The geometric Burge correspondence and the partition function of polymer replicas**. *Selecta Mathematica New Series* 27 (2021), #100. URL: https://doi.org/10.1007/s00029-021-00712-8.

[9] E. Bɪsɪ, F. D. Cᴜɴᴅᴇɴ, S. Gɪʙʙᴏɴs, and D. Rᴏᴍɪᴋ. **Sorting networks, staircase Young tableaux and last passage percolation**. *Séminaire Lotharingien de Combinatoire 84B (2020), Proceedings of the 32nd Conference on Formal Power Series and Algebraic Combinatorics*. 2020, #3. URL: https://www.mat.univie.ac.at/~slc/wpapers/FPSAC2020/3.html.

[10] E. Bɪsɪ and N. Zʏɢᴏᴜʀᴀs. **GOE and** $\text{Airy}_{2 \to 1}$ **marginal distribution via symplectic Schur functions**. *Probability and Analysis in Interacting Physical Systems: In Honor of S.R.S. Varadhan*. Ed. by P. Fʀɪᴢ, W. Köɴɪɢ, C. Mᴜᴋʜᴇʀᴊᴇᴇ, and S. Oʟʟᴀ. Berlin: Springer, 2019. URL: https://doi.org/10.1007/978-3-030-15338-0_7.

[11] E. Bɪsɪ and N. Zʏɢᴏᴜʀᴀs. **Point-to-line polymers and orthogonal Whittaker functions**. *Transactions of the American Mathematical Society* 371.12 (2019), pp. 8339–8379. URL: https://doi.org/10.1090/tran7423.

[12] E. Bɪsɪ, F. Mᴇʟᴢᴀɴɪ, and V. Zᴀᴄᴄᴀʀɪᴀ. **Symbolic analysis of higher-order side channel countermeasures**. *IEEE Transactions on Computers* 666.6 (2017), pp. 1099–1105. URL: https://doi.org/10.1109/TC.2016.2635650.

Tᴇᴀᴄʜɪɴɢ

2020–2024	Lecturer, **TU Wien**
	Theory of Stochastic Processes, MSc module (2023-2024, sem. 2; 2022-2023, sem. 2)
	Mathematical Statistics, MSc module (2023-2024, sem. 1)
	Seminar in Probability Theory on: longest increasing subsequences in random permutations, MSc module (2020-2021, sem. 2)
2020–2024	Instructor of problem classes, **TU Wien**
	Theory of Stochastic Processes, MSc module (2023-2024, sem. 2; 2022-2023, sem. 2; 2021-2022, sem. 2; 2020-2021, sem. 2)
	Mathematical Statistics, MSc module (2023-2024, sem. 1; 2022-2023, sem. 1; 2021-2022, sem. 1)
	Measure and Probability Theory 2, BSc module (2022-2023, sem. 1)

2019	Substitute lecturer, **University College Dublin** *Probability Theory*, BSc module (2019-2020, sem. 1)
2015–2018	Teaching assistant, **University of Warwick** *Probability Theory*, BSc module (2017-2018, term 2; 2016-2017, term 2) *Mathematical Methods*, BSc module (2017-2018, term 1) *Mathematics of Random Events*, BSc module (2016-2017, term 1) *Stochastic Processes*, BSc module (2015-2016, term 2) *Mathematical Techniques*, BSc module (2015-2016, term 1) *Probability A & B*, BSc module (2014-2015, term 2)

Supervision

2019	Research project supervisor, **University College Dublin** *Undergraduate summer research project*: "Interacting Particle Systems, Last Passage Percolation, and Random Matrices" *Supervised student*: Shane Gibbons (competitively selected by a departmental committee) *Cosupervisor*: Fabio Deelan Cunden

Refereeing

2014–Present	Referee for scientific journals and conference proceedings *ALEA - Latin American Journal of Probability and Mathematical Statistics* *Annales de l'Institut Henri Poincaré - Probabilités et Statistiques* *Annals of Applied Probability* *Annals of Probability* *Communications in Mathematical Physics* *Electronic Journal of Probability* *Formal Power Series and Algebraic Combinatorics - proceedings* *International Mathematics Research Notices* *Mathematical Physics, Analysis and Geometry* *Probability Surveys* *Probability Theory and Related Fields* *Stochastic Processes and their Applications* *Symmetry, Integrability and Geometry: Methods and Applications*

Organisation

Jul 2025	Organiser of the session "Random matrices and combinatorial structures" (**invited**), 44th Conference on Stochastic Processes and their Applications, **Wrocław**.

Jun 2024	Organiser of the session "Combinatorial structures in probability and statistics", Fourth Italian Meeting on Probability and Mathematical Statistics, **Rome**. *Invited participants*: Alejandra Avalos Pacheco, Gianmarco Bet, Fabio D. Cunden, Ivailo Hartarsky
Jul 2023	Organiser of the session "Interacting Markov processes related to random matrices", 43rd Conference on Stochastic Processes and their Applications, **Universidade de Lisboa**. *Invited participants*: Jonas Arista, Theo Assiotis, Will FitzGerald
Jun 2019	Organiser of the session "Random interfaces and universality", Second Italian Meeting on Probability and Mathematical Statistics, **Salerno**. *Invited participants*: Giuseppe Cannizzaro, Alberto Chiarini

Outreach

Jul 2017	Seminar leader, *Science and survival* program, **University of Warwick** Interactive seminars called "Probability in Statistical Physics" in a higher education outreach program for secondary school students.

Invited talks (selected)

17-22 Nov 2024	"Mixing Times in the Kardar-Parisi-Zhang Universality Class" mini-workshop, **Mathematisches Forschungsinstitut Oberwolfach**.
11 Sep 2024	UCD probability seminar, **University College Dublin**. *Random matrices, Young diagrams, and trees*
14 Jun 2024	"Fourth Italian Meeting on Probability and Mathematical Statistics", Session "Random walks and disordered models", **Università di Roma - La Sapienza**. *Non-intersecting path constructions for inhomogeneous TASEP and the KPZ fixed point*
8 Jan 2024	Vienna Probability Seminar, **Universität Wien**. *Non-intersecting path constructions for inhomogeneous TASEP and the KPZ fixed point*
19 Oct 2023	"Discrete Random Structures" conference, **Będlewo**, Poland. *Random planar trees and the Jacobian conjecture*
7 Sep 2023	"XXII Congresso dell'Unione Matematica Italiana" (sezione di probabilità e statistica matematica), **Università di Pisa** and **Scuola Normale Superiore**. *Probabilità su alberi e la congettura jacobiana*

21 Jul 2023	Munich-Augsburg Probability Colloquium, **Universität Augsburg**. *Non-intersecting path constructions for inhomogeneous TASEP and the KPZ fixed point*
7 Feb 2023	SPASS (Seminars in Probability, Stochastic Analysis and Statistics), **Università di Pisa** *Matrix Whittaker processes*
06 Apr 2022	UniBA Mathematical Physics Seminar, **Università di Bari (online)** *Matsumoto-Yor and Dufresne type theorems for a random walk on positive definite matrices*
29 Nov 2021	Meeting of the international research network PIICQ ("Integrable Probability, Classical and Quantum Integrability"), **online** *Polymer models, geometric RSK and Whittaker functions*
20 Apr 2021	Vienna Discrete Mathematics Seminar (Arbeitsgemeinschaft "Diskrete Mathematik"), **TU Wien (online)** *Sorting networks, staircase Young tableaux and last passage percolation*
10 Mar 2021	Workshop on Enumerative Combinatorics 2021, **University College Dublin (online)** *Sorting networks and staircase Young tableaux*
6 Oct 2020	Vienna Probability Seminar, **TU Wien** *The oriented swap process and last passage percolation*
18 Jun 2020	Junior Integrable Probability Seminar, **online** *Random sorting networks and last passage percolation*
10 Jan 2020	Dipartimento di Matematica e Fisica, **Università Roma Tre** *Random sorting networks and last passage percolation*
25 Jun 2019	"Advances in Last Passage Percolation" workshop, **University of Sussex** *Transition between characters of classical groups, decomposition of Gelfand-Tsetlin patterns, and last passage percolation*
7 Jun 2019	"Virginia Integrable Probability Summer School 2019", **University of Virginia** *Transition between characters of classical groups, decomposition of Gelfand-Tsetlin patterns, and last passage percolation*
14 May 2019	Integrable probability seminar, **Massachusetts Institute of Technology** *Transition between characters of classical groups, decomposition of Gelfand-Tsetlin patterns, and last passage percolation*
5 Oct 2018	"Insalate di Matematica" seminar, **Università di Milano-Bicocca** *How long does it take to go through a series of N queues?*

21 Jun 2018	"Randomness and Symmetry" workshop, **University College Dublin**
	Point-to-line polymers via orthogonal Whittaker and symplectic Schur functions
28 Nov 2017	School of Mathematics and Statistics, **University College Dublin**
	Point-to-line log-gamma polymers

Other skills

Languages	Italian (native speaker)
	English (fluent)
	Spanish (fluent)
	German (basic)
	French (basic)
Software	LaTeX
	Matlab
	Mathematica