Elia Bisi, PhD

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[Last update: 2nd October 2025]

Work experience

Sep 2024–Present	Assistant Professor ('Ricercatore Tenure Track'), **University of Florence**, Department of Mathematics and Computer Science *Research group*: Probability and Mathematical Statistics
Sep 2020–Aug 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
Jul 2018–Aug 2020	Research Scientist, **University College Dublin**, School of Mathematics and Statistics *Funding*: ERC grant "Integrable random structures" *Supervisor*: Neil O'Connell
Mar 2014–Sep 2014	Research intern, **STMicroelectronics**, Agrate Brianza, Italy Advanced System Technology, Security Lab, Cryptography group

Higher education

Oct 2014–Jul 2018	Ph.D. in Statistics, **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 Zygouras
Oct 2011–Nov 2013	MSc. in Mathematics, **Università di Milano-Bicocca** *Erasmus* exchange year, **Universidad Autónoma de Madrid**, 2012-2013 *Thesis*: "Large deviations" *Supervisor*: Prof. Francesco Caravenna *Final mark*: 110/110 *cum laude*
Oct 2008–Nov 2011	BSc. in Mathematics, **Università di Milano-Bicocca** *Thesis*: "Algebre di composizione" *Supervisor*: Prof. Lino Di Martino *Final mark*: 110/110 *cum laude*

Grants

2025 | Grant for the workshop "Probability Models in Mathematical Physics – Integrability, asymptotics, and universality", to be held in **Rome**, 15-19 June 2026
€15k, awarded by the INdAM (National Institute of High Mathematics)
Other grantees: Fabio D. Cunden, Giovanni Gramegna, Marilena Ligabò

2023 | Focused Research Grant "A graph-theoretic approach to the Jacobian conjecture: Part II", co-investigator
£5k, awarded by the Heilbronn Institute for Mathematical Research
Principal investigator: Samuel G. G. Johnston
Other co-investigators: Piotr Dyszewski, Nina Gantert, Joscha Prochno, Dominik Schmid

2022 | Focused Research Grant "A graph-theoretic approach to the Jacobian conjecture", co-investigator
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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**
∼£50k, awarded by the Department of Statistics at Warwick

Awards

2024 | *Best Paper Award 2023*, Faculty of Mathematics and Geoinformation, **TU Wien**
Prize: €1,000 for academic purposes
Paper awarded: **Matrix Whittaker processes** (Probab. Theory Relat. Fields, 2023)

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

Habilitation

2025 | Italian National Scientific Habilitation as Associate Professor
Scientific field: MATH-03/B – Probability and Mathematical Statistics
Validity period: 28/02/2025 – 28/02/2037

Publications and preprints

[1] 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.

[2] E. Bisi and F. D. Cunden. **λ-shaped random matrices, λ-plane trees, and λ-Dyck paths**. *Electronic Journal of Probability* 30 (2025), #24. DOI: 10.1214/25-EJP1268.

[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). DOI: 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. DOI: 10.1007/s00440-023-01210-y.

[5] E. Bisi, Y. Liao, A. Saenz, and N. Zygouras. **Non-intersecting path constructions for TASEP with inhomogeneous rates and the KPZ fixed point**. *Communications in Mathematical Physics* 402 (2023), pp. 285–333. DOI: 10.1007/s00220-023-04723-8.

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

[7] E. Bisi, F. D. Cunden, S. Gibbons, and D. Romik. **The oriented swap process and last passage percolation**. *Random Structures and Algorithms* 60.4 (2022), pp. 690–715. DOI: 10.1002/rsa.21055.

[8] E. Bisi, N. O'Connell, and N. Zygouras. **The geometric Burge correspondence and the partition function of polymer replicas**. *Selecta Mathematica New Series* 27 (2021), #100. DOI: 10.1007/s00029-021-00712-8.

[9] E. Bisi, F. D. Cunden, S. Gibbons, and D. Romik. **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. Bisi and N. Zygouras. **GOE and $\mathrm{Airy}_{2\to 1}$ marginal distribution via symplectic Schur functions**. *Probability and Analysis in Interacting Physical Systems: In Honor of S.R.S. Varadhan*. Ed. by P. Friz, W. König, C. Mukherjee, and S. Olla. Berlin: Springer, 2019. DOI: 10.1007/978-3-030-15338-0_7.

[11] E. Bisi and N. Zygouras. **Point-to-line polymers and orthogonal Whittaker functions**. *Transactions of the American Mathematical Society* 371.12 (2019), pp. 8339–8379. DOI: 10.1090/tran/7423.

[12] E. Bisi, F. Melzani, and V. Zaccaria. **Symbolic analysis of higher-order side channel countermeasures**. *IEEE Transactions on Computers* 666.6 (2017), pp. 1099–1105. DOI: 10.1109/TC.2016.2635650.

Teaching

2025–present | Lecturer, **University of Florence**
Stochastic Processes, MSc in Mathematics (2024-25, 2025-26)
Probability and Statistics, BSc in Mechanical Engineering (2025-26)
Probability, MSc in Mathematics (2024-25)

2020–2024 | Lecturer, **TU Wien**
Theory of Stochastic Processes, MSc in Statistics and Mathematics in Economics (2023-24, 2022-23)
Mathematical Statistics, MSc in Statistics and Mathematics in Economics (2023-24)
Seminar in Probability Theory on: longest increasing subsequences in random permutations, MSc in Technical Mathematics (2020-21)

2020–2024 | Instructor of problem classes, **TU Wien**
Theory of Stochastic Processes, MSc in Statistics and Mathematics in Economics (2023-24, 2022-23, 2021-22, 2020-21)
Mathematical Statistics, MSc in Statistics and Mathematics in Economics (2023-24, 2022-23, 2021-22)
Measure and Probability Theory 2, various Mathematics and Statistics BSc programmes (2022-23)

2019 | Substitute lecturer, **University College Dublin**
Probability Theory, various BSc programmes (2019-20)

2015–2018 | Teaching assistant, **University of Warwick**
Probability Theory, BSc module (2017-18, 2016-17)
Mathematical Methods, BSc module (2017-18)
Mathematics of Random Events, BSc module (2016-17)
Stochastic Processes, BSc module (2015-16)
Mathematical Techniques, BSc module (2015-16)
Probability A & B, BSc module (2014-15)

Supervision

2025 | MSc thesis supervisor, **University of Florence**
Supervised student: Alessio Donati
Cosupervisor: Gianmarco Bet

2025 | MSc thesis supervisor, **University of Florence**
Supervised student: Emmanuil Klados (Erasmus trainee)

2025 | MSc thesis supervisor, **University of Florence**
Supervised student: Eleonora Bordiga
Cosupervisor: Luca Avena

2025 | BSc thesis supervisor, **University of Florence**
Project: "Counting trees and forests through random walks" (in Italian)
Supervised student: Andrea Ficozzi
Cosupervisor: Luca Avena

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

Event organisation

15-19 Jun 2026 | INdAM workshop "Probability Models in Mathematical Physics – Integrability, asymptotics, and universality", **Rome**
Co-organisers: Fabio D. Cunden, Giovanni Gramegna, Marilena Ligabò

2025–Present | Recurrent one-day workshop "Days in Probability and Statistical Physics", **University of Florence**
Co-organisers: Luisa Andreis, Luca Avena, Gianmarco Bet

21-25 Jul 2025 | Conference "Non-equilibrium statistical physics: mathematical and physical advances", **Florence** (local organiser)
Other members of the local organising committee: Luca Avena, Gianmarco Bet, Filippo Colomo, Cristian Giardinà

15 Jul 2025 | Invited session "Random matrices and combinatorial structures", 44th Conference on Stochastic Processes and their Applications, **Wrocław**
Invited participants: Dimitris Cheliotis, Fabio D. Cunden, Michele Salvi

11 Jun 2024 | Contributed 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

24 Jul 2023 | Contributed session "Interacting Markov processes related to random matrices", 43rd Conference on Stochastic Processes and their Applications, **Lisbon**
Invited participants: Jonas Arista, Theo Assiotis, Will FitzGerald

17 Jun 2019 | Contributed session "Random interfaces and universality", Second Italian Meeting on Probability and Mathematical Statistics, **Salerno**
Invited participants: Giuseppe Cannizzaro, Alberto Chiarini

Admin

2024–Present | Erasmus+ and International Mobility Programme Coordinator for the BSc and MSc in Mathematics, **University of Florence**

Outreach

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

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
ESAIM: Probability and Statistics
Formal Power Series and Algebraic Combinatorics - proceedings
International Mathematics Research Notices
Journal of Statistical Physics
Mathematical Physics, Analysis and Geometry
Probability Surveys
Probability Theory and Related Fields
Stochastic Processes and their Applications
Symmetry, Integrability and Geometry: Methods and Applications

Scientific visits

15-24 Sep 2025 | **Università di Bari**
Collaboration with: Fabio D. Cunden, Giovanni Gramegna, Marilena Ligabò

3-7 Jun 2024 | **Università di Bari**
Collaboration with: Fabio D. Cunden, Giovanni Gramegna, Marilena Ligabò

21-25 Nov 2023 | **King's College London**
Collaboration with: Piotr Dyszewski, Nina Gantert, Samuel G. G. Johnston, Dominik Schmid

30 Jun-6 Jul 2023 | **University of Warwick**
Collaboration with: Guillaume Barraquand, Yuchen Liao, Nikos Zygouras

2-7 Oct 2022 | **University of Warwick**
Collaboration with: Yuchen Liao, Nikos Zygouras

24-30 Sep 2022 | **University of Bath**
Collaboration with: Samuel G. G. Johnston, Dominik Schmid

Invited talks (selected)

14 Jul 2025 | "44th Conference on Stochastic Processes and their Applications", Session "Random partitions", **Wrocław**
Random planar trees and the Jacobian conjecture

7 May 2025 | "Giornata INdAM 2025" one-day workshop, **Università Roma Tre**
Random matrices, Young diagrams, and trees

17-22 Nov 2024 | "Mixing Times in the Kardar-Parisi-Zhang Universality Class" mini-workshop, **Mathematisches Forschungsinstitut Oberwolfach**
Random matrices, Young diagrams, and trees

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