

Elia BISI, PhD

ASSISTANT PROFESSOR (NON-TENURED), TECHNISCHE UNIVERSITÄT WIEN

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[Last update: 24th June 2023]

WORK EXPERIENCE

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| SEP 2020 - PRESENT | Non-tenured Assistant Professor (Universitätsassistent), TU Wien ,
Institute of Statistics and Mathematical Methods in Economics
<i>Research unit:</i> Mathematical Stochastics |
| JUL 2018 - AUG 2020 | Research Scientist, University College Dublin , School of Mathematics and Statistics
<i>Funding:</i> ERC grant “Integrable random structures”
<i>Supervisor:</i> Neil O’Connell |
| MAR 2014 - SEP 2014 | Research intern, STMicronics , Agrate Brianza, Italy
Advanced System Technology, Security Lab, Cryptography group |

HIGHER EDUCATION

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| OCT 2014 - JUL 2018 | Ph.D. in STATISTICS, University of Warwick
<i>Thesis:</i> “Random polymers via orthogonal Whittaker and symplectic Schur functions” (http://wrap.warwick.ac.uk/121448/)
<i>Award date:</i> 18 December 2018
<i>Supervisor:</i> Prof. Nikos ZYGOURAS |
| OCT 2011 - NOV 2013 | MSc. in MATHEMATICS, Università di Milano-Bicocca
<i>Erasmus exchange year, Universidad Autónoma de Madrid, 2012-2013</i>
<i>Final mark:</i> 110/110 <i>cum laude</i> |
| OCT 2008 - NOV 2011 | BSc. in MATHEMATICS, Università di Milano-Bicocca
<i>Final mark:</i> 110/110 <i>cum laude</i> |

GRANTS

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| 2023 | Member of the Focused Research Grant “A graph-theoretic approach to the Jacobian conjecture: Part II”
Awarded by the Heilbronn Institute for Mathematical Research.
<i>Principal investigator:</i> Dr Samuel G. G. Johnston.
<i>Other members:</i> Dr Piotr Dyszewski, Prof. Nina Gantert, Prof. Joscha Prochno, Dr Dominik Schmid. |
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2022 | Member of the Focused Research Grant “A graph-theoretic approach to the Jacobian conjecture”
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Principal investigator: Dr Samuel G. G. Johnston.
Other members: 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, 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](https://arxiv.org/abs/2301.08221).
- [2] J. ARISTA, E. BISI, and N. O’CONNELL. **Matrix Whittaker processes**. *Probab. Theory Relat. Fields* (2023+). URL: <https://doi.org/10.1007/s00440-023-01210-y>.
- [3] E. BISI, Y. LIAO, A. SAENZ, and N. ZYGOURAS. **Non-intersecting path constructions for TASEP with inhomogeneous rates and the KPZ fixed point**. *Comm. Math. Phys.* (2023+). URL: <https://doi.org/10.1007/s00220-023-04723-8>.
- [4] J. ARISTA, E. BISI, and N. O’CONNELL. **Matsumoto-Yor and Dufresne type theorems for a random walk on positive definite matrices**. *Annales de l’Institut Henri Poincaré - Probabilités et Statistiques* (2022+). In press. URL: <https://imstat.org/journals-and-publications/annales-de-linstitut-henri-poincare/annales-de-linstitut-henri-poincare-accepted-papers/>.
- [5] 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. URL: <https://doi.org/10.1016/j.aim.2022.108453>.
- [6] 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. URL: <https://doi.org/10.1002/rsa.21055>.

- [7] 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. URL: <https://doi.org/10.1007/s00029-021-00712-8>.
- [8] 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>.
- [9] E. BISI and N. ZYGOURAS. **GOE and $\text{Airy}_{2 \rightarrow 1}$ 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. KONIG, C. MUKHERJEE, and O. STEFANO. Berlin: Springer, 2019. URL: https://doi.org/10.1007/978-3-030-15338-0_7.
- [10] 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. URL: <https://doi.org/10.1090/tran/7423>.
- [11] E. BISI, F. MELZANI, and V. ZACCARIA. **Symbolic analysis of higher-order side channel countermeasures.** *IEEE Transactions on Computers* 66.6 (2017), pp. 1099–1105. URL: <https://doi.org/10.1109/TC.2016.2635650>.

SUPERVISION EXPERIENCE

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

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| 2020 - PRESENT | <p>Lecturer, TU Wien
 <i>Theory of Stochastic Processes</i> (2022-2023, sem. 2)
 <i>Seminar in Probability Theory on:</i> longest increasing subsequences in random permutations (2020-2021, sem. 2)</p> |
| 2020 - PRESENT | <p>Instructor of problem classes, TU Wien
 <i>Measure and Probability Theory 2</i> (2022-2023, sem. 1)
 <i>Theory of Stochastic Processes</i> (2020-2021, sem. 2; 2021-2022, sem. 2; 2022-2023, sem. 2)
 <i>Mathematical Statistics</i> (2021-2022, sem. 1; 2022-2023, sem. 1)</p> |
| 2019 | <p>Substitute lecturer, University College Dublin
 <i>Probability Theory</i> (2019-2020, sem. 1)</p> |

2015 - 2018 | Teaching assistant, **University of Warwick**
Probability Theory (2016-2017, term 2; 2017-2018, term 2)
Mathematical Methods (2017-2018, term 1)
Mathematics of Random Events (2016-2017, term 1)
Stochastic Processes (2015-2016, term 2)
Mathematical Techniques (2015-2016, term 1)
Probability A & B (2014-2015, term 2)

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.

SERVICE

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

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
Electronic Journal of Probability
Formal Power Series and Algebraic Combinatorics - proceedings
International Mathematical Research Notices
Mathematical Physics, Analysis and Geometry
Probability Surveys
Probability Theory and Related Fields
Symmetry, Integrability and Geometry: Methods and Applications

SELECTED TALKS

Invited talks

10-14 JUN 2024 | “Fourth Italian Meeting on Probability and Mathematical Statistics”, Section “Random walks and disordered models”, **Università di Roma - La Sapienza**.

- 15-21 OCT 2023 | “Discrete Random Structures” conference, **Będlewo**, Poland.
- 4-9 SEP 2023 | “XXII Congresso dell’Unione Matematica Italiana” (sezione di probabilità e statistica matematica), **Università di Pisa** and **Scuola Normale Superiore**.
Probability on trees and the Jacobian conjecture
- 21 JUL 2023 | Munich-Augsburg Probability Colloquium, **Universität Augsburg**.
Non-intersecting path constructions for inhomogeneous TASEP and the KPZ fixed point
- 07 FEB 2023 | SPASS (Seminars in Probability, Stochastic Analysis and Statistics), **Università di Pisa**
Matrix Whittaker processes
- 19 MAY 2022 | (Not So) Informal Probability Seminar, **Universität Wien**
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

Contributed talks

- 5 JUL 2022 | “Algorithmic and Enumerative Combinatorics conference”, **TU Wien**
Transition between characters of classical groups, decomposition of Gelfand-Tsetlin patterns and last passage percolation
- 26 AUG 2020 | “Bernoulli-IMS One World Symposium 2020”, **online** (prerecorded talk and live discussion)
The geometric Burge correspondence and the partition function of polymer replicas
- 17 JUN 2019 | “Second Italian Meeting on Probability and Mathematical Statistics”, **Salerno, Italy**
Corner growth model, symplectic characters, and KPZ universality
- 8 MAY 2018 | “Young researchers’ meeting” seminar, **University of Warwick**, Department of Statistics
A central limit theorem for point-to-line last passage percolation
- 13 APR 2018 | “2018 UK Easter Probability meeting”, **University of Sheffield**
Point-to-line last passage percolation via symplectic Schur functions
- 7 Nov 2017 | Mathematical physics and probability seminar, **University of Warwick**
Point-to-line polymers and orthogonal Whittaker functions
- 29 Nov 2016 | Statistics PhD open day, **University of Warwick**
A few probabilistic models in the KPZ universality class

Posters

- 7 JUN 2022 | “Random Matrices and Beyond - A conference in celebration of Kurt Johansson’s 60th birthday”, **KTH Stockholm**
Matrix Whittaker processes

9 APR 2019 | “Integrability and Randomness in Mathematical Physics and Geometry”
workshop, **CIRM Marseille**
*Transition between characters of classical groups, decomposition of Gelfand-Tsetlin patterns,
and last passage percolation*

OTHER SKILLS

LANGUAGES | Italian (native speaker)
English (fluent)
Spanish (fluent)
German (basic)
French (basic)

SOFTWARE | LaTeX
Matlab
Mathematica