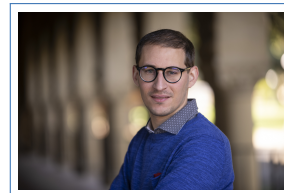


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Jacopo Borga

Curriculum vitae

Mathematical Interests

My research area is probability theory with connections to combinatorics. I mainly focus on the study of various random discrete structures such as random permutations, random walks, random trees and random planar maps. I am interested in their continuous and discrete limits and I look at universality phenomena. I introduced a new universal family of limiting permutons, called *skew Brownian permuton*, and explored its connections with Liouville quantum gravity. I also studied some polytopes arising from local limits of permutations.

Employment history

- 2021–present **Stanford University, Mathematics Department**, *Szegő Assistant Professor*, Stanford, California, USA.
- 2017–2021 **Universität Zürich, Institut für Mathematik**, *Ph.D. fellow and teaching assistant*, Zürich, Switzerland.

Education

- 2017–2021 **Universität Zürich**, *Ph.D. in Mathematics (with distinction)*, Advisors: Valentin Féray and Mathilde Bouvel.
- 2016–2017 **Université Sorbonne Paris Cité (USPC)**, *M.Sc. in Mathematics (M2)*, Mathématiques fondamentales, Courses from Paris 6, Paris 7 and Paris 13, Advisor: Giambattista Giacomin.
Final mark: *Très bien*.
- 2015–2018 **Università degli Studi di Padova**, *M.Sc. in Mathematics*, Pure and Applied Mathematics, Advisor: Paolo Dai Pra.
Final mark: *110/110 cum laude*.
- 2012–2015 **Università degli Studi di Padova**, *B.Sc. in Mathematics*, Pure and Applied Mathematics, Advisor: Paolo Dai Pra.
Final mark: *110/110 cum laude*.

Special Honors and Awards

- 2021 **Bernoulli Society New Researcher Award**, *Bernoulli Society*, It will be officially announced during the 42nd Conference on Stochastic Processes and their Applications 2022 in Wuhan, China, June 27–July 1 2022.
- 2021 **PhD thesis distinction**, *Faculty of Science, University of Zurich*, Distinction awarded for "*the excellence of the PhD thesis, outstanding research contributions, and the clear expertise in the research domain of random permutations*".
- 2018 **Certificate of merit**, *Municipality of Ponzano Veneto*.
- 2018 **Major de la promotion 2017**, *Université Paris 13*, Mention: *Très bien*.
- 2016 **"MIEM USPC" Scholarships for International Students in France**, *Université Sorbonne Paris Cité*.
- 2012 **"INdAM" fellowship**, *Istituto Nazionale di Alta Matematica "Francesco Severi"*.
Top 5% over 420 candidates.
- 2012 **International contests of Kavics Cup**, *Budapest, Fazekas Myhály Gimnázium*.
International Team Math Competition: Fourth place.
- 2011 & 2012 **"Albo nazionale delle eccellenze"**, *MIUR*, <http://www.indire.it/eccellenze>.

2011 & 2012 **Italian Mathematical Olympiad**, *Italian Team Competition* (more than 700 Italian high schools took part in the contest), "Gold medal, Maths Team Champions Italy" (2011), "Silver medal" (2012).

Grants

- 2020 **Forschungskredit (Candoc)**, *Funding for promising young academics who would work on an excellent Ph.D. thesis*, Approved amount: 14387 CHF.
- 2019 **GRC Travel Grant**, *Funding for a research stay in the USA in the Spring 2020 (visit cancelled due to the covid pandemic)*, Approved amount: 1600 CHF.
- 2018 **GRC Grant**, *Funding for the organization of the "Student workshop in permutation patterns 2019"*, Approved amount: 8150 CHF.

Research articles

Published/accepted articles

1. **Local convergence for permutations and local limits for uniform ρ -avoiding permutations with $|\rho| = 3$** , J. Probab. Theory Relat. Fields 176.1-2 (2020), pp.449-531.
2. **Square permutations are typically rectangular**, with Erik Slivken, Ann. Appl. Probab. 30 (2020), no. 5, pp.2196–2233.
3. **A decorated tree approach to random permutations in substitution-closed classes**, with Mathilde Bouvel, Valentin Féray, and Benedikt Stufler, Electron. J. Probab. 25 (2020), paper no. 67, 52 pp.
4. **The feasible region for consecutive patterns of permutations is a cycle polytope**, with Raul Penaguiao, Algebraic Combinatorics 3(6) (2020), pp.1259–1282.
5. **Almost square permutations are typically square**, with Enrica Duchi and Erik Slivken, Ann. Inst. H. Poincaré Probab. Statist. 57(4): 1834-1856 (November 2021).
6. **Asymptotic normality of consecutive patterns in permutations encoded by generating trees with one-dimensional labels**, Random Structures and Algorithms 59 (2021), no. 3, 339-375.
8. **Scaling and local limits of Baxter permutations and bipolar orientations through coalescent-walk processes**, with Mickaël Maazoun, Ann. Probab. (to appear), arXiv preprint:2008.09086 (2020).
9. **Quenched law of large numbers and quenched central limit theorem for multi-player leagues with ergodic strengths**, with Benedetta Cavalli, Ann. Appl. Probab. (to appear), arXiv preprint:2103.01320 (2021).

Preprints

10. **The feasible region for consecutive patterns of pattern avoiding permutations**, with Raul Penaguiao, arXiv preprint:2010.06273 (2020), submitted.
11. **The permuton limit of strong-Baxter and semi-Baxter permutations is the skew Brownian permuton**, arXiv preprint:2112.00159 (2021), submitted.
12. **The skew Brownian permuton: a new universality class for random constrained permutations**, arXiv preprint:2112.00156 (2021), submitted.

Published articles in conferences with proceedings

13. **Scaling and local limits of Baxter permutations through coalescent-walk processes**, with Mickaël Maazoun, LIPIcs, Vol. 159, 7:1–7:18, AofA 2020.
14. **The feasible region for consecutive patterns of permutations is a cycle polytope**, with Raul Penaguiao, FPSAC 2020, Séminaire Lotharingien de Combinatoire, 84B.30 (2020), 12 pp.

Organization of scientific meetings

- 03-05/2021 **Swiss Graduate Seminar in Probability**, *Joint seminar of various swiss Universities*, main organizer.
- 06/2019 **Students workshop Permutation Patterns 2019**, *Universität Zürich*, main organizer.
- 06/2019 **Conference Permutation Patterns 2019**, *Universität Zürich*, co-organizer.

Teaching activities

- 2021-present **Main instructor for the following courses at Stanford University**, *Probability I*, *Stochastic calculus and Brownian motion*, *Discrete probabilistic methods*.
Main duties for teaching assistants: preparing and teaching lectures, writing exercises and solutions, offer office hours to students, grading exams.
- 2021 **Math Teaching Workshop (4 days)**, *Stanford University*.
Aim of the workshop: (i) increase awareness of the challenges in teaching math to general undergraduates and of the student perspectives relevant to learning math at this level; (ii) highlight a variety of strategies to become more effective teachers of university-level math, as well as evidence supporting the value of these strategies; (iii) underscore the important role teaching plays in a professional mathematician's career development.
- 2017-2021 **Teaching assistant for the following courses at Universität Zürich**, *Probability 1*, *Measure Theory*, *Combinatorics of Words*, *Programming (Python)*, *Random Combinatorial Structures*, *Enumerative Combinatorics*, *Complex Analysis*, *Probability 2*.
Main duties for teaching assistants: exercise sessions, presenting homework solutions, grading exams.

Recent selected talks*

*A complete list of talk is available at <http://www.jacopoborga.com/talks/>.

Invited talks in conferences

- 06/2022 **42nd Conference on Stochastic Processes and their Applications**, *Wuhan (China)*, "The skew Brownian permuton".
- 01/2022 **Workshop "Random Geometry"**, *CIRM, Marseille (France)*, "The skew Brownian permuton: a new universal limit for random constrained permutations and its connections with Liouville quantum gravity".
- 10/2020 **Workshop "Random Polymers and Networks"**, *IGESA, Iles de Porquerolles (France)*, "Scaling and local limits of Baxter permutations and bipolar orientations through coalescent-walk processes".
- 10/2019 **Journées MathSTIC 2019**, *Université Paris 13, Paris (France)*, "Phase transition for almost square permutations".

Contributed talks in conferences

- 06/2021 **8th European congress of Mathematics, session *Extremal and Probabilistic Combinatorics***, *Portoroz (Slovenia)*, online, "Universal phenomena for random constrained permutations".
- 03/2021 **ALÉA 2021**, *CIRM, Marseille (France)*, online, "Random permutations: A geometric point of view".
- 08/2020 **Bernoulli-IMS One World Symposium 2020**, online, "Scaling and local limits of Baxter permutations and bipolar orientations through coalescent-walk processes".
- 07/2019 **Random Trees and Graphs Summer School**, *CIRM, Marseille (France)*, "Square permutations are typically rectangular".
- 06/2019 **AofA 2019**, *CIRM, Marseille (France)*, "Local convergence for permutations: A Markov chain approach via generating trees".

Seminar talks

- 02/2022 **The University of British Columbia**, *British Columbia (Canada)*, "The skew Brownian permuton".
- 02/2022 **UC Davis**, *California (USA)*, "The skew Brownian permuton".
- 11/2021 **University of Pennsylvania**, *Pennsylvania (USA)*, "The skew Brownian permuton".
- 11/2021 **Dartmouth College in Hanover**, *New Hampshire (USA)*, "Local limits for permutations and generating trees".
- 11/2021 **The University of Chicago**, *Illinois (USA)*, "The skew Brownian permuton".
- 10/2021 **ENS Lyon**, *Lyon (France)*, online, "The skew Brownian permuton".
- 01/2021 **Stanford University**, *California (USA)*, online, "Random permutations: A geometric point of view".
- 10/2020 **MIT**, *Boston (USA)*, online, "Scaling and local limits of Baxter permutations and bipolar orientations through coalescent-walk processes".
- 04/2020 **Bilkent University**, *Ankara (Turkey)*, online, "Phase transition for almost square permutations".

03/2020 **CUNY, New York (USA)**, online, "Scaling and local limits of Baxter permutations and bipolar orientations through coalescent-walk processes".

Mini courses

10/2020 **The limiting shape of random permutations: an introduction to permuton convergence**, Nancy (France), working group in probability theory, two lectures.

Reviewer activities

since 2019 **Reviewer for the following journals**, *Probability Theory and Related Fields* (1 paper), *Journal of Combinatorial Theory - Series A* (2 papers), *Random Structures & Algorithms* (2 papers), *Pure Mathematics and Applications* (1 paper), *Algebra and Theoretical Computer Science* (1 paper).

since 2021 **Reviewer for the following conference**, *Combinatorial Pattern Matching (CPM 2021)*.

Other Work Experience

10/2008- **Pizzaiolo**, Pizzeria DA PINO, Via Roma 27, Ponzano Veneto (TV).

08/2016 Weekend job.

June-July **Children's entertainer**, Summer camp "Isola Del Sorriso", Via Mure 13/A, Ponzano Veneto (TV).
2014

Languages

Italiano **Native speaker**

English **Fluent (C2)**

Français **Intermediate/Advanced (B2)**

Deutsch **Beginner (A1)**

Interests and activities

Scout, tutoring math, guitar, cooking and bartending.