

CURRICULUM VITAE

JOHANNES ALT

Personal information

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Employment

since 01/2023: **Bonn Junior Fellow (W2)**, University of Bonn
01/2021 – 12/2022: **Marie Skłodowska-Curie Global Postdoctoral Fellow**
Outgoing phase: Courant Institute of New York University
Host: Professor Dr. Paul Bourgade
Incoming phase: University of Geneva
Host: Professor Dr. Antti Knowles
08/2021 – 09/2021: **Research member** at Mathematical Sciences Research Institute in Berkeley
09/2018 – 12/2020: **Postdoctoral researcher** at University of Geneva
Advisor: Professor Dr. Antti Knowles
09/2014 – 08/2018: **Doctoral student** at Institute of Science and Technology Austria
Supervisor: Professor László Erdős, PhD

University Education

09/2014 – 08/2018: **PhD in Mathematics**
Institute of Science and Technology Austria
Title: *Dyson equation and eigenvalue statistics of random matrices*
Oral thesis defence: 12/07/2018
10/2012 – 08/2014: **Master of Science Mathematics**
Ludwig-Maximilians university Munich, final GPA: 1.0
Carathéodory prize for outstanding master thesis in Mathematics
10/2009 – 09/2012: **Bachelor of Science Mathematics**
Saarland university, final GPA: 1.0
10/2009 – 09/2012: **Bachelor of Science Physics**
Saarland university, final GPA: 1.1
02/2011 – 04/2011: Internship at the Max-Planck Institute for Plasma Physics

Honours, Awards, and Fellowships

- Research membership in MSRI fall programme 2021 on *Universality and Integrability in Random Matrix Theory and Interacting Particle Systems* (March 2021)
- Marie Skłodowska-Curie Global Fellowship (February 2020)
- Carathéodory prize of Ludwig-Maximilians university Munich for outstanding master thesis in Mathematics (July 2015)
- *Deutschlandstipendium* paid by German government and Deutsche Telekom AG (10/2012 – 09/2014)

Obtained external funding

- Marie Skłodowska-Curie Global Fellowship, EUR 178 206 (February 2020)
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Publications

- [16] *Localized phase for the Erdős-Rényi graph*,
accepted in *Comm. Math. Phys.*, 78 pp., arXiv:2305.16294, with *R. Ducatez* and *A. Knowles*.
- [15] *The completely delocalized region of the Erdős-Rényi graph*,
Electron. Commun. Probab. **27** (2022), paper no. 10, 9 pp., arXiv:2109.03227, with *R. Ducatez*
and *A. Knowles*.
- [14] *Poisson statistics and localization at the spectral edge of sparse Erdős-Rényi graphs*,
Ann. Probab. **51** (2023), no. 1, 277–358, arXiv:2106.12519, with *R. Ducatez* and *A. Knowles*.
- [13] *Local elliptic law*,
Bernoulli **28** (2022), no. 2, 866–909, arXiv:2102.03335, with *T. Krüger*.
- [12] *Delocalization transition for critical Erdős-Rényi graphs*,
Comm. Math. Phys. **388** (2021), no. 1, 507–579, arXiv:2005.14180, with *R. Ducatez* and *A. Knowles*.
- [11] *Inhomogeneous Circular Law for Correlated Matrices*,
J. Funct. Anal. **281** (2021), no. 7, 109120, 73 pp., arXiv:2005.13533, with *T. Krüger*.
- [10] *Spectral radius of random matrices with independent entries*,
Probab. Math. Phys. **2** (2021), no. 2, 221–280, arXiv:1907.13631, with *L. Erdős* and *T. Krüger*.
- [9] *Extremal eigenvalues of critical Erdős-Rényi graphs*,
Ann. Probab. **49** (2021), no. 3, 1347–1401, arXiv:1905.03243, with *R. Ducatez* and *A. Knowles*.
- [8] *The Dyson equation with linear self-energy: spectral bands, edges and cusps*,
Doc. Math. **25** (2020), 1421–1539, arXiv:1804.07752, with *L. Erdős* and *T. Krüger*.
- [7] *Correlated random matrices: Band rigidity and Edge universality*,
Ann. Probab. **48** (2020), no. 2, 963–1001, arXiv:1804.07744,
with *L. Erdős*, *T. Krüger* and *D. Schröder*.
- [6] *Singularities of the density of states of random Gram matrices*,
Electron. Commun. Probab. **22** (2017), no. 63, 13 pp., arXiv:1708.08442.
- [5] *Location of the spectrum of Kronecker random matrices*,
Ann. Inst. H. Poincaré Probab. Statist., **55** (2019), no. 2, 661–696, arXiv:1706.08343,
with *L. Erdős*, *T. Krüger* and *Yu. Nemish*.
- [4] *Local inhomogeneous circular law*,
Ann. Appl. Probab. **28** (2018), no. 1, 148–203, arXiv:1612.07776, with *L. Erdős* and *T. Krüger*.
- [3] *Local law for random Gram matrices*,
Electron. J. Probab. **22** (2017), no. 25, 41 pp., arXiv:1606.07353, with *L. Erdős* and *T. Krüger*.
- [2] *The local semicircle law for random matrices with a fourfold symmetry*,
J. Math. Phys. **56** (2015), no. 10, arXiv:1506.04683.

Proceedings

- [1] *Spectral radius of random matrices with independent entries*, in: *Oberwolfach Rep.* **16** (2019),
no. 4, p. 3471.
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Contributions to conferences

- Young European Probabilists (YEP) workshop XVIII, Eindhoven, invited talk, *Localized phase of the Erdős-Rényi graph*, 30/03/2023.
- Session on Random Matrices at 2022 Annual Meeting of the Institute of Mathematical Statistics, London, invited talk, *Localization and Delocalization in Erdős-Rényi graphs*, 28/06/2022.
- XVII Brunel-Bielefeld Workshop on Random Matrix Theory and Applications, invited talk, *Localization and Delocalization in Erdős-Rényi graphs*, 17/12/2021.

- Session on Statistical Mechanics and Random Structures, Young Researchers Symposium of International Congress on Mathematical Physics, Geneva, talk, *Poisson-statistics for extremal eigenvalues of subcritical Erdős-Rényi graphs*, 29/07/2021.
- Session on Random Matrices, Bernoulli-IMS One World Symposium 2020 (online meeting), video talk, *Inhomogeneous circular law for correlated matrices*, August 2020. Video available at <https://www.youtube.com/watch?v=3Ymin26DiH8>
- Random Matrices, Conference at Mathematical Research Institute Oberwolfach, talk, *Spectral radius of random matrices with independent entries*, 11/12/2019.
- NCCR SwissMap General Meeting, Villars-sur-Ollon, talk, *Extreme Eigenvalues and Eigenvectors of critical Erdős-Rényi graphs*, 10/09/2019.
- Random Matrices and Random Graphs, Conference at CIRM Luminy, talk, *Correlated random matrices: Dyson equation and edge universality*, 16/04/2019.
- International congress on mathematical physics, Montreal, talk, *Correlated random matrices: Dyson equation and edge universality*, 24/07/2018.
- Annual meeting of the German mathematical society, section functional analysis, Paderborn, talk, *Dyson equation and the self-consistent density of states*, 08/03/2018.
- XIII Brunel – Bielefeld Workshop, ZiF, Bielefeld, poster, *Local inhomogeneous circular law*, December 2017.
- Park City Mathematics Institute: Summer session on random matrices, poster, *Local inhomogeneous circular law*, June – July 2017.

Presentations at research seminars and colloquia

- University of Mainz, Rhein-Main Stochastik Kolloquium, *Spectral Phases of the Erdős-Rényi graph*, 02/06/2023.
- University of Bonn, Oberseminar Stochastik, *Spectral Phases of Erdős-Rényi graphs*, 20/04/2023.
- University of Duisburg-Essen, Probability Seminar, *Spectral Phases of Erdős-Rényi graphs*, 04/04/2023.
- University of Basel, Seminar in Probability Theory and Statistics, *Spectral Phases of Erdős-Rényi graphs*, 12/10/2022.
- FAU Erlangen, Oberseminar Stochastik, *Spectral Phases of Erdős-Rényi graphs*, 19/07/2022.
- University of Chicago, Probability and Statistical Physics Seminar, *Localization and Delocalization in Erdős-Rényi graphs*, 08/04/2022.
- Massachusetts Institute of Technology, MIT Probability Seminar, Boston, *Localization and Delocalization in Erdős-Rényi graphs*, 04/04/2022.
- Temple University, Penn/Temple Probability Seminar, Philadelphia, *Localization and Delocalization in Erdős-Rényi graphs*, 29/03/2022.
- City University of New York, Probability Seminar, *Localization and Delocalization in Erdős-Rényi graphs*, 22/03/2022.
- TU Vienna, Seminar, *Random matrices and random graphs: localization and delocalization*, 20/12/2021.
- University of California, San Diego, Probability seminar (online), *Localization and Delocalization in Erdős-Rényi graphs*, 18/11/2021.
- Bonn University, Seminar, *Random matrices and random graphs: localization and delocalization*, 08/11/2021.
- Hamburg University, Seminar (online), *Random matrices and universality*, 05/07/2021.
- Bonn University, Stochastics seminar, *Extreme Eigenvalues and Eigenvectors of critical Erdős-Rényi graphs*, 24/10/2019.
- Bielefeld University, Random matrix seminar, *Spectral radius of random matrices with independent entries*, 23/10/2019.
- IST Austria, Analysis & Mathematical physics seminar, *Extreme Eigenvalues of critical Erdős-Rényi graphs*, 11/07/2019.
- ETH Zurich & University Zurich, Zurich graduate colloquium, *What is a random matrix?*, 05/03/2019.

- TU Graz, Structure theory seminar, *Correlated random matrices: Dyson equation and edge universality*, 17/12/2018.
 - Queen Mary University of London, Probability and applications seminar, *Local inhomogeneous circular law*, 07/02/2018.
 - Bielefeld University, Random matrix seminar, *Local inhomogeneous circular law*, 18/12/2017.
 - Courant Institute, New York University, Probability and mathematical physics seminar, *Local inhomogeneous circular law*, 08/12/2017.
 - University of Geneva, Mathematical physics seminar, *Local inhomogeneous circular law*, 04/12/2017.
 - Saarland University, Saarbrücken, Free probability seminar, *Local inhomogeneous circular law*, 22/11/2017.
 - Institut Henri Poincaré, Paris, Random matrices and graphs seminar, *Local inhomogeneous circular law*, 05/05/2017.
 - University of Lancaster, Probability seminar, *Local inhomogeneous circular law*, 23/03/2017.
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Teaching experience

As lecturer

University of Bonn

Winter term 2023/2024: Lecturer of student seminar *Selected topics in random matrices and random operators*

Summer term 2023: Lecturer of *Random matrices and universality*

University of Geneva

Spring term 2020: Lecturer of *Random matrices and universality II*

Spring term 2019: Lecturer of *Introduction to random matrices*

The lecture *Random matrices and universality II* was part of the SwissMap Master Class 2019/2020 on Mathematical Physics at the University of Geneva. It was recorded and the links to the videos can be found at https://unige.ch/~alt/ranmat_universality.html

As teaching assistant

Fall term 2020: Teaching assistant for *Probability Theory* at University of Geneva

Fall term 2019: Teaching assistant for *Random Matrices and Universality I* at University of Geneva

Winter term 2016/2017: Teaching assistant for *Mathematical Analysis* at IST Austria

Summer term 2016: Teaching assistant for *Fourier Transform* at IST Austria

Summer term 2014: Tutor for *Mathematical Statistical Physics* at LMU Munich

Winter term 2013/2014: Tutor and marker for *Analysis III* at LMU Munich

Supervision

- Master thesis of Fabian Apostel

Service and Organization

- External examiner of PhD thesis of Jacob Fronk (University of Copenhagen, 2023)
 - Main organizer of summer school on *Recent developments in disordered systems* at Hausdorff center in Bonn in September 2024 (Main lecturers: Alice Guionnet, Ioan Manolescu, Eliran Subag, Simone Warzel)
 - Coorganizer of the research seminars *Stochastics* and *Mathematical Physics* at University of Bonn (since 01/03/2023)
 - Organizer of the research seminar *Mathematical Physics* at University of Geneva (01/09/2018 – 31/08/2020)
 - Referee for *Annals of Probability*, *Annales de l'Institut Henri Poincaré*, *Probabilités et Statistiques*, *Bernoulli Journal*, *Communications in Mathematical Physics*, *Electronic Journal of Probability*, *Journal of Mathematical Physics*, *Journal of Statistical Physics*, *Probability and Mathematical Physics*, and *Random Matrices: Theory and Applications*; quick opinions for *Communications in Mathematical Physics*, *Electronic Journal of Probability*, *Journal of Functional Analysis* and *Probability Theory and Related Fields*.
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Outreach activities

- 06/12/2023: Presentation at Dies Academicus at University of Bonn
Antrittsvorlesung (inaugural lecture) titled *Busfahrzeiten, Atomkerne und Riemannsche Zetafunktion: Verteilungen von Zufallsmatrizen sind überall*
- 27/05/2018: Participation in the *Open Campus Day* at IST Austria:
Interactive presentation of probabilistic experiments to the general public.
- 25/11/2016: Participation in the *Student Open Day* at IST Austria:
Presentation of the research topics of the Erdős group to undergraduate students interested in the PhD programme.
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Conference attendances

- July 2023: *43rd Conference on Stochastic Processes and their Applications*, conference, Lisbon
- June 2023: *Recent Advances in Quantum and Statistical Mechanics*, summer school, Hausdorff School for Advances Studies in Mathematics, Bonn
- March 2023: *Young European Probabilists (YEP) workshop XVIII*, Eindhoven
- July 2022: *Random matrices and Random Landscapes, Conference in honour of Yan Fyodorov's 60th birthday*, Ascona
- July 2022: *Probability and Mathematical Physics*, Helsinki
- June 2022: *Institute of Mathematical Statistics – Annual Meeting in Probability and Statistics*, London
- December 2021: *XVII Brunel – Bielefeld Workshop*, ZiF, Bielefeld, Online Meeting
- September 2021: *Universality and Integrability in Random Matrix Theory and Interacting Particle Systems, Part 2*, MSRI, Berkeley
- August 2021: *Universality and Integrability in Random Matrix Theory and Interacting Particle Systems, Part 1*, MSRI, Berkeley
- August 2021: *International congress on mathematical physics*, Geneva
- July 2021: *ICMP Young Researchers Symposium*, Geneva
- September 2020: *7th NCCR SwissMAP general meeting*, Saanenmöser
- August 2020: *Bernoulli-IMS One World Symposium 2020*, Online Conference
- May 2020: *Online Random Matrices and Their Applications 2020*, Online Conference
- February 2020: *Workshop on Mathematical Physics*, Les Diablerets
- December 2019: *Random Matrices*, Mathematical Research Institute Oberwolfach
- September 2019: *6th NCCR SwissMap general meeting*, Villars-sur-Ollon

August 2019:	<i>From Many Body Problems to Random Matrices</i> , BIRS, Banff
April 2019:	<i>Random Matrices and Random Graphs</i> , CIRM Luminy
February 2019:	<i>Workshop on Statistical Mechanics</i> , Les Diablerets
November 2018:	<i>Brown measures and non-normal random matrices</i> , Toulouse
July 2018:	<i>International congress on mathematical physics</i> , Montreal
July 2018:	<i>ICMP Young Researchers Symposium</i> , Montreal
June 2018:	<i>Probability and Mathematical Physics</i> , Summer school, IST Austria, Klosterneuburg
March 2018:	<i>Annual meeting of the German mathematical society</i> , Paderborn
December 2017:	<i>XIII Brunel – Bielefeld Workshop</i> , ZiF, Bielefeld
June – July 2017:	<i>Summer session on random matrices</i> , Park City Mathematics Institute
August 2016:	<i>Frontiers in Mathematical Physics</i> , CRM, Montreal
August 2016:	<i>Methods of Modern Mathematical Physics</i> , Young Researcher Symposium, Fields Institute, Toronto
June, July 2015:	<i>Quantum Many-body Systems, Random Matrices and Disorder</i> , Workshops, ESI, Vienna
September 2013:	<i>Free Probability and Operator Algebras</i> , Master Class, WWU Münster.

Miscellaneous

Language skills:	German (mother tongue), English (fluent), French (advanced knowledge).
Computer skills:	Matlab, Mathematica, \LaTeX , Programming language C.
Leisure time activities:	Hiking, swimming, running, biking.