

Manuel Esser

manuel.esser@polytechnique.edu

Centre de Mathématiques Appliquées de l'École Polytechnique
Institut Polytechnique de Paris
Route de Saclay
91128 Palaiseau cedex, France

Education

01/2021–07/2025	Dr. rer. nat. Mathematics (magna cum laude) University of Bonn Thesis: <i>Fitness Valleys, Metastability and Changing Environments</i> (Advisor: Prof. A. Bovier)
10/2018–09/2020	Master of Science in Mathematics (with distinction) University of Bonn Thesis: <i>Metastability in stochastic population models: Surprising phenomena beyond the fitness valley</i> (Advisor: Prof. A. Bovier)
10/2015–09/2018	Bachelor of Science in Mathematics minor Pedagogy University of Bonn Thesis: <i>Metastability in Zero-Temperature-Limit</i> (Advisor: Prof. A. Bovier)
10/2014–09/2015	Bachelor studies in Mathematics and Pedagogy (Teacher education program, not finished) University of Cologne
08/2005–06/2013	Abitur Ev. Amos-Comenius-Gymnasium Bad Godesberg

Employment

05/2025–present	PostDoc, Centre de Mathématiques Appliquées , École Polytechnique, Paris
01/2021–04/2025	Research Associate, Institute for Applied Mathematics , University of Bonn
10/2017–12/2020	Student Assistant, Institute for Applied Mathematics , University of Bonn

Research Interest

Stochastic models of biology and evolution, particle systems, multi-scale analysis, metastability, time-dependent parameters, changing environments, dormancy

Awards & Honors

07/2016 – 09/2020	Student Scholarship of the Friedrich-Ebert-Foundation (FES)
-------------------	---

Publications

In Preparation

- [1] N. Champagnat and M. Esser. Time of evolutionary branching and dynamics of separation
- [2] M. Doumic, M. Esser, S. Kaakai and S. Méléard. How age structured populations cross a fitness valley

Preprints

- [1] M. Esser and A. Kraut. Crossing a fitness valley in a changing environment: With and without pit stop. *Arxiv*, 2503.19766, 2025.

Journal Articles

- [1] M. Esser and A. Kraut. Effective growth rates in a periodically changing environment: From mutation to invasion. *Stoch. Proc. Appl.*, 184:104598, 2025.
- [2] M. Esser and A. Kraut. A general multi-scale description of metastable adaptive motion across fitness valleys. *J. Math. Biol.*, 89(4):46–, 2024.

Research Visits

09/2025	Université de Lorraine Nancy, Prof. Nicolas Champagnat
11/2024	École Polytechnique Paris, Prof. Sylvie Méléard
06/2024	Université de Grenoble Alpes, MCF Loren Coquille
01/2023	University of Minnesota, Lab of Prof. Jasmin Foo
03/2022	University of Minnesota, Lab of Prof. Jasmin Foo

Presentations

Invited Talks

31.03.2026	École Polytechnique, Paris Groupe de travail Probabilités et Analyse
05.11.2025	Institut des Hautes Études Scientifiques, Bures-sur-Yvette Interactive Math Day of MSV and MathCSI (FMJH)
04.11.2025	Université Sorbonne Paris Nord (13) Séminaire de Probabilités et Statistiques du LAGA
07.05.2025	Istituto superiore di sanità, Roma,

	Conference: Cancer dormancy and therapy resistance: From models to the clinic
14.11.2024	École Polytechnique, Paris Séminaire MERGE
28.10.2024	Goethe Universität Frankfurt, SPIELE-Seminar
18.06.2024	Université de Grenoble Alpes, Séminaire Probabilités
18.12.2023	Goethe Universität Frankfurt Workshop: Critical phenomena and challenges emerging from dormancy
25.10.2023	Rheinische Friedrich-Wilhelms-Universität Bonn, HCM Graduate Colloquium
25.11.2022	Rheinische Friedrich-Wilhelms-Universität Bonn, MaLiS-Club of the IRU Mathematics and Lifescience
12.07.2022	Johannes Gutenberg Universität Mainz, Oberseminar Stochastik

Contributions

21.07.2026	Cork University College Mathematical Models in Ecology and Evolution
11.09.2025	Lübeck, Dynamics of interacting populations and beyond
02.07.2025	Rheinische Friedrich-Wilhelms-Universität Bonn Promotionskolloquium
11.03.2025	Technische Universität Dresden German Probability and Statistic Days
12.09.2024	La Rogaia, Summer School Stochastic Bonn-Mainz
15.07.2024	Universität Wien Mathematical Models in Ecology and Evolution
27.-28.06.2024	Hausdoff Center for Mathematics, Bonn BIGS Poster Exhibition
12.06.2024	CNRS Centre Paul-Langevin, Aussois École de recherche de la Chaire MMB
24.05.2024	CIRM, Marseille Stochastic processes in evolutionary biology
03.08.2023	Cadenabbia, Summer School Stochastic Bonn-Mainz
27.03.2023	Technische Universität Darmstadt Springschool: Probabilistic methods in population biology
07.-10.03.2023	Universität Duisburg Essen German Probability and Statistic Days
06.10.2022	Universität Bielefeld, Colloquium of the SPP1590 Probabilistic Structures in Evolution
30.06.-01.07.2022	Hausdoff Center for Mathematics, Bonn BIGS Poster Exhibition
14.03.2022	University of Minnesota Math Biology Seminar
24.06.2021	Hausdoff Center for Mathematics, Bonn

Teaching

Teaching assistance

10/2024 – 03/2025	Lecture: Einführung in die Wahrscheinlichkeitstheorie
10/2023 – 03/2024	Lecture: Markov Processes
03/2023 – 09/2023	Seminar: Stochastic models in evolution
03/2021 – 09/2021	Seminar: Probleme und Knobelien aus Wahrscheinlichkeitstheorie und Statistik

Tutorial classes

11/2025 – 02/2026	Probabilités avancées
03/2022 – 09/2022	Stochastic Processes
10/2020 – 03/2021	Introduction to Stochastic Analysis
04/2020 – 09/2020	Stochastic Processes
03/2020	Revision course: Einführung in die Wahrscheinlichkeitstheorie
10/2019 – 03/2020	Einführung in die Wahrscheinlichkeitstheorie
04/2019 – 09/2019	Stochastic Processes
10/2018 – 03/2019	Einführung in die Wahrscheinlichkeitstheorie
04/2018 – 09/2018	Stochastic Processes
10/2017 – 03/2018	Einführung in die Wahrscheinlichkeitstheorie

Teaching Methodology

10/2024	Training for tutors
10/2023	Training for tutors
10/2022	Training for tutors
10/2021	Training for tutors
10/2020	Training for tutors
10/2019	Training for tutors

Academic Service

Journal Reviewer

2025 –	Random Structures and Algorithms
2025 –	Stochastic Processes and their Applications
2026 –	Journal of Mathematical Biology
2026 –	Annals of Applied Probability

Organisation of Meetings

01/2027 – 04/2027	Junior Trimester Programm at the Hausdorff Research Institute of Mathematics (Bonn) (Subgroupleader)
09/2024	Summer School Stochastic Bonn-Mainz (Lago di Como) (Co-Organiser)
08/2023	Summer School Stochastic Bonn-Mainz (Umbria)(Co-Organiser)
03/2022 – 09/2024	PhD-Seminar Stochastic (University of Bonn) (Organiser)

Committees

10/2024 – 12/2024	Member of the hiring committee for Bonn-Junior-Fellows
10/2023 – 12/2023	Member of the hiring committee for Bonn-Junior-Fellows
04/2022 – 05/2025	Member of the Fachkommision Mathematik (University of Bonn)
10/2018 – 05/2025	Member of the steering committee of the Institut for Applied Mathematics

Memberships

2026 –	DMV Fachgruppe Stochastik
2025 –	Chaire Modélisation Mathématique et Biodiversité (Chair MMB)
2021 – 2025	Bonn International Graduate School of Mathematics (BIGS)

Last updated: August 27, 2026