

Stefan Junk (シュテファン ユンク)

Department of Mathematics, Gakushuin University
Mejiro 1-5-1, Toshima-ku, 171-8588 Tokyo, Japan

sjunk@math.gakushuin.ac.jp
www.stefanjunkprob.de
ORCID: 0000-0002-5151-8008

Research interests	Probability Theory, specifically random processes in random media: <ul style="list-style-type: none">• The KPZ universality class, in particular the Directed Polymer Model.• Scaling limits for reversible Markov processes.• Random networks, in particular their degree correlations.• Mathematical Physics.
Employment	Gakushuin University Assistant Professor September 2023 – present Tohoku University Assistant Professor August 2021 – August 2023 Kyoto University and Tsukuba University JSPS Postdoctoral Fellow. November 2019 – June 2021 Hosted by David Croydon and Ryoki Fukushima.
Education	TU München. PhD (Mathematics) 2014 – 2019 Supervised by Nina Gantert, passed <i>summa cum laude</i> . MSc (Mathematics, TopMath Elite Master Study Program) 2012 – 2014 BSc (Mathematics) 2009 – 2012
Teaching experience	Gakushuin University Exercise classes (微分積分 I, 微分積分 III, 複素関数入門). In Japanese. Nagoya University Special Course on Analysis III (Intensive Course, June 2024) TU München Exercise classes (mostly master level)
Prizes	Takebe Katahiro Prize (Special Prize) 2024 Mathematical Society of Japan Young Scientist Award 2025 Ministry of Education, Culture, Sports, Science and Technology
Funding	JSPS Grant-in-Aid for Early-Career Scientists (3.4m JPY) 2023 – 2026 Grant-in-Aid for JSPS Fellows (1.6m JPY) 2019 – 2021
Languages	German (native speaker), English (fluent) and Japanese (JLPT level N2).

Publication list

Accepted

- 2024 [1] **Stefan Junk** and Hubert Lacoin. *Strong disorder and very strong disorder are equivalent for directed polymers*. arXiv:2402.02562, *To appear in Ann. Sci. Ec. Norm. Super.*

Published

- 2026 [2] **Stefan Junk** and Hubert Lacoin. “Coincidence of critical points for directed polymers for general environments and random walks”. In: *Orbita Math.* 3.1 (Apr. 2026), pp. 89–125. DOI: 10.2140/om.2026.3.89.
- 2025 [3] Yuka Fujiki and **Stefan Junk**. “Structural robustness of networks with degree-degree correlations between second-nearest neighbors”. In: *PLoS ONE* 20.12 (Dec. 2025), e0336970. DOI: 10.1371/journal.pone.0336970.
- [4] **Stefan Junk**. “Fluctuations of partition functions of directed polymers in weak disorder beyond the L^2 -phase”. In: *Ann. Probab.* 53.2 (Mar. 2025), pp. 557–596. DOI: 10.1214/24-aop1716.
- [5] **Stefan Junk**. “Local limit theorem for directed polymers beyond the L^2 -phase”. In: *J. Eur. Math. Soc.* (May 2025). DOI: 10.4171/jems/1650.
- [6] **Stefan Junk** and Hubert Lacoin. “The Tail Distribution of the Partition Function for Directed Polymers in the Weak Disorder Phase”. In: *Comm. Math. Phys.* 406.3 (Feb. 2025). DOI: 10.1007/s00220-025-05246-0.
- [7] **Stefan Junk** and Shuta Nakajima. “Equivalence of fluctuations of discretized SHE and KPZ equations in the subcritical weak disorder regime”. In: *Probab. Math. Phys.* 6.3 (June 2025), pp. 819–856. DOI: 10.2140/pmp.2025.6.819.
- 2023 [8] David A. Croydon, Ryoki Fukushima, and **Stefan Junk**. “Anomalous scaling regime for one-dimensional Mott variable-range hopping”. In: *Ann. Appl. Probab.* 33.5 (2023), pp. 4044–4090. DOI: 10.1214/22-AAP1915.
- [9] David A. Croydon, Ryoki Fukushima, and **Stefan Junk**. “Extremal regime for one-dimensional Mott variable-range hopping”. In: *Ann. Henri Lebesgue* 6 (2023), pp. 1169–1211. DOI: 10.5802/ahl.186.
- [10] Ryoki Fukushima and **Stefan Junk**. “Moment characterization of the weak disorder phase for directed polymers in a class of unbounded environments”. In: *Electron. Comm. Probab.* 28 (2023), pp. 1–9. DOI: 10.1214/23-ECP545.
- [11] **Stefan Junk**. “Stability of weak disorder phase for directed polymer with applications to limit theorems”. In: *ALEA Lat. Am. J. Probab. Math. Stat.* 20 (2023), pp. 861–883. DOI: 10.30757/ALEA.v20-31.
- 2022 [12] Ryoki Fukushima and **Stefan Junk**. “Number of paths in oriented percolation as zero temperature limit of directed polymer”. In: *Probability Theory and Related Fields* 183.3–4 (May 2022), pp. 1119–1151. DOI: 10.1007/s00440-022-01130-3.
- [13] **Stefan Junk**. “New characterization of the weak disorder phase of directed polymers in bounded random environments”. In: *Comm. Math. Phys.* 389.2 (2022), pp. 1087–1097. DOI: 10.1007/s00220-021-04259-9.

- 2021 [14] Ryoki Fukushima and **Stefan Junk**. “On large deviation rate functions for a continuous-time directed polymer in weak disorder”. In: *Electron. Comm. Probab.* 26 (2021), pp. 1–10. DOI: 10.1214/21-ECP378.
- 2020 [15] **Stefan Junk**. “Comparison of partition functions in a space-time random environment”. In: *J. Stat. Phys.* 181.1 (2020), pp. 95–115. DOI: 10.1007/s10955-020-02566-4.
- 2019 [16] Ryoki Fukushima and **Stefan Junk**. “Zero temperature limit for the Brownian directed polymer among Poissonian disasters”. In: *Ann. Appl. Probab.* 29.6 (2019), pp. 3821–3860. DOI: 10.1214/19-AAP1493.
- 2017 [17] Nina Gantert and **Stefan Junk**. “A branching random walk among disasters”. In: *Electron. J. Probab.* 22 (2017), Paper No. 67, 34. DOI: 10.1214/17-EJP75.
- 2014 [18] **Stefan Junk**. “On the survival probability of a random walk in random environment with killing”. In: *ALEA Lat. Am. J. Probab. Math. Stat.* 11.1 (2014), pp. 823–844.

Thesis

- 2019 [19] **Stefan Junk**. “Random polymers in disastrous environments”. <http://mediatum.ub.tum.de/?id=1488489>. Dissertation. München: Technische Universität München.

Invited Talks (since 2019)

- Nov. 2025 **One World IAMP Mathematical Physics Seminar, Online.**
The phase transition for the directed polymer model in higher dimensions
- Nov. 2025 **Shanghai Probability Meeting, Shanghai.**
Equivalence of fluctuations of discretized SHE and KPZ equations in the subcritical weak disorder regime
- Oct. 2025 **Stochastic Analysis on Large Scale Interacting Systems, Tokyo.**
The directed polymer model with general reference random walk
- Aug. 2025 **Stochastic Processes and Complex Systems, Sendai.**
Equivalence of fluctuations of discretized SHE and KPZ equations in the subcritical weak disorder regime
- Jun. 2025 **Far East Probability Workshop, Sapporo.**
Equivalence of fluctuations of discretized SHE and KPZ equations in the subcritical weak disorder regime
- Nov. 2024 **Random Operators and Related Topics, Sendai.**
Recent progress in the directed polymer model
- Sep. 2024 **Open German-Japanese Conference on Stochastic Analysis and Applications**
Equivalence of strong disorder and very strong disorder for directed polymer in random environment
- May 2024 **Random Walks, Scaling Limits and Criticality.**

- May 2024 Strong disorder and very strong disorder are equivalent for directed polymers
Oberseminar Stochastics, Bonn.
- May 2024 Strong disorder and very strong disorder are equivalent for directed polymers
NYU Shanghai-Kyoto-Waseda Young Probabilists' Meeting.
- Mar. 2024 Strong disorder and very strong disorder are equivalent for directed polymers
Probability Seminar, Singapore.
- Feb. 2024 Strong disorder and very strong disorder are equivalent for directed polymers
Probability Seminar, Hong Kong.
- Jan. 2024 Strong disorder and very strong disorder are equivalent for directed polymers
Probability Seminar Series, Shanghai.
- Dec. 2023 The Directed Polymer Model in Weak Disorder beyond the L^2 -Phase
Workshop on random interacting systems, Singapore.
- Nov. 2023 Local limit theorem for directed polymer beyond the L^2 -phase
Tokyo Probability Seminar, Tokyo.
- Oct. 2023 Local limit theorem for directed polymer in (almost) the whole weak disorder regime
Stochastic Analysis on Large Scale Interacting Systems, Kyoto.
- Oct. 2023 Local Limit Theorem for Directed Polymers beyond the L^2 -phase
Random Operators and Related Topics, Sendai.
- Dec. 2022 Local limit theorem for directed polymer in the delocalized phase
Stochastic Analysis on Large Scale Interacting Systems, Fukuoka.
- Aug. 2022 The directed polymer model in weak disorder beyond the L^2 -regime.
Probability and Analysis on Random Structures and Related Topics, Kyoto.
- May 2022 Fluctuations for the partition function of directed polymers beyond the L^2 -phase.
Probability Seminar, Münster.
- Feb. 2022 Fluctuations for partition function of directed polymers beyond the L^2 -phase.
Probability Seminar, Sendai.
- Feb. 2021 Number of paths in oriented percolation as zero-temperature limit of directed polymer.
Statistics Seminar, Bergen.
- Nov. 2020 Zero-temperature limit for the number of open paths in oriented percolation.
Kansai Probability Seminar, Kyoto.
- Nov. 2020 Anomalous scaling regime for one-dimensional Mott variable-range hopping.
Workshop on Microstructure, Sapporo.
- Feb. 2020 Anomalous scaling regime for one-dimensional Mott variable-range hopping.
KTGU Workshop, Kyoto.
- Nov. 2019 Large deviations for directed polymers in the whole weak disorder phase.
Stochastic Analysis in Large Scale Interacting Systems, Osaka.
- Feb. 2019 Zero-temperature limit for the Brownian polymer among Poissonian disasters.
Probability Seminar, Haifa.
- Zero-temperature limit for Brownian directed polymers among Poissonian disasters.