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: • 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 *summa cum laude*. 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)
Prices	MSJ Takebe Katahiro Prize 2024 (Special Prize)
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

Submitted

[1] Stefan Junk and Hubert Lacoin. Coincidence of critical points for directed polymers for general environments and random walks, February 2025. arXiv:2502.04113.

[2] Yuka Fujiki and Stefan Junk. Structural robustness of networks with degree-degree correlations between second-nearest neighbors, December 2024. arXiv:2412.02438.

[3] Stefan Junk and Hubert Lacoin. Strong disorder and very strong disorder are equivalent for directed polymers, February 2024. arXiv:2402.02562.

[4] Stefan Junk and Shuta Nakajima. Equivalence of fluctuations of discretized SHE and KPZ equations in the subcritical weak disorder regime, October 2024. arXiv:2410.06801.

Accepted (peer-reviewed)

[5] Stefan Junk. Local limit theorem for directed polymers beyond the L^2-phase. *J. Eur. Math. Soc.*, July 2023. arXiv:2307.05097.

Published (peer-reviewed)

[6] Stefan Junk. Fluctuations of partition functions of directed polymers in weak disorder beyond the L^2-phase. *Ann. Probab.*, 53(2):557–596, March 2025. ISSN 0091-1798. doi:10.1214/24-aop1716.

[7] Stefan Junk and Hubert Lacoin. The tail distribution of the partition function for directed polymers in the weak disorder phase. *Comm. Math. Phys.*, 406(3), February 2025. doi:10.1007/s00220-025-05246-0.

[8] David A. Croydon, Ryoki Fukushima, and Stefan Junk. Anomalous scaling regime for one-dimensional Mott variable-range hopping. *Ann. Appl. Probab.*, 33(5):4044 – 4090, 2023. doi:10.1214/22-AAP1915.

[9] David A. Croydon, Ryoki Fukushima, and Stefan Junk. Extremal regime for one-dimensional Mott variable-range hopping. *Ann. Henri Lebesgue*, 6:1169–1211, 2023. 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. *Electron. Comm. Probab.*, 28:1 – 9, 2023. doi:10.1214/23-ECP545.

[11] Stefan Junk. Stability of weak disorder phase for directed polymer with applications to limit theorems. *ALEA Lat. Am. J. Probab. Math. Stat.*, 20:861–883, 2023. doi:10.30757/ALEA.v20-31.

[12] Ryoki Fukushima and Stefan Junk. Number of paths in oriented percolation as zero temperature limit of directed polymer. *Probab. Theory Relat. Fields*, 2022. doi:10.1007/s00440-022-01130-3.

[13] Stefan Junk. New characterization of the weak disorder phase of directed polymers in bounded random environments. *Comm. Math. Phys.*, 389(2):1087–1097, 2022. doi:10.1007/s00220-021-04259-9.

[14] Ryoki Fukushima and Stefan Junk. On large deviation rate functions for a continuous-time directed polymer in weak disorder. *Electron. Comm. Probab.*, 26:1 – 10, 2021. doi:10.1214/21-ECP378.

[15] Stefan Junk. Comparison of partition functions in a space-time random environment. *J. Stat. Phys.*, 181(1):95–115, 2020. ISSN 0022-4715. doi:10.1007/s10955-020-02566-4.

[16] Ryoki Fukushima and Stefan Junk. Zero temperature limit for the Brownian directed polymer among Poissonian disasters. *Ann. Appl. Probab.*, 29(6):3821–3860, 2019. doi:10.1214/19-AAP1493.

[17] Nina Gantert and Stefan Junk. A branching random walk among disasters. *Electron. J. Probab.*, 22:Paper No. 67, 34, 2017. doi:10.1214/17-EJP75.

[18] Stefan Junk. On the survival probability of a random walk in random environment with killing. *ALEA Lat. Am. J. Probab. Math. Stat.*, 11(1):823–844, 2014. *Based on results from the Bachelor thesis.*

Thesis

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

Invited Talks (since 2019)

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**.
	Strong disorder and very strong disorder are equivalent for directed polymers
May 2024	**Oberseminar Stochastics, Bonn**.
	Strong disorder and very strong disorder are equivalent for directed polymers
May 2024	**NYU Shanghai-Kyoto-Waseda Young Probabilists' Meeting**.
	Strong disorder and very strong disorder are equivalent for directed polymers
Mar. 2024	**Probability Seminar, Singapore**.
	Strong disorder and very strong disorder are equivalent for directed polymers
Feb. 2024	**Probability Seminar, Hong Kong**.
	Strong disorder and very strong disorder are equivalent for directed polymers
Jan. 2024	**Probability Seminar Series, Shanghai**.
	The Directed Polymer Model in Weak Disorder beyond the L^2-Phase
Dec. 2023	**Workshop on random interacting systems, Singapore**.

Local limit theorem for directed polymer beyond the L^2-phase

Nov. 2023   **Tokyo Probability Seminar, Tokyo**.
Local limit theorem for directed polymer in (almost) the whole weak disorder regime

Oct. 2023   **Stochastic Analysis on Large Scale Interacting Systems, Kyoto**.
Local Limit Theorem for Directed Polymers beyond the L^2-phase

Oct. 2023   **Random Operators and Related Topics, Sendai**.
Local limit theorem for directed polymer in the delocalized phase

Dec. 2022   **Stochastic Analysis on Large Scale Interacting Systems, Fukuoka**.
The directed polymer model in weak disorder beyond the L^2-regime.

Aug. 2022   **Probability and Analysis on Random Structures and Related Topics, Kyoto**.
Fluctuations for the partition function of directed polymers beyond the L^2-phase.

May 2022   **Probability Seminar, Münster**.
Fluctuations for partition function of directed polymers beyond the L^2-phase.

Feb. 2022   **Probability Seminar, Sendai**.
Number of paths in oriented percolation as zero-temperature limit of directed polymer.

Feb. 2021   **Statistics Seminar, Bergen**.
Zero-temperature limit for the number of open paths in oriented percolation.

Nov. 2020   **Kansai Probability Seminar, Kyoto**.
Anomalous scaling regime for one-dimensional Mott variable-range hopping.

Nov. 2020   **Workshop on Microstructure, Sapporo**.
Anomalous scaling regime for one-dimensional Mott variable-range hopping.

Feb. 2020   **KTGU Workshop, Kyoto**.
Large deviations for directed polymers in the whole weak disorder phase.

Nov. 2019   **Stochastic Analysis in Large Scale Interacting Systems, Osaka**.
Zero-temperature limit for the Brownian polymer among Poissonian disasters.

Feb. 2019   **Probability Seminar, Haifa**.
Zero-temperature limit for Brownian directed polymers among Poissonian disasters.