

# Adrian Röllin

## Curriculum Vitae

### Education

- 11/2002–11/2006 **Ph.D. in Mathematics**, *University of Zürich, Switzerland*, under supervision of A. D. Barbour.
- 10/1996–10/2002 **M.Sc. in Mathematics**, *University of Zürich, Switzerland*, minor subjects: computer science, actuarial science.

### Positions

- since 07/2021 Professor, Department of Statistics and Data Science, NUS
- 01/2015–06/2021 Associate Professor, Department of Statistics and Applied Probability, NUS
- 07/2009–12/2014 Assistant Professor, Department of Statistics and Applied Probability, NUS
- 09/2008–06/2009 Postdoc, Department of Mathematics, NUS
- 05/2008–07/2008 Postdoc, Institute of Social and Preventive Medicine, University of Bern
- 04/2007–03/2008 Postdoc, Department of Statistics, University of Oxford

### Other Appointments

- since 07/2018 Honorary appointment, Saw Swee Hock School of Public Health, NUS
- since 07/2016 Honorary appointment, Department of Mathematics, NUS

### Awards and Recognitions

- 2019 IMS Fellow (Institute of Mathematical Statistics)
- 2019 ISI Elected Member (International Statistical Institute)
- 2019 Dean's Chair, Faculty of Science, NUS
- 2010 Young Scientist Award, Faculty of Science NUS
- 2007 PhD thesis awarded for scientific excellence from the Faculty of Science, University of Zürich

### Editorial Work

- since 01/2021 Associate Editor, *Bernoulli Journal*
- since 10/2020 Associate Editor, Applied Probability Trust (*Advances in Applied Probability* and *Journal of Applied Probability*)
- 2013–2021 Associate Editor, *Probability in the Engineering and Informational Sciences*

### Professional Committee Work

- since 2025 Vice President, Singapore Mathematical Society
- 2025 Member of the Scientific Programme Committee, IASC-ARS Meeting 2025, Ho Chi Minh City, Vietnam
- 2023–2027 Member of the Board of Directors of IASC-ARS (International Association for Statistical Computing, Asian Regional Section)
- 2025 Chair, Scientific Programme Committee, 65th ISI World Statistics Congress, The Hague
- 2024–2025 Committee on Nominations, Institute of Mathematical Statistics
- 2020–2025 Ethel Newbold Prize Committee, Bernoulli Society (Chair 2024–2025)

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2020–2025 Management Committee, Singapore Mathematical Society

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## Service appointments

2021–2024 Head, Department of Statistics and Data Science, NUS  
2018–2021 Deputy Director, Institute for Mathematical Sciences, NUS  
2018–2021 Deputy Head, Department of Statistics and Applied Probability, NUS  
2018–2021 Faculty Promotion and Tenure Committee, Faculty of Science, NUS

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## Memberships in Professional Organisations

- American Mathematical Society
- Bernoulli Society
- Institute of Mathematical Statistics
- Intern. Assoc. for Statistical Computing
- International Statistical Institute
- Singapore Mathematical Society

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## Research Interests

- Distributional approximations in probability and statistics via Stein's method
- Random graphs and other random combinatorial objects
- Epidemiological modelling
- Applied statistical modelling and analysis in life sciences
- Statistical applications of deep neural networks

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## Research Group

### *Postdocs*

since 2023 Francesca Cottini, joint Luxembourg-Singapore research grant, NRF Luxembourg  
2022–2023 Yuanfei Huang, under MOE Tier 2 research grant  
2022–2023 Tianshu Cong, under MOE Tier 2 research grant  
2020–2022 Van Hao Can, under MOE Tier 2 research grant  
2019–2021 Zhuosong Zhang, under MOE Tier 2 research grant  
2018–2021 Gursharn Kaur, under Faculty of Science RSB program  
2019–2020 Arturo Jaramillo Gil, joint with *University of Luxembourg*, under Luxembourg NRF  
2019–2020 Xiaochuan Yang, joint with *University of Luxembourg*, under Luxembourg NRF

### *Ph.D. students*

since 2021 Ryo Imai, *Stein's Method for Multivariate Translated Poisson Approximation*  
2018–2023 Shang Li, *Stein's Method for Total Variation Approximation With Applications to Analysis of Computer Algorithms*.  
2016–2020 Wai Hoh Tang, *Deep Learning in Fluorescence Spectroscopy*.  
2010–2014 Daniel Paulin (co-supervised with Louis H. Y. Chen), *Stein's method for Concentration of Measure*.

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## Invited Talks and Invited Conference Sessions

### *Past events*

12/2024 Invited speaker, *Mathematical Foundations of Network Models and Their Applications*, BIRS/CMI Workshop, Chennai, India  
09/2024 Invited speaker, Probability Seminar, ICTS-TIFR, Bangalore, India  
09/2024 Invited speaker, Probability Seminar, University of Melbourne, Australia  
08/2024 Invited speaker, *Bernoulli-IMS World Congress*, Bochum, Germany  
01/2024 Invited participant, *Discussion Meeting on Probability* at ICTS-TIFR Bangalore, India  
01/2024 Invited speaker, *IMS Pacific RIM*, Melbourne, Australia  
08/2023 Invited speaker, *Permutation and Causal Inference Connections and Applications*, IMSI Chicago, United States

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- 03/2023 Invited speaker, *UK Easter Probability Meeting*, Manchester, United Kingdom
- 09/2022 Invited speaker, *Graph Limits, Non-Parametric Models, and Estimation*, Simons Institute, UC Berkeley
- 04/2022 Invited speaker, *Advances in Stein's Method and its Applications in Machine Learning and Optimization*, BIRS Workshop, Banff, Canada
- 03/2022 Invited speaker (hybrid), *Workshop: Population Dynamics and Statistical Physics in Synergy*, Oberwolfach, Germany
- 10/2020 Invited speaker (online talk), *Stochastics Seminar*, Georgia Tech, USA
- 07/2020 Invited speaker (online talk), *Probability Victoria Seminar*, Australia
- 2020 Invited participant, *Discussion Meeting on Stochastic Analysis, Geometry, and Random Fields* at ISI Bangalore, India
- 2019 Invited to conduct 4-day mini-lecture series as part of graduate course *Introduction to Causal Inference and Stein's method*, Universities of Mannheim and Heidelberg, Germany
- 2019 Invited-session organiser, *ISI World Statistics Congress*, Kuala Lumpur, Malaysia
- 2019 Invited speaker, *Mathematical Colloquium*, Institute for Mathematics, University of Osnabrück, Germany
- 2018 Invited speaker, *Workshop on High-Dimensional Phenomena in Probability*, Bochum, Germany
- 2018 Invited speaker, *Workshop in Honour of Carl-Gustav Esseen's 100th Birthday*, Uppsala, Sweden
- 2018 Invited participant, *AIM Workshop on Stein's Method and Applications in High-Dimensional Statistics*, San Jose, United States
- 2018 Invited-session speaker, *IMS Asia Pacific Rim Meeting*, Singapore
- 2018 Invited-session speaker, *9th International Workshop on Applied Probability*, Budapest, Hungary
- 2018 Invited speaker, *International Conference in Statistics and Probability in Memory of 125 P. C. Mahalanobis*, Kolkata, India
- 2017 Invited speaker at *Melbourne-Singapore Probability and Statistics Forum*, Melbourne, Australia
- 2017 Invited speaker, *Probability Meeting at ISI Bangalore*, Bangalore, India
- 2016 Invited-session organiser and invited-session speaker, *IMS Asia Pacific Rim Meeting*, Hong Kong
- 2016 Invited speaker, *Asian Mathematical Conference*, Bali, Indonesia
- 2015 Invited-session speaker, *Stochastic Processes and Applications*, Oxford, United Kingdom
- 2014 Invited-session speaker, *IMS Annual Meeting*, Sydney, Australia
- 2014 Invited speaker, *International Colloquium on Stein's Method, Concentration Inequalities, and Malliavin Calculus*, Nantes, France
- 2013 Invited speaker for lecture series at the University of Melbourne, Melbourne, Australia
- 2013 Invited speaker, *Workshop on New Directions in Probability*, ISI Bangalore, India
- 2013 Invited-session speaker, *IMS-China International Conference on Statistics and Probability*, Chengdu, China
- 2013 Invited-session speaker, *Statistics, Science, and Society: New Challenges and Opportunities*, international conference organised by the International Indian Statistical Association, Chennai, India
- 2012 Invited speaker of contributed session, *8th World Congress in Probability and Statistics*, Istanbul, Turkey
- 2012 Invited-session speaker, *International Workshop in Applied Probability*, Jerusalem, Israel

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## Conference Organiser

### *Chair or co-chair of organising committee*

- 2022 *Stein's Method — The Golden Anniversary* (4-week program, 60 participants), Institute for Mathematical Sciences, NUS
- 2022 *A Tale of Rare Events — Symposium in Honour of Louis Chen on His 80th Birthday* (4 days, 30 participants), NUS
- 2022 *SASI — Singapore–Abu Dhabi–Shanghai–India Probability Meeting*, NYU Abu Dhabi Institute, Abu Dhabi
- 2019 *SASI — Singapore–Abu Dhabi–Shanghai–India Probability Meeting* (3 days, over 30 participants), Institute for Mathematical Sciences and Department of Mathematics, NUS
- 2016 *Second Melbourne–Singapore Probability and Statistics Forum* (1 day, 15 participants), Institute for Mathematical Sciences, NUS
- 2015 *Workshop on New Directions in Stein's Method* (2 weeks, around 70 participants), Institute for Mathematical Sciences, NUS

### *Member of organising committee*

- 2021 *SASI — Singapore–Abu Dhabi–Shanghai–India Probability Meeting*, NYU Abu Dhabi
- 2019 *Symposium in Memory of Charles Stein [1920 - 2016]* (2 weeks, around 70 participants), Institute for Mathematical Sciences, NUS
- 2010 *Workshop on Epidemiology of Infectious Diseases: Emerging Challenges* (1 week), Institute for Mathematical Sciences, NUS

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## Publications

### *Preprints*

- [50] Y. Huang, A. Röllin (2024). The SIR epidemic on a dynamic Erdős-Rényi random graph. [arxiv.org:2404.12566](https://arxiv.org/abs/2404.12566)
- [49] S. Athreya, F. den Hollander and A. Röllin (2024). The Moran model with random resampling rates. [arxiv.org:2402.01333](https://arxiv.org/abs/2402.01333)
- [48] V. H. Can, A. Röllin. Mean-field spin models – Fluctuation of the magnetization and maximum likelihood estimator. [arXiv:2312.07313](https://arxiv.org/abs/2312.07313).
- [47] L. H. Y. Chen and A. Röllin. Stein couplings for normal approximation. [arXiv:1003.6039](https://arxiv.org/abs/1003.6039).

### *Journal articles*

- [46] W. H. Tang, S. R. Sim, D. Y. K. Aik, A. V. S. Nelanuthala, T. Athilingam, A. Röllin, T. Wohland (2024). Deep learning reduces data requirements and allows real-time measurements in Imaging FCS. *Biophysical Journal* **123**, 1–12.
- [45] A. Röllin and Z.-S. Zhang (2023). Dense multigraphon-valued stochastic processes and edge-changing dynamics in the configuration model. *Ann. Appl. Probab.* **33**, 3207–3239
- [44] A. Röllin (2022). Kolmogorov bounds for the normal approximation of the number of triangles in the Erdős-Rényi random graph. *Probab. Engng. Inform. Sci.* **36**, 747–773.
- [43] J. Fulman and A. Röllin (2022). Stein's method, heat kernel, and linear functions on the orthogonal groups. *J. Algebra* **607**, 272–285.
- [42] M. A. Mendieta-Serrano, S. Dhar, B. H. Ng, R. Narayanan, J. J. Y. Lee, H. T. Ong, P. J. Y. Toh, A. Röllin, S. Roy, and T. E. Saunders (2022). Slow muscles guide fast myocyte fusion to ensure robust myotome formation despite the high spatiotemporal stochasticity of fusion events. *Dev. Cell* **57**, 2095–2110.e5.
- [41] L. H. Y. Chen, A. Röllin, A. Xia (2021). Palm theory, random measures and Stein couplings. *Ann. Appl. Probab.* **31**, 2881–2923.
- [40] G. Kaur and A. Röllin (2021). Higher-order fluctuations in dense random graph models. *Electronic J. Probab.* **26**, article no. 139, 1–36.

- [39] X. Fang, H. L. Gan, S. Holmes, H. Huang, E. A. Peköz, A. Röllin, and W. Tang (2021). Arcsine laws for random walks generated from random permutations with applications to genomics. *J. Appl. Probab.* **58**, 851–867.
- [38] S. Athreya, F. den Hollander and A. Röllin (2021). Graphon-valued stochastic processes from population genetics. *Ann. Appl. Probab.* **31**, 1724–1745.
- [37] W. H. Tang and A. Röllin (2021). Model identification for ARMA time series through convolutional neural networks. *Decis. Support Syst.* **146**, 113544.
- [36] J. Sankaran, H. Balasubramanian, W. H. Tang, X. W. Ng, A. Röllin, and T. Wohland (2021). Simultaneous spatiotemporal super-resolution and multi-parametric fluorescence microscopy. *Nat. Commun.* **12**, no. 1748.
- [35] L. H. Y. Chen, L. Goldstein and A. Röllin. Stein's method via induction (2020). *Electronic J. Probab.* **25**, article no. 132, 49 pp.
- [34] J. Fulman and A. Röllin (2020). Stein's method and Narayana numbers. *Statist. Probab. Lett.* **165**, article no. 108835, 1–9.
- [33] E. A. Peköz, N. Ross and A. Röllin (2020). Exponential and Laplace approximation for occupation statistics of branching random walk. *Electronic J. Probab.* **25**, article no. 55, 1–22.
- [32] A. K. J. Teo, K. Prem, M. I. C. Chen, A. Röllin, M. L. Wong, H. H. La and A. R. Cook (2019). Estimating the size of key populations for HIV in Singapore using the network scale-up method. *Sex. Transm. Infect.* **95**, 602–607.
- [31] A. D. Barbour, A. Röllin, and N. Ross (2019). Error bounds in local limit theorems using Stein's method. *Bernoulli* **25**, 1076–1104.
- [30] A. D. Barbour and A. Röllin (2019). Central limit theorems in the configuration model. *Ann. Appl. Probab.* **29**, 1046–1069.
- [29] E. A. Peköz, A. Röllin and N. Ross (2019). Pólya urns with immigration at random times. *Bernoulli* **25**, 189–220.
- [28] A. D. Barbour and A. Röllin (2018). A central limit theorem for the gossip process. *Electron. J. Probab.* **23**, article no. 123, 1–37.
- [27] A. Röllin (2018). On quantitative bounds in the mean martingale central limit theorem. *Statist. Probab. Lett.* **138**, 171–176
- [26] S. Athreya and A. Röllin (2018). Respondent driven sampling and sparse graph convergence. *Electron. Comm. Probab.* **23**, article no. 3, 1–12.
- [25] H. L. Gan, A. Röllin, N. Ross. Dirichlet approximation of equilibrium distributions in Cannings models with mutation. *Adv. Appl. Probab.* **49**, 927–959.
- [24] E. A. Peköz, A. Röllin and N. Ross (2017). Joint degree distributions of preferential attachment random graphs. *Adv. Appl. Probab.* **49**, 368–387.
- [23] S. Athreya and A. Röllin (2016). Dense graph limits under respondent-driven sampling. *Ann. Appl. Probab.* **26**, 2193–2210.
- [22] E. A. Peköz, A. Röllin and N. Ross (2016). Generalized gamma approximation with rates for urns, walks and trees. *Ann. Probab.* **44**, 1776–1816.
- [21] X. Fang and A. Röllin (2015). Rates of convergence for multivariate normal approximation with applications to dense graphs and doubly indexed permutation statistics. *Bernoulli* **21**, 2157–2189.
- [20] A. Röllin and N. Ross (2015). Local limit theorems via Landau-Kolmogorov inequalities. *Bernoulli* **21**, 851–880.
- [19] L. H. Y. Chen and A. Röllin (2013). Approximating dependent rare events. *Bernoulli* **19**, 1243–1267.
- [18] K. H. X. Tan, L. Simonella, H. L. Wee, A. Röllin, Y.-W. Lim, W.-Y. Lim, K. S. Chia, M. Hartman, and A. R. Cook (2013). Quantifying the natural history of breast cancer. *Br. J. Cancer* **109**, 2035–2043.
- [17] E. A. Peköz, A. Röllin, and N. Ross (2013). Total variation error bounds for geometric approximation. *Bernoulli* **19**, 610–632.

- [16] A. Röllin (2013). Stein's method in high dimensions with applications. *Ann. Inst. Henri Poincaré Probab. Stat.* **49**, 529–549.
- [15] E. A. Peköz, A. Röllin and N. Ross (2013). Degree asymptotics with rates for preferential attachment random graphs. *Ann. Appl. Probab.* **23**, 1188–1218.
- [14] A. Röllin (2012). On the optimality of Stein factors. *Probability Approximations and Beyond, Lecture Notes in Statistics 205*, Springer.
- [13] C. L. Althaus, J. C. M. Heijne, S. A. Herzog, A. Röllin and N. Low (2012). Individual and population level effects of partner notification for *Chlamydia trachomatis*. *PLoS ONE* **7**.
- [12] E. A. Peköz and A. Röllin (2011). Exponential approximation for the nearly critical Galton-Watson process and occupation times of Markov chains. *Electron. J. Probab.* **16**, 1381–1393.
- [11] S. Chatterjee, J. Fulman and A. Röllin (2011). Exponential approximation by Stein's method and spectral graph theory. *ALEA Lat. Am. J. Probab. Math. Stat.* **8**, 197–223.
- [10] E. A. Peköz, A. Röllin (2011). New rates for exponential approximation and the theorems of Rényi and Yaglom. *Ann. Probab.* **39**, 587–608.
- [9] C. L. Althaus, J. C. M. Heijne, A. Röllin and N. Low (2010). Transmission dynamics of *Chlamydia trachomatis* affect the impact of screening programmes. *Epidemics* **2**, 123–131.
- [8] G. Reinert and A. Röllin (2010). Random subgraph counts and U-statistics: multivariate normal approximation via exchangeable pairs and embedding. *J. Appl. Probab.* **47**, 378–393.
- [7] S. Tueckmantel, A. Röllin, A. E. Müller and C. Soligo (2009). Facial correlates of frontal bone pneumatization in strepsirrhine primates. *Mammalian Biology* **74**, 25–35.
- [6] E. A. Peköz, A. Röllin, V. Čekanavičius and M. Shwartz (2009). A three-parameter binomial approximation. *J. Appl. Probab.* **46**, 1073–1085.
- [5] G. Reinert and A. Röllin (2009). Multivariate normal approximation with Stein's method of exchangeable pairs under a general linearity condition. *Ann. Probab.* **37**, 2150–2173.
- [4] A. Röllin (2008). A note on the exchangeability condition in Stein's method. *Statist. Probab. Lett.* **78**, 1800–1806.
- [3] A. Röllin (2008). Symmetric and centered binomial approximation of sums of locally dependent random variables. *Electron. J. Probab.* **13**, 756–776.
- [2] A. Röllin (2007). Translated Poisson approximation using exchangeable pair couplings. *Ann. Appl. Probab.* **17**, 1596–1614.
- [1] A. Röllin (2005). Approximation of sums of conditionally independent variables by the translated Poisson distribution. *Bernoulli* **11**, 1115–1128.

#### *Posters and method articles*

- W. H. Tang, S. R. Sim, D. Y. Aik, A. V. S. Nelanuthala, T. Athilingam, A. Röllin, T. Wohland (2024). Deep learning reduces data requirements and allows real-time measurements in Imaging FCS. *Biophysical Journal* **123**, 655–666.
- T. Wohland, W. H. Tang, S. R. Sim, D. Y. Aik, A. V. S. Nelanuthala, and A. Röllin (2023). FCSNet and ImFCSNet, convolutional neural network approaches to FCS data analysis. *Biophysical Journal* **122**, 429a.
- T. Wohland, W. H. Tang, S. R. Sim, D. Y. Aik, and A. Röllin (2022). Deep learning approaches for imaging fluorescence correlation spectroscopy parameter estimation with limited data sets. *Biophysical Journal* **121**, 533a.
- H. Balasubramanian, J. Sankaran, W. H. Tang, X. W. Ng, A. Röllin, and T. Wohland (2021). SRRF'N'Tirf-FCS: New Insights into EGFR-Cytoskeleton Interactions. *Biophysical Journal* **120**, 186a.
- J. Sankaran, H. Balasubramanian, W. H. Tang, X. W. Ng, A. Röllin, T. Wohland (2021). Preparation of live cell samples for fluorescence spectroscopy and computational super-resolution imaging, 29 March 2021, PROTOCOL (Version 1). Available at Protocol Exchange.

- J. Sankaran, H. Balasubramanian, W. H. Tang, X. W. Ng, A. Röllin, T. Wohland (2021). Simultaneous spatiotemporal computational super-resolution and multi-parametric fluorescence microscopy, 29 March 2021, PROTOCOL (Version 1). Available at Protocol Exchange.

## Teaching

- since 07/2009 Lecturing at the National University of Singapore
- 09/2008–06/2009 Teaching assistant at the National University of Singapore
- 04/2007–03/2008 Teaching assistant, supervision of MSc students and admission interviewing at the University of Oxford
- 11/2002–03/2007 Teaching assistant for lectures in mathematics, probability, statistics and bioinformatics, graduate and undergraduate level

### *Courses taught*

Acad. Year	Sem.	Module Code	Module Title
2024/2025		ST5290	Data Science Industry Project
2024/2025	1	ST5225	Statistical Analysis of Networks
2019/2020	1	ST5214	Advanced Probability Theory
2018/2019	1	ST5214	Advanced Probability Theory
2017/2018	1	ST1131	Introduction to Statistics
2015/2016	2	ST5225	Statistical Analysis of Networks
2015/2016	1	ST5214	Advanced Probability Theory
2014/2015	2	MA4251/ST4238	Stochastic Processes II
2014/2015	1	ST5214	Advanced Probability Theory
2013/2014	2	GEM2900	Understanding Uncert. and Stat. Thinking
2012/2013	2	MA2216/ST2131	Probability
2012/2013	1	ST5214	Advanced Probability Theory
2011/2012	2	MA4251/ST4238	Stochastic Processes II
2011/2012	1	MA3238/ST3236	Stochastic Processes I
2010/2011	2	MA4251/ST4238	Stochastic Processes II
2010/2011	1	MA3238/ST3236	Stochastic Processes I
2009/2010	2	MA4251/ST4238	Stochastic Processes II
2009/2010	1	MA3238/ST3236	Stochastic Processes I