

Mark P. Holmes

ACADEMIC APPOINTMENTS

**Professor of Probability Theory and Stochastic Processes,
School of Mathematics and Statistics, the University of Melbourne, 2021–**
Associate Professor, U. Melbourne, 2017–2020.
Senior Lecturer, Dept. of Statistics, the University of Auckland, 2010–2017.
Lecturer, Dept. Stat., U. Auckland, Sept. 2007–2009.
Postdoctoral Fellow (Sept. 2005 - Sept. 2007), EURANDOM Institute (T.U. Eindhoven).

EDUCATION

Ph.D. Mathematics, 2005. [University of British Columbia]
M.Sc., Mathematics, 2001. [UBC]
M.Sc., Statistics (with distinction), 1999. [U. Auckland]
B.Sc.(Honours), Statistics (first class honours), 1998. [U. Auckland]
B.Com., Accounting and Finance, 1997. [U. Auckland]

ACADEMIC AWARDS /HONOURS

Aust. Mathematical Society Gavin Brown Prize, 2022 (with Ed Perkins, for the paper [32])
“...truly outstanding achievement in the area ... and is a landmark in our understanding of large space-time scaling”
Fellow of the Institute of Mathematical Statistics, 2021
ARC Future Fellow, 2017-2021
Shayle Searle Fellow (Victoria U. Wellington) 2017
NZ Statistical Association Littlejohn Research award, 2015
“For wide-ranging and creative research in theoretical and applied probability.”
NZ Mathematical Society Early Career Award, 2012
“For rapidly becoming a world expert in the theory of random walks, and in the analysis of high-dimensional models in statistical physics.”

SUBSTANTIAL RESEARCH GRANTS:

ARC Future Fellowship 2017-2021	AU\$873,568
(+UoM Establishment grant 2017-2023)	AU\$200,000
Marsden grant 2014-2016	NZ\$400,000
FRDF Postdoc Grant 2012-2014	NZ\$150,000
Marsden grant (with I. Ziedins) 2012-2014	NZ\$465,000
Marsden fast start grant 2011-2013	NZ\$345,000
NZ Fire Service project (with Y. Wang and I. Ziedins) 2008-2009	NZ\$68,739

WORKSHOP (WS) /SEMINAR ORGANISATION

Organiser, Auckland Probability WS, Jan. 2010, and Jan. 2011.
Organiser, NZMRI summer school, Jan. 2012.
Organiser, New Zealand Probability WS, Jan. 2012, Jan. 2014, Jan. 2016.
Co-organiser, Aust. and NZ Applied Prob. WS, Jan. 2012.
Invited session organiser, IMS annual meeting, Sydney, July 2014.
Programme committee, 6th Wellington WS in Prob. and Mathematical Stat., Dec 2017.
Co-organiser, WS on self-interacting processes, Monash U., Aug 2017.
Programme committee, ANZAMP annual meeting, Auckland, 2018.
Programme committee (chair), 7th Wellington WS in Prob. and Math. Stat., Dec 2019.
Programme committee, ANZAMP annual meeting, Adelaide, 2021.
Co-organiser of the Asia-Pacific Seminar in Probability and Mathematical Statistics 2020-

Director of AMSI Summer School, January 2023.
Co-organiser joint MATRIX/MFO workshop (Reinforcement processes), March 2023.
Co-organiser BIRS workshop (Reinforcement processes), August 2025.

REFEREEING Associate Editor for Stochastic Models, 2019-
/REVIEWING: Associate Editor for Mathematical Physics Analysis and Geometry, 2020-
Associate Editor for NZ Journal of Mathematics, 2021-.

Referee for Annales IHP B, ALEA, Annals of Applied Probability, Annals of Probability, Comm. Math. Phys., Comp. Stat. Data Analysis, Electronic Comm. Prob./Electronic J. Prob., J. Applied Prob./Advances Applied Prob., Probability Surveys, Prob. Theory and Related Fields, Stoch. Proc. Appl., Stochastic Models etc.

Reviewer for ARC (Australia), NWO (Netherlands), NSERC (Canada), ERC (Europe).

OTHER NZMRI invited member 2017-
SERVICE: Scientific Panel member, PIMS summer schools in probability 2020-
Programme committee for 80th birthday (Estate Khmaladze) conference, July 2025.
Scientific committee CIRM conference on “Topics in Random Walks”, January 2026.

DEPARTMENTAL/ University of Melbourne:
FACULTY SERVICE Awards committee (school chair) 2023-
Enrichment class presentations (to high school students), August 2017, September 2018, May 2022.
MUMS presentation (to undergraduate students), April 2019.
Visiting scholar committee, 2017- [chair, 2018-2024], (assessing applications for funding international visitors to the school).
Probability seminar organiser, 2018-2020 (seminars interrupted due to covid 19)
ARC Future Fellowship/DECRA pitching panel, October 2019, (giving advice to younger researchers on their draft grant applications).
Harcourt-Doig and Wurre-wurre Research Fellowship Selection Panel, 2019.
Postdoctoral Research Fellowship selection panel, 2020-2021.
Deputy fire warden 2017-
Engagement committee 2021-2024
Peter Hall Lecture committee 2018-

University of Auckland:
Faculty Research Committee, 2015-2017.
Science Scholars Committees 2014-2016.
Science Scholars Mentor 2015-2016.
Seminar Organiser, 2009-2015.
Internal PBFR portfolio assessment committee, 2015.
Deputy fire warden, 2010-2017.
PhD Committee, 2010-2015.
Research Committee, 2010-2017. [Chair, 2015-2017].
Undergraduate Student Mentor, 2012-2013.

RESEARCH TRAINING PhD: 5 students successfully completed (jointly supervised), 3 current (2 as co-supervisor).
MSc/MPhil: 8 students successfully completed (3 jointly supervised).
BSc(hons): 3 students successfully completed.

TEACHING University of Melbourne
MAST 20004: Probability, 2022, 2023, 2024.
MAST 90112: Advanced topics in stochastic models, 2022.
MAST 90081: Advanced Probability, 2019.
MAST 30001: Stochastic Modelling, 2017, 2021.

University of Auckland
Stats 710: Probability theory, 2012, 2013, 2014, 2015, 2016.
Stats 721: Special topic in applied probability, 2015, 2016.
Stats 325: Stochastic processes, 2015, 2016.
Stats 702: Theoretical Statistics, 2014.
Stats 320: Applied stochastic modelling, 2013.
Stats 125: Probability and its applications, 2008, 2009, 2010.
Stats 720: Stochastic processes, 2008, 2009, 2010, 2011.
Stats 255: Introduction to operations research, 2007.

SELECTED INVITED PRESENTATIONS
(WS=WORKSHOP) WS on self-interacting random walks, Eurandom, March 2006.
WS on spatial random processes and statistical mechanics, Oberwolfach, Sept. 2006.
Mark Kac seminar, Utrecht, Oct. 2006.
INFORMS Applied probability conference, Eindhoven, July 2007.
WS on random walks, particle systems and random media, Santiago de Chile, Jan. 2008.
7th World congress in probability and statistics, (Invited session) Singapore, July 2008.
Spring school on random walks, random media, and reinforcement (mini-course). Paul Langevin Centre, Aussois, June 2009.
WS on scaling limits in models of statistical mechanics. Oberwolfach, Aug. 2009.
WS on stat. physics 'above the critical dimension'. Poincaré Institute, Paris, Dec. 2009.
Fields Institute, Toronto, June 2010.
WS on universality and scaling limits in probab. and stat. mech., Sapporo, Sept. 2010.
WS on probability theory, statistical physics, and applications, Abu Dhabi, Jan. 2011.
Fields Institute, Toronto, May 2011.
Courant Institute, NYU, June 2011.
WS on the expanding art of expansions. Eurandom, February 2012.
Conference on disorder in probability and statistical mechanics, Modena, June 2012.
WS on scaling limits in models of statistical mechanics. Oberwolfach, Sept. 2012.
Lecture in Hangzhou U. Summer School, June 2013.
Pacific Rim Math. Assoc. Congress (Invited session), Shanghai, June 2013.
Recent trends in stochastic analysis Conference, Vancouver, July 2013.
WS on universality and scaling limits in probab. and stat. mech., Sapporo, Aug. 2013.
WS on spin glasses, random graphs and percolation, Poincaré Institute, Paris, Feb. 2015.
WS on Stochastic Processes in Random Media, Singapore, May 2015.
WS on Random Structures in High Dimensions, BIRS Mexico, June 2016.
WS on Self-interacting processes, Monash Sept. 2016.
(Keynote speaker) WS on Multivar. Polynomials & Stoch. Systems, Brisbane, June 2017.

WS on Random Walks, Random Graphs and Random Media, Munich, Sept. 2019.
 International Conference on Probability Theory and Statistics, Tbilisi, Sept. 2019.
 10th World congress in probability and statistics, (Invited session) Seoul, Aug. 2020 [Held online in 2021 due to covid].
 WS on Random Interacting Systems, Scaling Limits, and Universality, NU Singapore, December, 2023.
 Conference on 70 years of Percolation [In honour of Geoffrey Grimmett FRS]. U. Cambridge, July 2023.

SUBSTANTIAL
 WORKS IN PROG.

- (i) Hirsch, C., Holmes, M., and Kleptsyn, V. WARM percolation on a tree in the strong reinforcement regime.
- (ii) Beaton, N., Holmes, M., and Huang, X. Chemical distance for the half-orthant model.
- (iii) Angel, O. and Holmes, M. “All in” poker sequences.
- (iv) Holmes, M., and Kleptsyn, V. Infinite WARM graphs II: linear reinforcement.
- (v) Holmes, M., and Perkins, E. Random skeletons in high-dimensional lattice trees.
- (vi) Fralix, B., Holmes, M. and Lopker, A. Expected transit delays in a simple system with parallel routes.
- (vii) Holmes, M., and Kojadinovic, I. Approximate I -projections via finite partitions.

PUBLICATIONS

- [51] Holmes, M. and Salisbury, T. Percolation of terraces, and enhancements for the orthant model. *Transactions of the AMS (to appear)*.
- [50] Holmes, M., Kojadinovic, I., and Verhoijsen, A. Multi-purpose open-end monitoring procedures for multivariate observations based on the empirical distribution function. *Journal of Time Series Analysis* 45(1):27–56, (2024).
- [49] Holmes, M., Holroyd, A., and Ramirez, A. Cyclic products and optimal traps in cyclic birth and death chains. *Electronic Journal of Combinatorics* 30(2), (2023).
- [48] Fralix, B., Holmes, M., and Löpker, A. A Markovian Arrival Stream Approach to Stochastic Gene Expression in Cells. *Journal of Mathematical Biology* 86, Article number: 79 (2023).
- [47] Hirsch, C., Holmes, M., and Kleptsyn, V. Infinite WARM graphs III: strong reinforcement regime. *Nonlinearity* 36: 3013–3042, (2023).
- [46] Angel, O., Holmes M., and Ramirez, A. Balanced Excited Random Walk in Two Dimensions. *Annals of Probability* 51(4): 1421–1448, (2023).
- [45] Cabezas, M. Fribergh, A. Holmes, M., and Perkins, E. Historical lattice trees. *Comm. Math. Phys.* 401:435–496 (2023).
- [44] Beaton, N. and Holmes, M. The mean square displacement of random walk on the Manhattan lattice. *Statistics and Probability Letters*, Volume 193, (2023).

- [43] Holmes, M. and Kious, D. Coexistence of lazy frogs on \mathbb{Z} . *J. Applied Probability*. 59(3):702–713, (2022).
- [42] Holmes, M., and Kojadinovic, I. Open-end nonparametric sequential change-point detection based on the retrospective CUSUM statistic. *Elect. J. Stat.* Vol. 15, No. 1, 2288–2335, (2021).
- [41] Holmes, M. and Salisbury, T. Phase transitions for degenerate random environments. *ALEA, Lat. Am. J. Probab. Math. Stat.* 18, 707–725, (2021).
- [40] Beaton, N., Grimmett, G., and Holmes, M. Alignment Percolation. *Mathematical Physics, Analysis and Geometry*, 24:3 (2021), 22 pages.
- [39] Brydges, D., Helmuth, T., and Holmes, M. The continuous-time lace expansion. *Comm. Pure Appl. Math.*, 74(11) 2251–2309, (2021).
- [38] Holmes, M. and Salisbury, T. A shape theorem for the orthant model. *Annals of Probability*, 49:3, 1237–1256, (2021).
- [37] Henze, N, and Holmes, M. Curiosities regarding waiting times in Polya’s urn model. *Transactions of A. Razmadze Math. Inst. (special issue in honour of E. Khmaladze)* 174, 2:149–154, (2020).
- [36] Hirsch, C., Holmes, M., and Kleptsyn, V. Absence of warm percolation in the very strong reinforcement regime. *Ann. Appl. Probab.* 31 (1), 199–217, (2021).
- [35] Grimmett, G. and Holmes, M. Non-coupling from the past. In *Progress in Probability: In and out of Equilibrium 3 - Celebrating Vladas Sidoravicius*, 471–485, (2021).
- [34] Holmes, M. and Taylor, P. A paradox for expected hitting times. *Stochastic Models*, 36:365–377, (2020).
- [33] Croydon, D. and Holmes, M. Random walk on the trace of random walk on the trace of \dots . *Comm. Math. Phys.*, 375(2):1341–1372, (2020).
- [32] Holmes, M., Perkins, E. On the range of lattice models in high dimensions. *Prob. Th. Rel. Fields.* 176:941–1009, (2020).
- [31] Angel, O. and Holmes, M. Kemeny’s constant for infinite DTMCs is infinite. *Journal of Applied Probability*. 56:1269–1270, (2019).
- [30] Holmes, M. and Kious, D. A monotonicity property for once reinforced biased random walk on \mathbb{Z}^d . In *Sojourns in Probability and Statistical Physics - III: Festschrift in honour of Chuck Newman*, pages 255–273, (2019).
- [29] Collecchio, A., Holmes, M. and Kious, D. On the speed of once reinforced biased random walk on trees. *Electronic J. of Probability*, 23:1–32, (2018).

- [28] Holmes, M., and Salisbury, T.S. Ballisticity and invariance principle for random walk in non-elliptic random environment. *Electronic J. of Probability*, 22:81, (2017). 18 pages
- [27] Holmes, M., and Kleptsyn, V. Proof of the WARM whisker conjecture for neuronal connections. *Chaos* 27, 043104, (2017). 10 pages
- [26] Holmes, M., and Salisbury, T.S. Forward clusters for degenerate random environments. *Combinatorics, Probability, and Computing*. 25(5):744–765, (2016).
- [25] Holmes, M. Backbone scaling for critical lattice trees in high dimensions. *J. Physics A: Math. Theor.*, 49 (Special issue in honour of A. Guttmann) 314001, (2016). 26 pages
- [24] Hofstad, R.v.d., Holmes, M., Kuznetsov, A., and Ruszel, W. Strongly reinforced Polya urns with graph-based competition. *Annals of Applied Prob.* 26(4):2494–2539, (2016).
- [23] Holmes, M. On strict monotonicity of the speed for excited random walks in one dimension *Electronic Comm. Prob.* 20:1–7, (2015).
- [22] Holmes, M., Mohylevskyy, Y., and Newman, C. The voter model chordal interface in two dimensions. *Journal of Statistical Physics* 159:937–957, (2015).
- [21] Hofstad, R. v.d., Holmes, M., and Perkins, E. Criteria for convergence to super-Brownian motion on path space. *Annals of Prob.* 45:278–376, (2017).
- [20] Hofstad, R. v.d., and Holmes, M.P. The survival probability and r -point functions in high dimensions. *Annals of Math.* 178: 665–685, (2013).
- [19] Holmes, M., and Salisbury, T.S. Random walks in degenerate random environments. *Canadian J. Math.* 66:1050–1077, (2014).
- [18] Holmes, M., Kojadinovic, I., and Quessy, J.-F. Nonparametric tests for change-point detection a la Gombay and Horvath. *J. of Multivariate Analysis* 115:16–32, (2013).
- [17] Wang, Y., Ziedins, I., Holmes, M., and Challands, N. Tree models for difference and change detection in a complex environment. *Annals of Applied Stat.* 6:1162–1184, (2012).
- [16] Holmes, M., and Salisbury, T.S. Degenerate random environments. *Random Structures and Algorithms* 45:111–137, (2014).
- [15] Galbraith, S., and Holmes, M. A non-uniform birthday problem with applications to discrete logarithms. *Discrete Applied Mathematics* 160:1547–1560, (2012).
- [14] Chen, Y., Holmes, M., and Ziedins, I. Monotonicity properties of user equilibrium policies for parallel batch systems. *Queueing Systems* 70:81–103, (2012).
- [13] Holmes, M., and Sun, R. A monotonicity property for random walk in a partially random environment. *Stoch. Proc. Appl.* 122:1369–1396, (2012).

- [12] Holmes, M., and Salisbury, T.S. A combinatorial result with applications to self-interacting random walks. *Journal of Combinatorial Theory, Series A*, 119:460–475, (2012).
- [11] Hofstad, R. v.d., and Holmes, M.P. An expansion for self-interacting random walks. *Brazilian J. of Probability and Statistics*, 26:1–55, (2012).
- [10] Holmes, M. Excited against the tide: A random walk with competing drifts. *Annales de l'Institut Henri Poincaré Prob. et Statistiques* 48: 745–773, (2012).
- [9] Kojadinovic, I., Yan, J. and Holmes, M. Fast large-sample goodness-of-fit tests for copulas. *Statistica Sinica* 21:841–871, (2011).
- [8] Hofstad, R. v.d. and Holmes, M.P. Monotonicity for excited random walk in high dimensions. *Prob. Theory and Related Fields* 147:333–348, (2010).
- [7] Kojadinovic, I., and Holmes, M. Tests of independence among continuous random vectors based on Cramer-von Mises functionals of the empirical copula process. *J. of Multivariate Analysis* 100:1137–1154, (2009).
- [6] Holmes, M.P. The scaling limit of senile reinforced random walk. *Electronic Comm. Prob.* 14:104–115, (2009).
- [5] Hofstad, R. v.d., Holmes, M.P., and Slade, G. An extension of the inductive approach to the lace expansion. *Electronic Comm. Prob.* 13:291–301, (2008).
- [4] Holmes, M.P. Convergence of lattice trees to super-Brownian motion above the critical dimension. *Electronic J. Prob.* 13:671–755, (2008).
- [3] Holmes, M.P., and Sakai, A. Senile reinforced random walks. *Stoch. Proc. Appl.* 117:1519–1539, (2007).
- [2] Holmes, M.P., and Perkins, E. Weak convergence of measure-valued processes and r-point functions. *Annals of Prob.* 35:1769–1782, (2007).
- [1] Holmes, M.P., Jarai, A.A., Sakai, A., and Slade, G. High dimensional graphical networks of self-avoiding walks. *Canadian J. Math.* 56:77–114, (2004).