Curriculum Vitae

Jonas Peters

Contact Information

Department of Mathematics, ETH Zürich
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Education and Professional Experience

04/2023 –	Professor of Statistics, ETH Zürich
07/2019 – 03/2023	Professor of Statistics, University of Copenhagen
08/2016 – 06/2019	Associate Professor of Statistics, University of Copenhagen
03/2015 – 08/2016	Group Leader at Max Planck Institute for Intelligent Systems, Tübingen
05/2014 – 07/2014	Visiting resarcher at CMU, Pittsburgh, USA (host: P. Spirtes)
09/2013 – 12/2013	Visiting resarcher at UC Berkeley, USA (host: M. Wainwright)
12/2012 – 02/2015	PostDoc (Marie Curie, IEF) at ETH Zürich, Switzerland
02/2012 – 12/2012	PhD at ETH Zürich, ETH Medal for an outstanding PhD thesis (supervisors: P. Bühlmann, D. Janzing, B. Schölkopf)
08/2011 – 10/2011	Internship at Microsoft Research, Redmond, USA (host: L. Bottou)
01/2009 – 02/2012	PhD at Max Planck Institute for Biological Cybernetics, Tübingen
01/2009	Diploma in mathematics (minor: physics), University of Heidelberg, "with distinction"
06/2007	Master of Advanced Study in Mathematics (Part III), University of Cambridge, UK, "with distinction"
06/2002 – 05/2003	Civilian Service (administration of a children's home)
06/2002	Abitur at Burg-Gymnasium Bad Bentheim, one year skipped

Awards and Honours

Test of Time Award (runner-up) at ICML (with B. Schölkopf, D. Janzing, E. Sgouritsa, K. Zhang, and J. Mooij, 2022), Silver Medal of the Royal Danish Academy of Sciences and Letters (2021), COPSS Leadership Academy, awarded by the Committee of Presidents of Statistical Societies (2021), Guy Medal in Bronze, awarded by the Royal Statistical Society (2019), ASA Causality in Statistics Education Award (with D. Janzing and B. Schölkopf, 2018), Teacher of the year at SCIENCE, University of Copenhagen (2018), Read paper to the Royal Statistical Society, London (with P. Bühlmann and N. Meinshausen, 2016), Member of the Junge Akademie (2016–2021; board member 2017–2019), Marie Curie fellowship (2013–2015), ETH medal for an outstanding PhD thesis (2013), scholarhsip of the Studienstiftung des deutschen Volkes (2004–2008), UNWIN prize and election to scholar (Downing College, University of Cambridge, 2007), European Excellence Programme (DAAD, 2006–2007), Kurt-Hahn-Trust (2006–2007), Hölderlin Programme (Allianz, 2006–2007), Deutsche SchülerAkademie (2001)

Scientific Memberships

Bernoulli Society, Danish Society for Theoretical Statistics, Institute of Mathematical Statistics (IMS), International Statistical Institute (ISI elected), Royal Statistical Society, ELLIS

External Funding

PI: Villum Young Investigator (2018–2023):	1,100,000 €
PI: Carlsberg Foundation Distinguished Associate Prof. Fellowship (2018–2021):	360,000 €
Co-Investigator: Villum Foundation (2016–2021):	648,000 €
PI: Marie Curie Fellowship (IEF) (2013–2015):	184,709 €
Other: Co-leader of Collab. 'CX', Pioneer Centre for AI (P1) (2021–2023)	

Supervision

Postdocs	Nicola Gnecco, Leonard Henckel, Lucas Kook, Sebastian Weichwald;
PhD students	main supervisor: Rune Christiansen, Martin Jakobsen, Sorawit Saengkyongam, Nikolaj Thams co-supervisor: Christina Heinze-Deml, Niklas Pfister

Teaching

Lecture courses	University of Copenhagen, University of Tübingen, ETH Zurich
Summer academies	Studienstiftung des deutschen Volkes (two weeks, 2015), Deutsche SchülerAkademie (two weeks, 2009, 2010, 2011, 2012, 2013, 2014, 2016)
Other	Vertrauensdozent der Studienstiftung des dt. Volkes.

Selected invited talks

SIAM Conference on Applied Algebraic Geometry (keynote, 2019), Nordstat (keynote, 2023), EMS (keynote, 2023), Nordic Econometric Meeting (keynote, 2024), German Probability and Statistics Days (keynote, 2025), European Causal Inference Meeting (keynote, 2025); many tutorials: e.g., MIT ($> 70,000$ views on youtube), MLSS (Tübingen and Cadiz), GCPR (Aachen).

Reviewing and Editing

Program Chair / Editor	UAI 2020 (program chair); UAI 2021 (general chair); both with D. Sontag (MIT)
Area Chair / AE	ACM/IMS Journal of Data Science, Annals of Statistics, IEEE TPAMI, Journal of the American Statistical Association (T&M), Journal of Causal inference, SIAM Journal on Mathematics of Data Science; several years: UAI, AISTATS
Reviewing (journals, books)	ACM Transactions on Intelligent Systems and Technology, Annals of Statistics, Bernoulli Journal, Biometrika, eLife, Electronic Journal of Statistics, IEEE Transactions of Pattern Analysis and Machine Intelligence, IEEE Transactions on Information Theory, Information Fusion, International Journal of Approximate Reasoning, Journal of Artificial Intelligence Journal of Causal Inference, Journal of Machine Learning Research, Journal of the American Statistical Association, Journal of the Royal Statistical Society, MIT Press, Nature – Scientific Reports, Neurocomputing, NeuroImage, Physica A, PLOS ONE, Springer, Statistical Science, Statistics and Computing, Transactions on Intelligent Systems and Technology, Wiley
Reviewing (conferences)	several years: AISTATS, COLT, ECML, ICLR, ICML, ICONIP, NeurIPS, TIME, UAI
Reviewing (grants)	many national agencies and EU.

(Co-)organized Workshops and Conferences:

Advances in Causal Inference (UAI 2014), Networks: Causality and Processes (DALI 2015), Causal Inference: Learning and Prediction (UAI 2015), Time for Space (Ohlstadt 2018), Statistics in Complex Systems (Copenhagen 2018), Foundations and New Horizons for Causal Inference (Oberwolfach 2019), Program chair (UAI 2020), General chair (UAI 2021), Causality and Climate (Villa Garbald 2022), Distribution Shifts (NeurIPS 2022), Causality in Extremes (Geneva 2024).

Additional Skills

Languages	English (fluent), Latin, Danish (advanced), Dutch, French (basic)
Programming	R, Python (current), Matlab, C#, Visual Basic, Delphi, Turbo Pascal
Other interests	Playing the cello, cycling, climate change, disc golf

Books

1. J. Peters and N. Meinshausen. *The Raven's Hat: Fallen Pictures, Rising Sequences, and Other Mathematical Games*. MIT Press, Cambridge, MA, USA, 2021
2. J. Peters, D. Janzing, and B. Schölkopf. *Elements of Causal Inference: Foundations and Learning Algorithms*. MIT Press, Cambridge, MA, USA, 2017

Peer-Reviewed Publications

1. N. Pfister M. Lazzaretto, J. Peters. Invariant subspace decomposition. *Journal of Machine Learning Research*, 26(95):1–56, 2025
2. J.L. Gamella, J. Peters, and P. Bühlmann. Causal chambers as a real-world physical testbed for ai methodology. *Nature Machine Intelligence*, 7:107–118, 2025
3. N. Thams, R. Søndergaard, S. Weichwald, and J. Peters. Identifying causal effects using instrumental time series: Nuisance IV and correcting for the past. *Journal of Machine Learning Research*, 25(302):1–51, 2024
4. L. Kook, S. Saengkyongam, A. R. Lundborg, T. Hothorn, and J Peters. Model-based causal feature selection for general response types. *Journal of the American Statistical Association*, 120(550):1090–1101, 2024
5. S. Saengkyongam, E. Rosenfeld, P. Ravikumar, N. Pfister, and J. Peters. Identifying representations for intervention extrapolation. In *Proceedings of the 12th International Conference on Learning Representations (ICLR, accepted), ArXiv e-prints (2310.04295)*, 2024
6. S. Saengkyongam, N. Pfister, P. Klasnja, S. Murphy, and J. Peters. Effect-invariant mechanisms for policy generalization. *Journal of Machine Learning Research*, 25:1–36, 2024
7. N. Thams, S. Saengkyongam, N. Pfister, and J. Peters. Statistical testing under distributional shifts. *Journal of the Royal Statistical Society, Series B*, 85(3):597–663, 2023
8. S. Saengkyongam, N. Thams, J. Peters, and N. Pfister. Invariant policy learning: A causal perspective. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 54(7):8606–8620, 2023
9. A. R. Lundborg, R. D. Shah, and J. Peters. Conditional independence testing in Hilbert spaces with applications to functional data analysis. *Journal of the Royal Statistical Society, Series B*, 84(5):1821–1850, 2022
10. M. E. Jakobsen, R. D. Shah, P. Bühlmann, and J. Peters. Structure learning for directed trees. *Journal of Machine Learning Research*, 23(159):1–97, 2022
11. N. Pfister and J. Peters. Identifiability of sparse causal effects using instrumental variables. In *Proceedings of the 38th Conference on Uncertainty in Artificial Intelligence (UAI)*, pages 1613–1622. PMLR, 2022
12. P. Mogensen, N. Thams, and J. Peters. Invariant ancestry search. In *Proceedings of the 39th International Conference on Machine Learning (ICML)*, pages 15832–15857. PMLR, 2022
13. S. Saengkyongam, L. Henckel, N. Pfister, and J. Peters. Exploiting independent instruments: Identification and distribution generalization. In *Proceedings of the 39th International Conference on Machine Learning (ICML)*, pages 18935–18958. PMLR, 2022
14. M. Jakobsen and J. Peters. Distributional robustness of k-class estimators and the PULSE. *The Econometrics Journal*, 25(2):404–432, 2022
15. R. Christiansen, M. Baumann, T. Kümmerle, M. Mahecha, and J. Peters. Towards causal inference for spatio-temporal data: Conflict and forest loss in Colombia. *Journal of the American Statistical Association*, 117(538):591–601, 2022
16. S. Weichwald, S. W. Mogensen, T. E. Lee, D. Baumann, O. Kroemer, I. Guyon, S. Trimpe, J. Peters, and N. Pfister. Learning by doing: Controlling a dynamical system using causality, control, and reinforcement learning. In *Proceedings of the NeurIPS 2021 Competition and Demonstration Track*, pages 246–258. PMLR, 2021
17. M. Migliavacca et al. The three major axes of terrestrial ecosystem function. *Nature*, 598:468–472, 2021
18. R. Christiansen, N. Pfister, M. Jakobsen, N. Gnecco, and J. Peters. A causal framework for distribution generalization. *IEEE Transactions on Pattern Analysis and Machine Intelligence*,

44(10):6614–6630, 2022

19. N. Pfister, E. G. William, J. Peters, R. Aebersold, and P. Bühlmann. Stabilizing variable selection and regression. *Annals of Applied Statistics*, 15(3):1220–1246, 2021
20. M. Oberst, N. Thams, J. Peters, and D. Sontag. Regularizing towards causal invariance: Linear models with proxies. In *Proceedings of the 38th International Conference on Machine Learning (ICML)*, pages 8260–8270, 2021
21. S. Bongers, P. Forre, J. Peters, and J. M. Mooij. Foundations of structural causal models with cycles and latent variables. *Annals of Statistics*, 49(5):2885–2915, 2021
22. N. Gnecco, N. Meinshausen, J. Peters, and S. Engelke. Causal discovery in heavy-tailed models. *Annals of Statistics*, 49(3):1755–1778, 2021
23. D. Rothenhäusler, P. Bühlmann, N. Meinshausen, and J. Peters. Anchor regression: heterogeneous data meets causality. *Journal of Royal Statistical Society, Series B*, 83(2):215–246, 2021
24. S. Weichwald and J. Peters. Causality in cognitive neuroscience: Concepts, challenges, and distributional robustness. *Journal of Cognitive Neuroscience*, 33(2):226–247, 2021
25. M. D. Mahecha, F. Gans, G. Brandt, R. Christiansen, S. E. Cornell, N. Fomferra, G. Kraemer, J. Peters, P. Bodesheim, G. Camps-Valls, J. F. Donges, W. Dorigo, L. M. Estupinan-Suarez, V. H. Gutierrez-Velez, M. Gutwin, M. Jung, M. C. Londoño, D. G. Miralles, P. Papastefanou, and M. Reichstein. Earth system data cubes unravel global multivariate dynamics. *Earth System Dynamics*, 11(1):201–234, 2020
26. R. Shah and J. Peters. The hardness of conditional independence testing and the generalised covariance measure. *Annals of Statistics*, 48(3):1514–1538, 2020
27. R. Christiansen and J. Peters. Switching regression models and causal inference in the presence of discrete latent variables. *Journal of Machine Learning Research*, 21(41):1–46, 2020
28. N. Pfister, S. Bauer, and J. Peters. Learning stable and predictive structures in kinetic systems. *Proceedings of the National Academy of Sciences*, 116(51):25405–25411, 2019
29. J. Runge et al. Inferring causation from time series in Earth system sciences. *Nature Communications*, 10(2553), 2019
30. C. Heinze-Deml, J. Peters, and N. Meinshausen. Invariant causal prediction for nonlinear models. *Journal of Causal Inference*, 6(2):1–35, 2018
31. M. Rojas-Carulla, B. Schölkopf, R. Turner, and J. Peters. Causal transfer in machine learning. *Journal of Machine Learning Research*, 19(36):1–34, 2018
32. N. Pfister, P. Bühlmann, and J. Peters. Invariant causal prediction for sequential data. *Journal of the American Statistical Association*, 114(527):1264–1276, 2018
33. N. Pfister, P. Bühlmann, B. Schölkopf, and J. Peters. Kernel-based tests for joint independence. *Journal of the Royal Statistical Society: Series B*, 80:5–31, 2017
34. N. Meinshausen, A. Hauser, J. Mooij, J. Peters, P. Versteeg, and P. Bühlmann. Methods for causal inference from gene perturbation experiments and validation. *Proceedings of the National Academy of Sciences*, 113(27):7361–7368, 2016
35. B. Schölkopf, D. Hogg, D. Wang, D. Foreman-Mackey, D. Janzing, C.-J. Simon-Gabriel, and J. Peters. Modeling confounding by half-sibling regression. *Proceedings of the National Academy of Sciences*, 113(27):7391–7398, 2016
36. J. Peters, P. Bühlmann, and N. Meinshausen. Causal inference using invariant prediction: identification and confidence intervals. *Journal of the Royal Statistical Society: Series B (with discussion)*, 78(5):947–1012, 2016
37. S. Bauer, B. Schölkopf, and J. Peters. The arrow of time in multivariate time series. In *Proceedings of the 33rd International Conference on Machine Learning (ICML)*, pages 2043–2051. Journal of Machine Learning Research: Workshop and Conference Proceedings, 2016
38. J. M. Mooij, J. Peters, D. Janzing, J. Zscheischler, and B. Schölkopf. Distinguishing cause from effect using observational data: methods and benchmarks. *Journal of Machine Learning Research*, 17(32):1–102, 2016
39. S. Sippel, J. Zscheischler, M. Heimann, F. E. L. Otto, J. Peters, and M. D. Mahecha. Quantifying changes in climate variability and extremes: Pitfalls and their overcoming. *Geophysical Research Letters*, 42(22):9990–9998, 2015

40. D. Rothenhäusler, C. Heinze, J. Peters, and N. Meinshausen. backShift: Learning causal cyclic graphs from unknown shift interventions. In *Advances in Neural Information Processing Systems 28 (NeurIPS)*, pages 1513–1521. Curran Associates, Inc., 2015
41. B. Schölkopf, D. W. Hogg, D. Wang, D. Foreman-Mackey, D. Janzing, C.-J. Simon-Gabriel, and J. Peters. Removing systematic errors for exoplanet search via latent causes. In *Proceedings of the 32nd International Conference on Machine Learning (ICML)*, pages 2218–2226. ACM Press, 2015
42. B. Schölkopf, K. Muandet, K. Fukumizu, S. Harmeling, and J. Peters. Computing functions of random variables via reproducing kernel Hilbert space representations. *Statistics and Computing*, 25(4):755–766, 2015
43. J. Peters and P. Bühlmann. Structural intervention distance (SID) for evaluating causal graphs. *Neural Computation*, 27:771–799, 2015
44. J. Peters. On the intersection property of conditional independence and its application to causal discovery. *Journal of Causal Inference*, 3:97–108, 2014
45. P. Bühlmann, J. Peters, and J. Ernest. CAM: Causal additive models, high-dimensional order search and penalized regression. *Annals of Statistics*, 42:2526–2556, 2014
46. J. Peters, J. M. Mooij, D. Janzing, and B. Schölkopf. Causal discovery with continuous additive noise models. *Journal of Machine Learning Research*, 15:2009–2053, 2014
47. J. Peters and P. Bühlmann. Identifiability of Gaussian structural equation models with equal error variances. *Biometrika*, 101(1):219–228, 2014
48. J. Peters, D. Janzing, and B. Schölkopf. Causal inference on time series using structural equation models. In *Advances in Neural Information Processing Systems 26 (NeurIPS)*, pages 585–592. Curran Associates, Inc., 2013
49. L. Bottou, J. Peters, J. Quiñonero-Candela, D. X. Charles, D. M. Chickering, E. Portugualy, D. Ray, P. Simard, and E. Snelson. Counterfactual reasoning and learning systems: The example of computational advertising. *Journal of Machine Learning Research*, 14:3207–3260, 2013
50. E. Sgouritsa, D. Janzing, J. Peters, and B. Schölkopf. Identifying finite mixtures of nonparametric product distributions and causal inference of confounders. In *Proceedings of the 29th Annual Conference on Uncertainty in Artificial Intelligence (UAI)*, pages 556–565. AUAI Press, 2013
51. B. Schölkopf, D. Janzing, J. Peters, E. Sgouritsa, K. Zhang, and J. M. Mooij. On causal and anticausal learning. In *Proceedings of the 29th International Conference on Machine Learning (ICML)*, pages 1255–1262. Omnipress, 2012
52. J. Peters, J. M. Mooij, D. Janzing, and B. Schölkopf. Identifiability of causal graphs using functional models. In *Proceedings of the 27th Annual Conference on Uncertainty in Artificial Intelligence (UAI)*, pages 589–598. AUAI Press, 2011
53. D. Janzing, E. Sgouritsa, O. Stegle, J. Peters, and B. Schölkopf. Detecting low-complexity unobserved causes. In *Proceedings of the 27th Annual Conference on Uncertainty in Artificial Intelligence (UAI)*, pages 383–391. AUAI Press, 2011
54. K. Zhang, J. Peters, D. Janzing, and B. Schölkopf. Kernel-based conditional independence test and application in causal discovery. In *Proceedings of the 27th Annual Conference on Uncertainty in Artificial Intelligence (UAI)*, pages 804–813. AUAI Press, 2011
55. J. Peters, D. Janzing, and B. Schölkopf. Causal inference on discrete data using additive noise models. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 33:2436–2450, 2011
56. J. Peters, D. Janzing, and B. Schölkopf. Identifying cause and effect on discrete data using additive noise models. In *Proceedings of the 13th conference on Artificial Intelligence and Statistics (AISTATS)*, pages 597–604. Journal of Machine Learning Research: Workshop and Conference Proceedings, 2010
57. D. Janzing, J. Peters, J. M. Mooij, and B. Schölkopf. Identifying confounders using additive noise models. In *Proceedings of the 25th Annual Conference on Uncertainty in Artificial Intelligence (UAI)*, pages 249–257. AUAI Press, 2009
58. J. M. Mooij, D. Janzing, J. Peters, and B. Schölkopf. Regression by dependence minimization and its application to causal inference. In *Proceedings of the 26th International Conference on Machine Learning (ICML)*, pages 745–752. ACM Press, 2009

59. J. Peters, D. Janzing, A. Gretton, and B. Schölkopf. Detecting the direction of causal time series. In *Proceedings of the 26th International Conference on Machine Learning (ICML)*, pages 801–808. ACM Press, 2009
60. P. O. Hoyer, D. Janzing, J. M. Mooij, J. Peters, and B. Schölkopf. Nonlinear causal discovery with additive noise models. In *Advances in Neural Information Processing Systems 21 (NeurIPS)*, pages 689–696. Curran Associates, Inc., 2009

Book Chapters

1. J. Peters, S. Bauer, and N. Pfister. *Causal Models for Dynamical Systems*, pages 671–690. Association for Computing Machinery, New York, NY, USA, 2022
2. B. Schölkopf, D. Janzing, J. Peters, E. Sgouritsa, K. Zhang, and J. Mooij. *Semi-supervised Learning in Causal and Anticausal Settings*, pages 129–141. Springer, Berlin, Heidelberg, 2013

PhD Thesis

J. Peters. *Restricted Structural Equation Models for Causal Inference*. PhD thesis, ETH Zurich and MPI for Intelligent Systems, 2012 **Diploma Thesis**

J. Peters. Asymmetries of time series under inverting their direction. Diploma Thesis, University of Heidelberg, 2008