

Pierre ALQUIER

Professor

Department: Information Systems, Decision

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Sciences and Statistics

ESSEC Business School

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95021 Cergy-Pontoise

France

RESEARCH INTERESTS

Statistical Data Analysis, Probability Theory & Mathematical Statistics

EDUCATION

- | | |
|------|--|
| 2013 | Habilitation à diriger des recherches, Université Pierre et Marie Curie (UPMC), France
<i>Contributions to Statistical Learning in Sparse Models</i> |
| 2006 | PhD (mathematical statistics), Université Pierre et Marie Curie (UPMC), France
<i>Transductive and Inductive Adaptive Inference for Density and Regression Estimation</i> |
| 2003 | MSc in Probability Theory and Statistics, Université Pierre et Marie Curie (UPMC), France |
| 2003 | Diplôme de statisticien-économiste, L'École nationale de la statistique et de l'administration économique (ENSAE), France |

EMPLOYMENT

Full-time academic positions

2023 - Present Professor, ESSEC Business School, Singapore

Other affiliations and appointments

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|-------------|--|
| 2019 - 2022 | Research scientist, RIKEN, Japan |
| 2014 - 2019 | Professor, L'École nationale de la statistique et de l'administration économique (ENSAE), France |
| 2012 - 2014 | Lecturer, University College of Dublin, Ireland |
| 2007 - 2012 | Assistant Professor, Université Paris-Diderot (Paris VII), France |
| 2006 - 2007 | Teaching and Research Assistant, Paris-Dauphine, PSL University, France |

GRANTS AND HONORS

Awards and Honors

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|------|---|
| 2019 | Best Paper Award, Asian Conference on Machine Learning, Japan |
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Journal Articles

- ALQUIER, P. and GERBER, M. (2024). Universal Robust Regression via Maximum Mean Discrepancy. *Biometrika*, 111(1), pp. 71-92.
- NAKAKITA, S., ALQUIER, P. and IMAIZUMI, M. (2024). Dimension-free bounds for sums of dependent matrices and operators with heavy-tailed distribution. *The Electronic Journal of Statistics*, 18(1), pp. 1130-1159.
- ALQUIER, P., CHERIEF-ABDELLATIF, B.E., DERUMIGNY, A. and FERMANIAN, J.D. (2023). Estimation of Copulas via Maximum Mean Discrepancy. *Journal of the American Statistical Association*, 118(543), pp. 1997-2012.
- FAN, X., ALQUIER, P. and DOUKHAN, P. (2022). Deviation inequalities for stochastic approximation by averaging. *Stochastic Processes and their Applications*, 152, pp. 452-485.
- ALQUIER, P., MARIE, N. and ROSIER, A. (2022). Tight risk bound for high dimensional time series completion. *The Electronic Journal of Statistics*, 16(1), pp. 3001-3035.
- CHERIEF-ABDELLATIF, B.E. and ALQUIER, P. (2022). Finite sample properties of parametric MMD estimation: Robustness to misspecification and dependence. *Bernoulli: A Journal of Mathematical Statistics and Probability*, 28(1), pp. 181-213.
- MEUNIER, D. and ALQUIER, P. (2021). Meta-Strategy for Learning Tuning Parameters with Guarantees. *Entropy*, 23(10).
- CAREL, L. and ALQUIER, P. (2021). Simultaneous dimension reduction and clustering via the NMF-EM algorithm. *Advances in Data Analysis and Classification*, 15(1), pp. 231-260.
- ALQUIER, P. and RIDGWAY, J. (2020). Concentration of tempered posteriors and of their variational approximations. *Annals of Statistics*, 48(3), pp. 1475-1497.
- ALQUIER, P., BERTIN, K., DOUKHAN, P. and GARNIER, R. (2020). High-dimensional VAR with low-rank transition. *Statistics and Computing*, 30(4), pp. 1139-1153.
- ALQUIER, P., COTTET, V. and LECUE, G. (2019). Estimation bounds and sharp oracle inequalities of regularized procedures with Lipschitz loss functions. *Annals of Statistics*, 47(4), pp. 2117-2144.
- ALQUIER, P. and MARIE, N. (2019). Matrix factorization for multivariate time series analysis. *The Electronic Journal of Statistics*, 13(2), pp. 4346-4366.
- ALQUIER, P., DOUKHAN, P. and FAN, X. (2019). Exponential inequalities for nonstationary Markov chains. *Dependence Modeling*, 7(1), pp. 150-168.
- MAIRE, F., FRIEL, N. and ALQUIER, P. (2019). Informed sub-sampling MCMC: approximate Bayesian inference for large datasets. *Statistics and Computing*, 29(3), pp. 449-482.
- CHERIEF-ABDELLATIF, B.E. and ALQUIER, P. (2018). Consistency of variational Bayes inference for estimation and model selection in mixtures. *The Electronic Journal of Statistics*, 12(2), pp. 2995-3035.
- ALQUIER, P. and GUEDJ, B. (2018). Simpler PAC-Bayesian bounds for hostile data. *Machine Learning*, 107(5), pp. 887-902.
- COTTET, V. and ALQUIER, P. (2018). 1-Bit matrix completion: PAC-Bayesian analysis of a variational approximation. *Machine Learning*, 107(3), pp. 579-603.
- MAI, T.T. and ALQUIER, P. (2017). Pseudo-Bayesian quantum tomography with rank-adaptation. *Journal of Statistical Planning and Inference*, 184, pp. 62-76.

- ALQUIER, P. and GUEDJ, B. (2017). An oracle inequality for quasi-Bayesian nonnegative matrix factorization. *Mathematical Methods of Statistics*, 26(1), pp. 55-67.
- ALQUIER, P., RIDGWAY, J. and CHOPIN, N. (2016). On the Properties of Variational Approximations of Gibbs Posteriors. *Journal of Machine Learning Research*, 17(239), pp. 1-41.
- ALQUIER, P., FRIEL, N., EVERITT, R. and BOLAND, A. (2016). Noisy Monte Carlo: convergence of Markov chains with approximate transition kernels. *Statistics and Computing*, 26(1-2), pp. 29-47.
- MAI, T.T. and ALQUIER, P. (2015). A Bayesian approach for noisy matrix completion: Optimal rate under general sampling distribution. *The Electronic Journal of Statistics*, 9(1), pp. 823-841.
- ALQUIER, P., LI, X. and WINTENBERGER, O. (2013). Prediction of time series by statistical learning: general losses and fast rates. *Dependence Modeling*, 1, pp. 65-93.
- ALQUIER, P., BUTUCEA, C., HEBIRI, M., MEZIANI, K. and MORIMAE, T. (2013). Rank-penalized estimation of a quantum system. *Physical Review A*, 88(3).
- ALQUIER, P., MEZIANI, K. and PEYRÉ, G. (2013). Adaptive estimation of the density matrix in quantum homodyne tomography with noisy data. *Inverse Problems*, 29(7), pp. 075017.
- ALQUIER, P. and BIAU, G. (2013). Sparse Single-Index Model. *Journal of Machine Learning Research*, 14, pp. 243-280.
- GUEDJ, B. and ALQUIER, P. (2013). PAC-Bayesian estimation and prediction in sparse additive models. *The Electronic Journal of Statistics*, 7, pp. 264-291.
- ALQUIER, P. and WINTENBERGER, O. (2012). Model selection for weakly dependent time series forecasting. *Bernoulli: A Journal of Mathematical Statistics and Probability*, 18(3), pp. 883-913.
- ALQUIER, P. and HEBIRI, M. (2012). Transductive versions of the LASSO and the Dantzig Selector. *Journal of Statistical Planning and Inference*, 142(9), pp. 2485-2500.
- ALQUIER, P. and HEBIRI, M. (2011). Generalization of constraints for high dimensional regression problems. *Statistics & Probability Letters*, 81(12), pp. 1760-1765.
- ALQUIER, P. and DOUKHAN, P. (2011). Sparsity considerations for dependent variables. *The Electronic Journal of Statistics*, 5, pp. 750-774.
- ALQUIER, P. and LOUNICI, K. (2011). PAC-Bayesian bounds for sparse regression estimation with exponential weights. *The Electronic Journal of Statistics*, 5, pp. 127-145.
- ALQUIER, P. (2008). PAC-Bayesian bounds for randomized empirical risk minimizers. *Mathematical Methods of Statistics*, 17(4), pp. 279-304.
- ALQUIER, P. (2008). LASSO, Iterative Feature Selection and the Correlation Selector: Oracle inequalities and numerical performances. *The Electronic Journal of Statistics*, 2, pp. 1129-1152.
- ALQUIER, P. (2008). Density estimation with quadratic loss: a confidence intervals method. *ESAIM: Probability and Statistics*, 12, pp. 438-463.
- ALQUIER, P. (2008). Iterative feature selection in least square regression estimation. *Annales de l'Institut Henri Poincaré-Probabilités et Statistiques*, 44(1), pp. 47-88.

Books and book editor

- ALQUIER, P. (2024). *User-friendly Introduction to PAC-Bayes Bounds*. Boston - Delft: now publishers.
- ALQUIER, P. [Ed] (2022). *Approximate Bayesian Inference*. MDPI.

ALQUIER, P., GAUTIER, E. and STOLTZ, G. [Eds] (2011). *Inverse Problems and High-Dimensional Estimation*. Springer Berlin Heidelberg.

Conference proceedings

SAKHI, O., ALQUIER, P. and CHOPIN, N. (2023). PAC-Bayesian Offline Contextual Bandits With Guarantees. In: *40th International Conference on Machine Learning (ICML)*. Hawaii: Proceedings of Machine Learning Research, pp. 29777-29799.

MAI, T.T. and ALQUIER, P. (2022). Understanding the Population Structure Correction Regression. In: *4th International Conference on Statistics: Theory and Applications (ICSTA'22)*. Prague: Avestia Publishing.

ALQUIER, P. (2021). Non-exponentially Weighted Aggregation: Regret Bounds for Unbounded Loss Functions. In: *38th International Conference on Machine Learning (ICML'21)*. Proceedings of Machine Learning Research.

DOAN, T., ABBANA BENNANI, M., MAZOURE, B., RABUSSEAU, G. and ALQUIER, P. (2021). A Theoretical Analysis of Catastrophic Forgetting through the NTK Overlap Matrix. In: *24th International Conference on Artificial Intelligence and Statistics (AISTat'21)*. Proceedings of Machine Learning Research.

CHERIEF-ABDELLATIF, B.E. and ALQUIER, P. (2020). MMD-Bayes: Robust Bayesian Estimation via Maximum Mean Discrepancy. In: *2nd Symposium on Advances in Approximate Bayesian Inference (AABI'19)*. Proceedings of Machine Learning Research.

CHERIEF-ABDELLATIF, B.E., ALQUIER, P. and KHAN, M.E. (2019). A Generalization Bound for Online Variational Inference. In: *11th Asian Conference on Machine Learning (ACML'19)*. Proceedings of Machine Learning Research.

ALQUIER, P., MAI, T.T. and PONTIL, M. (2017). Regret Bounds for Lifelong Learning. In: *20th International Conference on Artificial Intelligence and Statistics (AISTat'17)*. Proceedings of Machine Learning Research.

CAREL, L. and ALQUIER, P. (2017). Non-negative Matrix Factorization as a Pre-processing tool for Travelers Temporal Profiles Clustering. In: *25th European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning (ESANN'17)*. i6doc.com.

RIDGWAY, J., ALQUIER, P., CHOPIN, N. and LIANG, F. (2014). PAC-Bayesian AUC Classification and Scoring. In: *28th Conference on Neural Information Processing Systems (NIPS'14)*. Curran Associates, Inc.

ALQUIER, P. (2013). Bayesian Methods for Low-Rank Matrix Estimation: Short Survey and Theoretical Study. In: *24th International Conference on Algorithmic Learning Theory (ALT'13)*. Singapore: Springer Berlin Heidelberg, pp. 309-323.

ALQUIER, P. and LI, X. (2012). Prediction of Quantiles by Statistical Learning and Application to GDP Forecasting. In: *15th International Conference on Discovery Science (DS'12)*. Lyon: Springer Berlin Heidelberg, pp. 22-36.

ALQUIER, P. (2010). An Algorithm for Iterative Selection of Blocks of Features. In: *21st International Conference on Algorithmic Learning Theory (ALT'10)*. Caberra: Springer Berlin Heidelberg, pp. 35-49.

Conferences

ALQUIER, P., RIOU, C. and CHÉRIEF-ABDELLATIF, B.E. (2024). Rates of Convergence in Bayesian Meta-learning. In: *2024 IMS Asia-Pacific Rim Meeting*. Melbourne.

WOLFER, G. and ALQUIER, P. (2024). Optimistic Estimation of Convergence in Markov Chains with the Average Mixing Time. In: International Conference on Scientific Computation and Differential Equations. Singapore.

ALQUIER, P. (2024). PAC-Bayes bounds: understanding the generalization of Bayesian learning algorithms. In: CNRS - ESSEC APAC Workshop. Singapore.

ALQUIER, P. (2024). PAC-Bayesian Bounds for Offline Contextual Bandits. In: Mini-Workshop on Learning Theory & Methodology at NTU. Singapore.

ALQUIER, P. (2024). Learning with PAC-Bayes bounds. In: Third RIKEN AIP & A*STAR-CFAR Joint Workshop on Machine Learning and Artificial Intelligence. Singapore.

ALQUIER, P., RIOU, C. and CHÉRIEF-ABDELLATIF, B.E. (2023). Rates of convergence in Bayesian meta-learning. In: 6th International Conference on Econometrics and Statistics 2023. Tokyo.

ALQUIER, P. and CHÉRIEF-ABDELLATIF, B.E. (2023). Fast Rates in Meta-Learning with PAC-Bayes Bounds. In: 12th Workshop on High Dimensional Data Analysis 2023. Rabat.

Invited speaker

ALQUIER, P. and GERBER, M. (2024). Robust estimation and regression with MMD. In: The Mathematics of Data: Workshop on Optimization and Discrete Structures. Singapore.

ALQUIER, P. (2024). Introduction to PAC-Bayes bounds. In: Machine Learning Summer School in Okinawa 2024. Okinawa.

Prefaces of a journal

ALQUIER, P. (2020). Approximate Bayesian Inference. *Entropy*, 22(11), pp. 1272.

Presentations at a Faculty research seminar

ALQUIER, P. (2023). Concentration of variational approximations. In: Department of Statistics and Data Science Seminar. Singapore.

ALQUIER, P. (2023). Robust estimation with MMD. In: UCD School of Mathematics and Statistics -- Statistics Seminar. Dublin.

ALQUIER, P. (2023). Robust estimation and regression with MMD. In: Séminaire de Probabilités et Statistiques d'Orsay. Orsay.

ALQUIER, P. (2023). Rates of convergence in Bayesian meta-learning. In: UCL Statistical Science Seminars. London.

ALQUIER, P. (2023). Robust estimation and regression with MMD. In: Séminaire de Statistique du Laboratoire "Probabilités, Statistiques et Modélisation". Paris.

Press

ALQUIER, P. 2023. *ChatGPT*. March.

OTHER RESEARCH ACTIVITIES

Associate Editor

Since 2022 Transactions of Machine Learning Research

Since 2020 Journal of Machine Learning Research

Editorial Board Membership

2020 - 2022 Entropy

Organisation of a conference

- 2024 The 13th Workshop on High Dimensional Data Analysis (HDDA-XIII), ESSEC Business School, Singapore
- 2024 Interpretable Inference via Principled BNP Approaches in Biomedical Research and Beyond, National University of Singapore, Singapore
- 2024 CNRS@CREATE -- ESSEC APAC workshop, ESSEC Business School, Singapore
- 2024 Approximate Inference in Theory and Practice Conference, Institut Henri Poincaré, France

Affiliations

- Since 2022 Member, Société Française de Statistique (SFdS), France
- Since 2022 Member, Société de Mathématiques Appliquées et Industrielles (SMAI), France
- Since 2022 Member, Société Mathématique de France (SMF), France
- Since 2022 Member, European Mathematical Society (EMS)
- Since 2014 Member, IMS - Bernoulli Society, United States of America

PhD Supervision

- 2023 A. ROSIER (Université Paris X Nanterre), Thesis co-director, First Placement: Enseignant-chercheur à l'école d'ingénieurs ESME
- 2020 B.-E. CHÉRIEF-ABDELLATIF (L'École nationale de la statistique et de l'administration économique (ENSAE)), Thesis director, First Placement: Post-doctoral researcher, University of Oxford
- 2019 L. CAREL (L'École nationale de la statistique et de l'administration économique (ENSAE)), Thesis director, First Placement: Machine learning scientist, Expedia group
- 2017 V. COTTET (L'École nationale de la statistique et de l'administration économique (ENSAE)), Thesis co-director, First Placement: Senior statistician, INSEE
- 2017 T. T. MAI (L'École nationale de la statistique et de l'administration économique (ENSAE)), Thesis director, First Placement: Post-doctoral researcher, University of Oslo

Other research activities

- Since 2024 arXiv moderator, arXiv, United States of America
- 2025 ALT 2025: PC chair, Association for Algorithmic Learning Theory (AALT)
- 2024 COLT 2024: senior PC member, Association for Computational Learning (ACL), Canada
- 2024 ALT 2024: senior PC member, Association for Algorithmic Learning Theory (AALT), United States of America
- 2023 ACML 2023: PC chair, Asian Conference on Machine Learning, Turkey

- 2023 COLT 2023: senior PC member, Association for Computational Learning (ACL), India
- 2023 ALT 2023: senior PC member, Association for Algorithmic Learning Theory (AALT), Singapore
- 2022 NeurIPS 2022: AC (area chair), Neural Information Processing Systems foundation »Neural Information Processing Systems foundation, United States of America
- 2022 COLT 2022: PC chair, Association for Computational Learning (ACL), United Kingdom
- 2022 AISTATS 2022: AC (area chair), The Society for AI and Statistics
- 2021 NeurIPS 2021: AC (area chair), Neural Information Processing Systems foundation »Neural Information Processing Systems foundation, United States of America
- 2021 ITISE 2021: PC chair, Universidad de Granada, Spain
- 2020 ALT 2020: PC chair, Association for Algorithmic Learning Theory (AALT), United States of America
- 2018 JDS 2018: scientific committee member, Société Française de Statistique (SFdS), France
- 2016 AISTATS 2016: publication chair, The Society for AI and Statistics, Spain