

Pierre Humbert

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Professional experiments

- 2025 **CNRS researcher - Laboratoire de Mathématiques et Modélisation d'Évry (LaMME).**
Part of the Statistic and Genomic team.
- 2024-2025 **Post-doctoral researcher - Laboratoire de probabilités, statistique et modélisation (LPSM), Sorbonne Université.**
Conformal Prediction, Selection inference
Supervised by Etienne Roquain. Part of the MARS team.
Visiting researcher - Budapest University of Technology and Economics.
Conformal Prediction, Multivariate outputs
Invited by László Györfi to work in the Department of Computer Science and Information Theory.
- 2023-2024 **Post-doctoral researcher - Laboratoire de mathématiques d'Orsay (LMO).**
Conformal Prediction, Federated Learning
Supervised by Sylvain Arlot. Part of ANR Fast-Big and ANR Biscotte.
- 2021-2023 **Post-doctoral researcher - Laboratoire de mathématiques d'Orsay (LMO), Inria CELESTE.**
Cross Validation, Conformal Prediction, Federated Learning
Supervised by Sylvain Arlot.
- Winter 2021 **Post-doctoral researcher - Centre Borelli, École Normale Supérieure Paris-Saclay.**

Education

- 2016 – 2020 **Ph.D. in applied mathematics - Centre Borelli, department of Mathematics of École Normale Supérieure Paris-Saclay.**
Multivariate analysis with tensors and graphs – application to neuroscience.
Supervised by Nicolas Vayatis, Laurent Oudre, and Julien Audiffren.
Jury: Rémi Gribonval, Dimitri Van De Ville, Cédric Richard, Stéphanie Allassonière, Alexandre Gramfort.
Complementary formations - M2 MVA, ENS de Cachan.
– Convex optimization and applications in machine learning,
– Kernel Methods for machine learning,
– High Dimensional Signal Analysis.
- 2015 – 2016 **Master 2 - Statistic and Probability Major - UFR Science et Technique, Nantes.**
Statistic/Probability.
Final Project Internship - Centre de Mathématique et de leurs Application (CMLA), department of Mathematics of ENS Cachan.
Analysis of physiological signals during a general anesthesia.
Supervised by Nicolas Vayatis and Laurent Oudre.
- 2014 – 2015 **Master 1 - Statistic and Probability Major - UFR Science et Technique, Nantes.**
Statistic/Probability and Numerical analysis.

Supervisions

- 2023 **Co-supervision of the thesis of Lucas Zoroddu - ENS Paris-Saclay, (with Pr. Laurent Oudre).**
– CIFRE thesis with Volta Medical.
Supervision of a student in M2 MVA - ENS Paris-Saclay, (with Pr. Laurent Oudre).
– Learning Granger Network.
- 2021 **Supervision of a student in M2 MVA - ENS Paris-Saclay, (with Pr. Laurent Oudre).**
– Anomaly detection in multimodal signals.
Supervision of a student in M2 Bioengineering and Innovation in Neurosciences - Paris Descartes, (with Pr. Laurent Oudre and Md. Clément Dubost).
– Analysis of electroencephalogram 3 hours after a general anaesthesia.
- 2020 **Supervision of a Normalien in M1 - ENS Paris-Saclay, (with Pr. Laurent Oudre).**
– Learning product graph from signal with sparse spectral representation.

- 2018 **Supervision of a student in M2 BIN - Paris Descartes**, (with Md. Clément Dubost).
– Electroencephalogram channel selection to predict the depth of anesthesia.
- 2017 **Supervision of a student in M2 BIN - Paris Descartes**, (with Md. Clément Dubost).
– Estimation of the bispectral index based on electroencephalogram feature.
- 2016 **Supervision of a student in M2 BIN - Paris Descartes**, (with Md. Clément Dubost).
– Analysis of electroencephalogram 3 hours after a general anaesthesia.
Supervision of 2 Normaliens in L3 - ENS Cachan.
– Tensor completion with applications in image reconstruction.

Teaching

- 2025 **M2 Topics in modern machine learning**.
Teacher for the introduction to conformal prediction, Sorbonne Université (3h)
- 2024 **Machine learning and medicine**.
Teacher, APHP and Sorbonne Université (7h)

Pre-prints

- 2025 **Online selective conformal inference: adaptive scores, convergence rate and optimality**.
Pierre Humbert, Ulysse Gazin, Ruth Heller, and Etienne Roquain.
Submitted to *Annals of Statistics*.
- 2024 **Marginal and training-conditional guarantees in one-shot federated conformal prediction**.
Pierre Humbert, Batiste Le Bars, Aurélien Bellet, and Sylvain Arlot.
Submitted to *JMLR*.

Publications

- 2025 **Transductive conformal inference for full ranking**.
Jean-Baptiste Fermanian, Pierre Humbert, and Gilles Blanchard.
In *Conference on Neural Information Processing Systems 2025 (NeurIPS)*.
- On volume minimization in conformal regression**.
Batiste Le Bars and Pierre Humbert.
In *International Conference on Machine Learning 2025 (ICML)*.
- Localization of arrhythmogenic sites in post-ischemic ventricular tachycardia using Network Granger Causality**.
Lucas Zoroddu, Pierre Humbert, Laurent Oudre, Thomas Demarcy, Laurent Launay, and Francis Bessiere.
In *International Conference of the IEEE Engineering in Medicine and Biology Society 2025 (EMBC)*.
- 2024 **Learning Network Granger causality using Graph Prior Knowledge**, (*Journal*).
Lucas Zoroddu, Pierre Humbert, and Laurent Oudre.
In *Transactions on Machine Learning Research (TMLR)*.
- Using graph prior to learn network Granger causality**.
Lucas Zoroddu, Pierre Humbert, and Laurent Oudre.
In *European Signal Processing Conference 2024 (EUSIPCO)*.
- 2023 **One-Shot Federated Conformal Prediction**.
Pierre Humbert, Batiste Le Bars, Aurélien Bellet, and Sylvain Arlot.
In *International Conference on Machine Learning 2023 (ICML)*.
- 2022 **Robust Kernel Density Estimation with Median-of-Means principle**.
Pierre Humbert*, Batiste Le Bars*, and Ludovic Minvielle*.
In *International Conference on Machine Learning 2022 (ICML)*
*Authors with equal contribution to this work.
- 2021 **Adaptive Subsampling of Multidomain Signals With Product Graphs**.
Théo Gnassounou, Pierre Humbert, and Laurent Oudre.
In *IEEE International Conference on Acoustics, Speech and Signal Processing 2021 (ICASSP)*.
- Learning spatial filters from EEG signals with graph signal processing methods**.
Pierre Humbert, Laurent Oudre, and Clément Dubost.
In *International Conference of the IEEE Engineering in Medicine and Biology Society 2021 (EMBC)*.
- Tensor Convolutional Sparse Coding with Low-Rank activations**, (*Journal*).
Pierre Humbert, Laurent Oudre, Nicolas Vayatis, and Julien Audiffren.
In *IEEE Transactions on Signal Processing (TSP)*.

- 2020 **Learning the piece-wise constant graph structure of a varying Ising model.**
 Batiste Le Bars, Pierre Humbert, Argyris Kalogeratos, and Nicolas Vayatis.
 In *International Conference on Machine Learning 2020 (ICML)*.
Low rank activations for tensor-based convolutional sparse coding.
 Pierre Humbert, Julien Audiffren, Laurent Oudre, and Nicolas Vayatis.
 In *IEEE International Conference on Acoustics, Speech and Signal Processing 2020 (ICASSP)*.
Quantitative assessment of consciousness during anesthesia without EEG data, (Journal).
 Clément Dubost, Pierre Humbert, Gaël De Rocquigny, Laurent Oudre, Christophe Labourdette, Nicolas Vayatis and Pierre-Paul Vidal.
 In *Journal of Clinical Monitoring and Computing 2020 (JCMC)*.
Prediction of the Depth of anesthesia with Hidden Markov Model.
 Clément Dubost, Pierre Humbert, Gaël De Rocquigny, Nicolas Vayatis and Pierre-Paul Vidal.
 In *Virtual Physiological Human 2020 (VPH)*.
2019 **Learning Laplacian Matrix from Graph Signals with Sparse Spectral Representation, (Journal).**
 Pierre Humbert*, Batiste Le Bars*, Laurent Oudre, Argyris Kalogeratos, and Nicolas Vayatis
 In *The Journal of Machine Learning Research (JMLR)*.
 *Authors with equal contribution to this work.
Apprenticeship Learning for a Predictive State Representation of Anesthesia, (Journal).
 Pierre Humbert, Clément Dubost, Julien Audiffren, and Laurent Oudre.
 In *IEEE Transactions on Biomedical Engineering (TBME)*.
Learning Laplacian Matrix from Bandlimited Graph Signals.
 Batiste Le Bars*, Pierre Humbert*, Laurent Oudre, and Argyris Kalogeratos.
 In *IEEE International Conference on Acoustics, Speech and Signal Processing 2019 (ICASSP)*.
 *Authors with equal contribution to this work
Subsampling of Multivariate Time-Vertex Graph Signals.
 Pierre Humbert, Laurent Oudre, and Nicolas Vayatis.
 In *European Signal Processing Conference 2019 (EUSIPCO)*.
Selection of the Best Electroencephalogram Channel to Predict the Depth of Anesthesia, (Journal).
 Clément Dubost, Pierre Humbert, Arno Benizri, Jean-Pierre Tourtier, Nicolas Vayatis, and Pierre-Paul Vidal.
 In *Frontiers in computational neuroscience*.
2016 **Learning from an expert, (Workshop).**
 Pierre Humbert, Julien Audiffren, and Laurent Oudre.
 In *Neural Information Processing Systems 2016 (NeurIPS) Workshop on Machine Learning for Health*.

Selected international talks

- 2025 **Invited talk at SMPGD (keynote).**
 Tutorial on conformal prediction (45 minutes talk).
2024 **Séminaire du Laboratoire de mathématiques d'Orsay (LMO).**
 Marginal and training-conditional one-shot federated conformal prediction (45 minutes talk).
2023 **Séminaire UQsay (online).**
 One-shot federated conformal prediction (50 minutes talk).
Séminaire du Laboratoire de mathématiques d'Orsay (LMO) et Inria Celeste.
 One-shot federated conformal prediction (45 minutes talk).
International Conference on Machine Learning (ICML).
 One-shot federated conformal prediction.
2022 **Séminaire parisien de statistique, Institut Henri Poincaré (IHP).**
 Robust kernel density estimation with median-of-means principle (50 minutes talk).
International Conference on Machine Learning (ICML).
 Robust kernel density estimation with median-of-means principle.
2021 **IEEE International Conference on Acoustics, Speech and Signal Processing.**
 Adaptive subsampling of multidomain signals with product graphs (15 minutes talk).
2020 **IEEE International Conference on Acoustics, Speech and Signal Processing.**
 Low rank activations for tensor-based convolutional sparse coding (15 minutes talk).
French-German Summer School on Transfer Learning.
 Low rank activations for tensor-based convolutional sparse coding (15 minutes talk).

- 2019 **Parietal team – Inria-CEA joint team part of the Neurospin research center.**
 Detection of the depth of anesthesia with and without electroencephalogram signals (50 minutes talk).
- European Signal Processing Conference.**
 Subsampling of multivariate time-vertex graph signals (25 minutes talk).
- IEEE International Conference on Acoustics, Speech and Signal Processing.**
 Learning Laplacian matrix from bandlimited graph signals (25 minutes talk).

Services

- **Reviewing for JASA, JMLR, EJS, Neurips, ICML, ICLR, Aistat.**
- 2023 **Co-organizer of the GT Conformal Prediction.**
- 2021 **Co-organizer of the GT Robust Statistics.**
Jury member, IdF AI Challenge.
- 2017 **Jury member**, Machine Learning project M2 CentraleSupelec.

Computer skills

- Advanced Python, R, L^AT_EX
- Intermediate Git, Java, Android, C/C++
- Basic HTML, PHP, SQL, Javascript, CSS

Languages

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|---------|---------------------------------|-------------------------------|
| French | Native speaker | |
| English | Professional proficiency | <i>good working knowledge</i> |

Referees

- Dr. Etienne Roquain: Postdoctorat advisor**
Pr. Sylvain Arlot: Postdoctorat advisor
Pr. Nicolas Vayatis: Ph.D. advisor
Pr. Laurent Oudre: Ph.D. advisor
Md. Clément Dubost: Former colleague

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 nicolas [dot] vayatis (at) ens-paris-saclay [dot] fr
 laurent [dot] oudre (at) ens-paris-saclay [dot] fr
 clement [dot] dubost (at) intradef.gouv [dot] fr*