

# Pierre Humbert

Paris/Evry, France  
✉ pierre.humbert(at)cnrs.fr

## Professional experiments

- 2025 **CNRS researcher - Laboratoire de Mathématiques et Modélisation d'Évry (LaMME).**  
Part of the Statistics and Genomics team.
- 2024-2025 **Post-doctoral researcher - Laboratoire de probabilités, statistique et modélisation (LPSM), Sorbonne Université.**  
Conformal Prediction, Selective 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.

## 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

- 2026 **M2 Modern topics in machine learning.**  
Teacher for the introduction to conformal prediction, Sorbonne Université.
- 2025 **M2 Modern topics in machine learning.**  
Teacher for the introduction to conformal prediction, Sorbonne Université.
- 2024 **Machine learning and medicine.**  
Teacher, APHP and Sorbonne Université.

## Pre-prints

- 2026 **Metric space valued Fréchet regression.**  
László Györfi, Pierre Humbert, Batiste Le Bars.
- 2025 **Online selective conformal inference: adaptive scores, convergence rate and optimality.**  
Pierre Humbert, Ulysse Gazin, Ruth Heller, and Etienne Roquain.
- 2024 **Marginal and training-conditional guarantees in one-shot federated conformal prediction.**  
Pierre Humbert, Batiste Le Bars, Aurélien Bellet, and Sylvain Arlot.

## 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 **Séminaire parisien de statistique, Institut Henri Poincaré (IHP).**  
 Transductive conformal inference for full ranking.  
**Invited talk at SMPGD (keynote).**  
 Tutorial on conformal prediction.  
**International Conference on Multiple Comparison Procedures (MCP).**  
 Online selective conformal inference: adaptive scores, convergence rate and optimality.  
**Séminar of the Alfréd Rényi Institute of Mathematics.**  
 Marginal and training-conditional one-shot federated conformal prediction.
- 2024 **Séminaire du Laboratoire de mathématiques d'Orsay (LMO).**  
 Marginal and training-conditional one-shot federated conformal prediction.
- 2023 **Séminaire UQsay (online).**  
 One-shot federated conformal prediction.  
**Séminaire du Laboratoire de mathématiques d'Orsay (LMO) et Inria Celeste.**  
 One-shot federated conformal prediction.  
**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.  
**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.
- 2020 **IEEE International Conference on Acoustics, Speech and Signal Processing.**  
Low rank activations for tensor-based convolutional sparse coding.
- French-German Summer School on Transfer Learning.**  
Low rank activations for tensor-based convolutional sparse coding.
- 2019 **Parietal team – Inria-CEA joint team part of the Neurospin research center.**  
Detection of the depth of anesthesia with and without electroencephalogram signals.
- European Signal Processing Conference.**  
Subsampling of multivariate time-vertex graph signals.
- IEEE International Conference on Acoustics, Speech and Signal Processing.**  
Learning Laplacian matrix from bandlimited graph signals.

## 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<sup>A</sup>T<sub>E</sub>X
- Intermediate Git, Java, Android, C/C++
- Basic HTML, PHP, SQL, Javascript, CSS

## Languages

- |         |                                 |                               |
|---------|---------------------------------|-------------------------------|
| French  | <b>Native speaker</b>           |                               |
| English | <b>Professional proficiency</b> | <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

*etienne [dot] roquain (at) upmc [dot] fr  
 sylvain [dot] arlot (at) universite-paris-saclay [dot] fr  
 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*