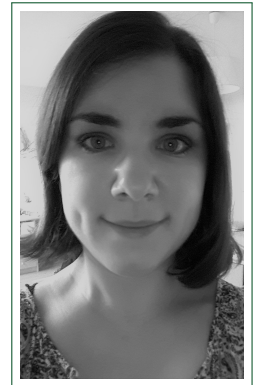


# Barbara PASCAL

## Curriculum Vitæ

Nantes, France  
✉ [barbara.pascal@cnrs.fr](mailto:barbara.pascal@cnrs.fr)  
📄 <https://bpascal-fr.github.io>  
GitHub: [bpascal-fr](#)  
French citizen



## Research

- 2022 - **CNRS Researcher**, *Laboratoire des Sciences du Numérique de Nantes (LS2N)*, France.
- Oct. 2020 - **Post-doctoral researcher**, *CRISTAL*, University of Lille, France, Under the supervision of Rémi Bardenet.
- Sept. 2022 Determinantal Point Processes, zeros of Gaussian Analytic Functions and Time-Frequency transforms.
- Sept. 2017 - **PhD Thesis in Signal and image processing**, *Laboratoire de Physique*, École Normale Supérieure de Lyon, France, Under the supervision of Patrice Abry and Nelly Pustelnik.
- Sept. 2020 Regularized estimation of fractal attributes *via* convex minimization for texture segmentation.  
Reviewers: Bruno Torrèsani and Gabriel Peyré.
- Apr. - July 2017 **Master 2 internship in Signal and image processing**, *Laboratoire de Physique*, École Normale Supérieure de Lyon, France, Under the supervision of Patrice Abry and Nelly Pustelnik.  
Multifractal analysis and convex optimisation applied to texture segmentation.
- May - July 2015 **Master 1 internship in Mathematical Physics**, *Laboratoire de Physique*, École Normale Supérieure de Lyon, France, Under the supervision of Jean-Michel Maillet and Giuliano Niccoli.  
Integrable models, quantum R-matrices and links with classical integrability.
- Nov. - Dec. 2014 **Master practical work**, *Laboratoire de Physique*, École Normale Supérieure de Lyon, France, Under the supervision of Antoine Naert, in collaboration with Juliette Monsel.  
Exchanges of energy with a dissipative thermostat.
- June - July 2014 **Bachelor internship in Experimental Physics**, *Institut Lumière Matière*, Université Lyon 1, France, Under the supervision of Bruno Issenmann.  
Effect of vibrations on a liquid trapped in a porous medium.

## Education

- 2017-2020 **PhD Thesis in Signal and image processing**, *Laboratoire de Physique*, École Normale Supérieure de Lyon, France.
- 2016-2017 **Master of Physics, concepts and applications (Second year)**, *École Normale Supérieure de Lyon*, Lyon, France, *With honors* **Rank 3<sup>rd</sup> (over 27)**.
- July 2016 **Agrégation de Mathématique: highly competitive national exam to teach mathematics in high education**, *École Normale Supérieure de Lyon*, Option: Scientific computing – **Rank 52<sup>th</sup> (over 300)**.
- 2014-2015 **Master of Physics (First year)**, *École Normale Supérieure de Lyon*, Lyon, France, **Rank 2<sup>nd</sup> (over 46)**.
- 2013-2014 **Bachelor of Physics (Third year)**, *École Normale Supérieure de Lyon*, Lyon, France, *With honors* **Rank 7<sup>th</sup> (over 45)**.
- 2010-2013 **Classe préparatoire scientifique: two-year undergraduate intensive course in mathematics, physics and computer science**, *Lycée Blaise Pascal*, Clermont-Ferrand, France, Option: Computer science.
- July 2010 **Baccalauréat: general exam at the end of high school**, *Lycée René Descartes*, Cournon d'Auvergne, France, *With honors* – Scientific, Option: mathematics.

## Scientific production

### Journal articles

7. G. Fort, **B. Pascal**, P. Abry, and N. Pustelnik,  
**"Covid19 reproduction number: Credibility intervals by blockwise proximal Monte Carlo samplers,"**  
*IEEE Transactions on Signal Processing*, vol. 71, pp 888-900, 2023.  
[hal-03611079](#)
6. C.-G. Lucas, **B. Pascal**, N. Pustelnik, and P. Abry,  
**"Hyperparameter selection for Discrete Mumford–Shah,"**  
*Signal, Image and Video Processing (JCR)*, vol. 17, no. 5, pp 1897-1904, 2023.  
[hal-03356059](#)
5. **B. Pascal**, and R. Bardenet,  
**"A covariant, discrete time-frequency representation tailored for zero-based signal detection,"**  
*IEEE Transactions on Signal Processing (JCR)*, vol. 70, pp 2950–2961, 2022.  
[hal-03553433](#)
4. **B. Pascal**, P. Abry, N. Pustelnik, S. Roux, R. Gribonval, and P. Flandrin,  
**"Nonsmooth convex optimization to estimate the Covid-19 reproduction number space-time evolution with robustness against low quality data,"**  
*IEEE Transactions on Signal Processing (JCR)*, vol. 70, pp 2859–2868, 2022.  
[hal-03348154](#)
3. **B. Pascal**, S. Vaiter, N. Pustelnik, and P. Abry,  
**"Automated data-driven selection of the hyperparameters for Total-Variation based texture segmentation,"**  
*Journal of Mathematical Imaging and Vision (JCR)*, pp 1-30, 2021.  
[arXiv:2004.09434](#) [stat.ML]
2. **B. Pascal**, N. Pustelnik, and P. Abry,  
**"Strongly Convex Optimization for Joint Fractal Feature Estimation and Texture Segmentation,"**  
*Applied and Computational Harmonic Analysis (JCR)*, vol. 54, pp 303-322, 2021.  
[arXiv:1910.05246](#) [math.OC]
1. **B. Pascal**, N. Pustelnik, P. Abry, J.-C. G  minard and V. Vidal,  
**"Parameter-free and fast nonlinear piecewise filtering. Application to experimental physics,"**  
*Annals of Telecommunications (JCR)*, vol. 75, no. 11, pp 655-671, 2020.  
[arXiv:2006.03297](#) [physics.data-an]

## Proceedings of international conferences

10. P. Abry, J. Chevallier, G. Fort, and **B. Pascal**,  
**"Hierarchical Bayesian Estimation of COVID-19 Reproduction Number,"**  
*ICASSP2025*, Hyderabad, India, April 6-11, 2025.  
[hal-04695138](#)
9. J. Du, **B. Pascal**, and P. Abry,  
**"Synthetic Spatiotemporal Covid19 Infection Counts to Assess Graph-Regularized Estimation of Multivariate Reproduction Numbers,"**  
*EUSIPCO2024*, Lyon, France, August 26-30, 2024.  
[hal-04501967](#)
8. **B. Pascal**, and M. Lagrange,  
**"On the Robustness of Musical Timbre Perception Models: From Perceptual to Learned Approaches,"** *EUSIPCO2024*,  
Lyon, France, August 26-30, 2024.  
[hal-04501973](#)
7. P. Abry, J. Chevallier, G. Fort, and **B. Pascal**,  
**"Pandemic Intensity Estimation from Stochastic Approximation-based Algorithms,"**  
*CAMSAP2023*, Los Sue  os, Costa Rica, December 10-13, 2023.  
[hal-04174245](#)
6. P. Abry, G. Fort, **B. Pascal**, and N. Pustelnik,  
**"Proximal-Langevin samplers for nonsmooth composite posteriors: Application to the estimation of Covid19 reproduction number,"**

*EUSIPCO2023*, Helsinki, Finlande, September 4-8, 2023.

[hal-03902144](#)

5. H. Artigas, **B. Pascal**, G. Fort, P. Abry, and N. Pustelnik,  
“**Credibility interval design for COVID19 reproduction number from nonsmooth Langevin-type Monte Carlo sampling,**”  
*EUSIPCO2022*, Belgrade, Serbia, July 29-August, 2 2022.  
[hal-03371837](#)
4. P. Abry, G. Fort, **B. Pascal**, and N. Pustelnik,  
“**Temporal evolution of the Covid19 pandemic reproduction number: Estimations from proximal optimization to Monte Carlo sampling,**”  
*IEEE EMBC*, Glasgow, Scotland, July 11-15, 2022.  
[hal-03565440](#)
3. **B. Pascal**, V. Mauduit, P. Abry, and N. Pustelnik,  
“**Scale-free texture segmentation: Expert feature-based versus Deep Learning strategies,**”  
*EUSIPCO2020*, Amsterdam, Netherlands, January 18-22, 2021.  
[hal-03058780](#)
2. **B. Pascal**, N. Pustelnik, P. Abry, M. Serres, and V. Vidal,  
“**Joint estimation of local variance and local regularity for texture segmentation. Application to multiphase flow characterization,**”  
*IEEE ICIP*, Athens, Greece, October 7-10, 2018.  
[hal-01818082](#)
1. **B. Pascal**, N. Pustelnik, P. Abry, and J.-C. Pesquet,  
“**Block-coordinate proximal algorithms for scale-free texture segmentation,**” *IEEE ICASSP*, Calgary, Alberta, Canada, April 15-20, 2018.  
[hal-01736991](#)

## Proceedings of national conferences

6. J. Du, **B. Pascal**, and P. Abry,  
“**Performances comparées d’estimateurs du coefficient de reproduction de la Covid19 à l’aide de données synthétiques réalistes,**”  
*GRETSI*, Grenoble, France, August 28-September 1, 2023.  
[hal-04032614](#)
5. **B. Pascal**, and R. Bardenet,  
“**Une famille de représentations covariantes de signaux discrets et son application ‘a la détection de signaux à partir de leurs zéros,**”  
*GRETSI*, Nancy, France, September 6-9, 2022.  
[hal-03614725](#)
4. H. T.V. Le, **B. Pascal**, N. Pustelnik, M. Foare, and P. Abry,  
“**Algorithmes proximaux rapides déroulés pour l’analyse d’images fractales homogènes par morceaux,**”  
*GRETSI*, Nancy, France, September 6-9, 2022.  
[hal-03621545](#)
3. P. Abry, G. Fort, **B. Pascal**, and N. Pustelnik,  
“**Estimation et intervalles de crédibilité pour le taux de reproduction de la Covid19 par échantillonnage Monte Carlo Langevin proximal,**”  
*GRETSI*, Nancy, France, September 6-9, 2022.  
[hal-03611891](#)
2. T. Busser, **B. Pascal**, N. Pustelnik, P. Abry, M. Serres, R. Philippe, V. Vidal,  
“**Écoulement gaz-liquide dans un milieu poreux confiné: caractérisation par analyse d’images,**”  
*Rencontres du non-linéaire*, Lille, France, March 27, 2019.  
[hal-02364232](#)

1. **B. Pascal**, T. Busser, N. Pustelnik, P. Abry, and V. Vidal,  
**"Segmentation d'images texturées en grande dimension. Application à l'analyse d'écoulements multiphasiques,"**  
*GRETSI*, Lille, France, August 26-29, 2019.  
[hal-02424793](#)

## Communications in international conferences

5. **B. Pascal**, N. Pustelnik, S. Vaiter and P. Abry,  
**"Texture segmentation based on fractal attributes using convex functional minimization with generalized Stein formalism for automated regularization parameter selection,"**  
*French-Italian workshop on the Mathematics of Imaging, Vision and their Applications MIA-MIVA*, Sophia-Antipolis, France, September 12-14, 2022.
4. **B. Pascal**, and R. Bardenet,  
**"The Kravchuk transform: a novel covariant representation for discrete signals amenable to zero-based detection tests,"**  
*Determinantal and permanent point processes, quantum physics, and signal processing*, Lyon, France, May 30-June 10, 2022.
3. **B. Pascal**, and R. Bardenet, *Invited mini-cours* ([https://github.com/bpascal-fr/mini-course\\_SP-and-GAF](https://github.com/bpascal-fr/mini-course_SP-and-GAF))  
**"Point processes and spatial statistics in time-frequency analysis,"**  
*Stochastic Geometry Days*, Dunkerque, France, November 15-19, 2021.  
[PDF material](#), [PYTHON notebooks](#) and [data available online](#)
2. **B. Pascal**, N. Pustelnik, and P. Abry,  
**"Joint estimation of local variance and local regularity for texture segmentation,"**  
*Curves and Surfaces*, Arcachon, France, June 28-July 4, 2018.
1. **B. Pascal**, N. Pustelnik, and P. Abry,  
**"Combining Local Regularity Estimation and Total Variation Optimization for Scale-Free Texture Segmentation,"**  
*SIAM IS*, Bologna, Italy, June, 5-8, 2018.

## Summer schools

2. **Harmonic and Multifractal Analyses: from Mathematics to Quantitative Neuroscience**  
 (Invited lecture and participation),  
 Montréal, Canada, July 3-14, 2023.  
[Summer school in Harmonic and Multifractal Analyses](#)
1. **Sparsity for Physics, Signal and Learning** (Attendance),  
 Paris, France, June 24-27, 2019.

## Softwares

7. **APURE-ESTIM-EPI** (2024)  
<https://github.com/bpascal-fr/APURE-Estim-Epi>  
 Risk estimate under a nonstationary autoregressive model for data-driven reproduction number estimation. Automated selection of the regularization parameter of a variational estimate with autoregression Poisson data-fidelity term.
6. **COVID-ESTIM-R** (2024)  
<https://github.com/bpascal-fr/Covid-Estim-R>  
 Estimation of Covid19 reproduction number via nonsmooth convex optimization both in an univariate manner, country per country, and in a multivariate setting for different states or counties jointly.
5. **TIMBRE-METRIC-LEARNING** (2024)  
<https://github.com/bpascal-fr/timbre-metric-learning>

Musical timbre perception models: from perceptual to learned approaches. Metric learning on different embeddings including state-of-the-art deep representations to match human dissimilarity ratings. Evaluation of the explained variance in terms of Pearson correlation.

4. **KRAVCHUK-TRANSFORM-AND-ITS-ZEROS** (2022) (<https://github.com/bpascal-fr/kravchuk-transform-and-its-zeros>)  
Computation of the Kravchuk transform, representation of the associated spectrogram on the "time-frequency sphere". Signal detection test based on the spatial statistics of the zeros of the Kravchuk spectrogram.
3. **GEOSTO-PP-FOR-TF** (2021) (<https://github.com/bpascal-fr/GeoSto-PP-for-TF>)  
PYTHON demonstration notebooks and real data supporting the mini-course "*Point processes and spatial statistics in time-frequency analysis*". Zeros of the spectrogram of: complex white gaussian noise, noisy synthetic signals and gravitational wave data. Sampling of the zeros of the planar Gaussian Analytic Function.
2. **STEIN-PIECEWISE-FILTERING** (2020) (<https://github.com/bpascal-fr/stein-piecewise-filtering>)  
Toolbox for signal, multivariate signal and image denoising favoring piecewise smooth behaviors including an automated selection of hyperparameters *via* Stein-based strategies.
1. **GSUGAR** (2020) (<https://github.com/bpascal-fr/gsugar>)  
Automated and data-driven hyperparameter selection based on a generalized Stein estimator of the gradient of the quadratic error for texture segmentation (2D) or fractal process segmentation (1D).

## Invited seminars

21. Signal and image processing seminar, Laboratory for Integration from Material to System (IMS), Bordeaux, France  
**"Proximal schemes for the estimation of the reproduction number of Covid19: From convex optimization to Monte Carlo sampling"**  
October 19, 2023. Organizer: Pascal Vallet.
20. Probability and statistics seminar, Institut Élie Cartan de Lorraine (IECL), Nancy, France  
**"The Kravchuk transform: a novel covariant representation for discrete signals amenable to zero-based detection tests"**  
June 8, 2023. Organizers: Ulysse Herbach, Edouard Strickler.
19. ANR Mistic workshop, Mathématiques Appliquées à Paris 5, France  
**"Texture segmentation based on fractal attributes"** April 7, 2023. Organizers: Jonathan Vacher, Mariem Abaach.
18. Data and randomness: theory and applications seminar, Laboratoire Jean Kuntzmann (LJK), Grenoble, France  
**"Proximal schemes for the estimation of the reproduction number of Covid19: From convex optimization to Monte Carlo sampling"**  
April 6, 2023. Organizer: Kévin Polisano.
17. Applied mathematics seminar, Laboratoire de Mathématiques Jean Leray (LMJL), Nantes, France  
**"The Kravchuk transform: a novel covariant representation for discrete signals amenable to zero-based detection tests"**  
November 29, 2022. Organizer: Aymeric Stamm.
16. Probability, statistics and applications seminar, Laboratoire de Mathématiques et Applications, (LMA) Poitiers, France  
**"The Kravchuk transform: a novel covariant representation for discrete signals amenable to zero-based detection tests"**  
November 24, 2022. Organizers: Farida Enikeeva, Sandrine Dallaporta.
15. Probability and statistics team seminar, Laboratoire J.-A. Dieudonné, Nice, France  
**"The Kravchuk transform: a novel covariant representation for discrete signals amenable to zero-based detection tests"**  
October 18, 2022. Organizer: Damien Garreau.
14. Machine learning and signal processing seminar, Laboratoire de Physique de l'ENS Lyon, France  
**"Generalized time-frequency transforms and their zeros"**  
September 28, 2022. Organizer: Titouan Vayer.
13. SIMUL team seminar, Centre de Recherche en Automatique de Nancy (CRAN), France  
**"The Kravchuk transform: a novel covariant representation for discrete signals amenable to zero-based detection tests"**

**test”**

July 12, 2022. Organizer: Julien Flamant.

12. Signal and Machine Learning seminar, Institut de Mathématiques de Marseille (I2M), France  
**“The Kravchuk transform: a novel covariant representation for discrete signals amenable to zero-based detection tests.”**  
18 March 2022. Organizer : Caroline Chaux
11. Workshop on Point Processes and Applications, CRISAL & Laboratoire Paul Painlevé, University of Lille  
**“The Kravchuk transform: a novel covariant representation for discrete signals amenable to zero-based detection tests.”**  
11 March 2022. Organizers : Mylène Maida and Michaël Fanuel.
10. Seminar of the Image team, Mathématiques Appliquées à Paris 5 (MAP5), University of Paris  
**“Analyse de données non stationnaires : représentations, théorie, algorithmes et applications.”**  
7 March 2022. Organizer : Rémy Abergel.
9. Seminar of the Géométrie, Apprentissage, Information, Algorithmes (GAIA) pole, GISPA-Lab, Grenoble  
**“Processing nonstationary data: representations, theory, algorithms and applications.”**  
December 16, 2021. Organizer: Guillaume Becq.
8. Seminar of the Signal Image et Son (SIMS) team, LS2N, Nantes  
**“Processing nonstationary data: representations, theory, algorithms and applications.”**  
December 10, 2021. Organizer: Clément Huneau.
7. Statistics and Optimization seminar, Institut de Mathématiques de Toulouse  
**“Texture segmentation based on fractal attributes using convex functional minimization with generalized Stein formalism for automated regularization parameter selection”**  
October 12 2021. Organizers: Mélisande Albert, Adrien Mazoyer, Pierre Weiss.
6. Workshop on Point Processes and Application,s CRISAL & Laboratoire Paul Painlevé, University of Lille  
**“A link between Majorana Stellar representation of pure spin states and Coulomb gas on the sphere”**  
May 28, 2021. Organizer: Mylène Maida.
5. Séminaire Cristolien d’Analyse Multifractale (SCAM), Centre de Mathématiques, Créteil, France  
**“Segmentation de textures à partir d’attributs fractals par minimisation de fonctionnelle, with réglage automatique des hyperparamètres”**  
February 4, 2021. Organizers: Stéphane Jaffard and Stéphane Seuret.
4. Signal and Image seminar, Institut de Mathématiques de Marchéille (I2M), France  
**“Texture segmentation based on fractal attributes using convex functional minimization with generalized Stein formalism for automated regularization parameter selection.”**  
November 27, 2020. Organizers: Caroline Chaux.
3. Image, Optimization and Probabilites (IOP) seminar, Institut de Mathématiques de Bordeaux, France  
**“How scale-free texture segmentation turns out to be a strongly convex optimization problem?”**  
March 12, 2020. Organizers: Arthur Leclaire and Camille Male.
2. Seminar of the SIGMA team, CRISAL Lille, France  
**“How scale-free texture segmentation turns out to be a strongly convex optimization problem?”**  
March 3, 2020. Organizers: Pierre-Antoine Thouvenin and Vincent Itier.
1. Image and Signal Processing Seminars, ICTEAM, Université Catholique de Louvain  
**“How scale-free texture segmentation turns out to be a strongly convex optimization problem?”**  
December 10, 2020. Organizer: Laurent Jacques.

## Fundings, projects

Oct. 2023 - Mar. 2027 PRC **OptiMoCSI**: *Optimization and Monte Carlo Sampling Intertwined*  
Funding from the generic call of ANR (french national research funding agency).

300 k€

- Scientific manager for the Nantes partner (LS2N).
- Coordinator of WP3 : *Automated data-driven parameter selection.*

## PhD Students



- Sept. 2024 - **Aubin Dauny**, *Stevens Institute of Technology and École Centrale Nantes*, Supervision: Diana Mateus (33%, LS2N), Barbara Pascal (33%, LS2N) and Shang Whang (33%, Charles V. Schaefer, Jr. School of Engineering and Science).  
Texture segmentation in frame times series obtained through Dynamic Optical Coherence Tomography.
- Sept. 2022 - **Juliana Du**, *Laboratoire de Physique de l'ENS Lyon and Laboratoire des Sciences du Numérique de Nantes*,  
Sept. 2024 Supervision: Patrice Abry (40%, LPENSL), Barbara Pascal (40%, LS2N) and Éric Guichard (20%, Triangle).  
An interdisciplinary contribution to monitoring the temporal and spatial evolution of the Covid-19 epidemic.

## Internship supervision

- Apr.-Aug. 2023 **Second year of École Centrale Nantes, major in Applied Mathematics**, *Laboratoire des Sciences du Numérique de Nantes*, Anass El Moubarak, co-supervised with Gwenaél Samain and Sébastien Bourguignon.  
Strong piecewise linearity regularization based on the  $l_0$ -norm. Application to the estimation of the Covid19 reproduction number.
- May-July 2021 **École Polytechnique 3<sup>rd</sup> year internship**, *Institut de Mathématiques de Toulouse*, Hugo Artigas, co-supervised with Gersende Fort, Nelly Pustelnik and Patrice Abry.  
Intervals of credibility for the Covid-19 Reproduction rate.
- Apr.-Aug. 2021 **Final year engineer intership**, *Laboratoire de Physique*, École Normale Supérieure de Lyon, France, Baptiste Desnos, co-supervised with Nelly Pustelnik and Patrice Abry.  
Unfolded proximal algorithms for deep learning texture segmentation.
- July-Sept. 2020 **Master 2 research internship**, *Laboratoire de Physique*, École Normale Supérieure de Lyon, France, Charles-Gérard Lucas, co-supervised with Patrice Abry and Nelly Pustelnik.  
Multivariate interface detection using Mumford-Shah-like functionals.
- June-July 2019 **Engineer intership**, *Laboratoire de Physique*, École Normale Supérieure de Lyon, France, Loris Helmlinger, co-supervised with Nelly Pustelnik.  
Texture segmentation on temporal series of multiphasic flow images: attribute-oriented approaches v.s. deep learning.

## Commitments to the scientific community

### Scientific instances, editorial responsibilities and academic societies

- 2025 Program committee of SSVN 2025: Member
- 2025 Organization of IEEE SSP 2025: Special sessions co-chair
- 2024 Organization of EUSIPCO 2024: Student co-chair
- Jan. 2024- Elsevier Signal Processing: Handling Editor
- Jan. 2024- European Association for Signal Processing (EURASIP): member of the *Technical Area Committee (TAC)* for *Theoretical and Methodological Trends in Signal Processing (TMTSP)*.

### Selection committees

- Spring 2025 Assistant professor position at INSA Rouen, Laboratoire de Mathématiques, St Etienne du Rouvray, France.
- Spring 2025 Assistant professor position at INSA Lyon & Institut Camille Jordan, Villeurbanne, France.
- Spring 2024 Assistant professor position at CentraleSupélec & IETR, Campus de Rennes, France.

### PhD jury

- April 24, 2024 Member of the jury of Mouna Gharbi CentraleSupélec, Gif-sur-Yvette, France.
- December 14, 2023 Member of the jury of Thu-Le Tran, IRMAR, Rennes, France.
- September 12, 2023 Member of the jury of Hashem Ghanem, Laboratoire J.-A. Dieudonné, Nice, France.

### Scientific seminar SIMS team & LS2N

- Monthly team seminars: presentation from an external invited scientific followed by questions and discussions.*

August 2023- **Organizer.**

Oct. 2022-July 2023 **Participant.**

o Peer reviewing

- *SIAM Journal of Imaging Sciences.*
- *IEEE Transactions on Image Processing.*
- *IEEE Transactions on Signal Processing.*
- *IEEE Signal Processing Letters.*
- *IEEE ICASSP.*
- *Inverse Problems and Imaging.*
- *Springer Journal of Mathematical Imaging and Vision.*
- *Statistics, Politics and Policy.*
- *IEEE Transactions on Signal and Information Processing over Networks.*
- *Heliyon.*

o Reading group SIMS Team & LS2N

**"Machine learning and applications"**

*Monthly sessions around recent contributions in machine learning.*

Oct. 2022- **Presentation and regular attendance.**

o Reading group SIGMA team at CRISTAL

**"Determinantal Point Processes: theoretical bases and applications"**

*Réunions bi-mensuelles en mode hybride sur d'un article de recherche présenté par un membre du groupe.  
Maintien d'une archive des séances passées (articles, présentation, résumés, notes) à destination du groupe.*

Sept. 2021-Sept. 2022 **Organizer.**

Oct. 2020-July 2021 **Co-organizer** with Arnaud Poinas.

o Working group CRISTAL & Paul Painlevé laboratory

**"Point processes and applications"**

*Weekly meetings to discuss major results in stochastic geometry and their applications.*

Oct. 2020-Sept. 2022 **Participant.**

o PhD students and post-doctoral researchers seminar SigMA Team, CRISTAL

*Monthly meetings, in hybrid mode if necessary, for a presentation on a scientific or academic topic of broad interest.*

Sept. 2021-Sept. 2022 **Co-organizer** with Pierre Palud.

Jan. 2020-July 2021 **Co-organizer** with Quentin Mayolle.

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## Scientific communication and initiatives toward the wide audience

- o Scientific trainer for the Rendez-vous des Jeunes Mathématiciennes et Informaticiennes Inria Lille (October, 16-17 2021). *Workshops in mathematics and data science for high school girls willing to embrace an ambitious scientific graduate studies projet.*
- o Guide for the Académie des Sciences à Lyon, Musée des Confluences (February, 13-14 2020). *Accompaniment of high school classes through different scientific workshops.*



- Participation to the *Réviser ton bac with la BmL !* program, in partnership with the association [ENSeigner](#) (April-June 2019). *Workshops to prepare the baccalauréat (high school final exam) proposed in Lyon public libraries.*

## Teaching

### Centrale Nantes (engineering school)

#### *DATASIM major*

- **Nonsmooth convex optimization** ..... 2023-2024  
Lecture ..... 4h
- **Signal and image processing projects** ..... 2023-2024  
Audio inpainting in the time-frequency domain using a probabilistic diffusion model ..... co-supervised with M. Lagrange  
Unbalanced optimal transport for time series comparison applied to epidemiology. .... co-supervised with J. Idier
- **Epidemic surveillance: Estimation of the reproduction number of Covid-19** ..... 2022-2023  
Lecture ..... 2h  
Lab session ..... 4h
- **Signal and image processing projects** ..... 2022-2023  
Description *versus* generation in metric learning ..... co-supervised with M. Lagrange  
Learning sound signal representations that are robust to the acquisition modality ..... co-supervised with V. Lostanlen  
Point processes for statistical learning ..... co-supervised with V. Lostanlen

#### *Master 2 CORO Signal and Image Processing*

- **Nonsmooth convex optimization** ..... 2022-2023  
Lecture ..... 4h  
Lab session ..... 2h

### Centrale Lille (engineering school)

#### *Core training of engineering degree (3<sup>rd</sup> year of bachelor)*

- **Measure theory and Lebesgue integration** ..... 2021-2022  
Practical exercises ..... 14h

### Université Claude Bernard Lyon 1

#### *Master of Applied Mathematics and Statistics*

- **Nonsmooth convex optimization - (Second year of master)** ..... 2018-2019, 2020-2021  
Lectures and numerical implementation (PYTHON) ..... 6h+1h30  
From the lecture notes of Nelly Pustelnik

### École Normale Supérieure de Lyon

#### *Formation à l'Enseignement, Agrégation et Développement Professionnel: Master degree for teaching in high school*

- **Préparation à l'agrégation de mathématiques: intensive preparation to the french examination for becoming high school teacher** ..... 2017-2018, 2018-2019, 2019-2020  
Correction of lessons during the training for final oral examination ..... 16h  
– Training for oral exam      – Supervision and evaluation of the preparation and presentation of lessons

#### *Classes préparatoires à l'enseignement supérieur (CPES)*

- **Mathematics** ..... 2017-2018, 2018-2019, 2019-2020  
Colles (oral examinations) ..... **28h**

### *Master of Physics, concepts and applications*

- **Signal and image processing - (First year of master)** ..... 2017-2018, 2018-2019, 2019-2020  
Practical and numerical implementation (MATLAB) ..... **8h**
  - Autoregressive processes, spectral v.s. parametric estimation
  - Non-stationary signals
  - Optimal filtering
  - Deconvolution and image processing

### *Bachelor of Physics*

- **Signal processing - (Third year of bachelor)** ..... 2018-2019, 2019-2020  
Practical exercises ..... **8h**
  - Random variables
  - Random processes and estimation
  - Spectral estimation
  - Statistical tests
- **Introduction to  $\LaTeX$  - (Third year of bachelor)** ..... 2017-2018, 2018-2019, 2019-2020  
Exercises and implementation (TEXMAKER, ZOTERO) ..... **6h**
  - Create a document
  - Using BibTeX to generate a bibliography
  - Insert tables, figures and mathematical formula

### *Master Complex Systems - IXXI*

- **Statistical physics - (Second year of master)** ..... 2017-2018, 2018-2019, 2019-2020  
Practical exercises ..... **8h**
  - Statistical ensembles
  - Disordered systems
  - Phase transitions

## **Linguistic skills**

French	Mother language
English	Professional level
Spanish	Rudiments

*Read, written, spoken*

## **Programming and office automation skills**

Matlab	Deep knowledge	Pyhton	Numpy, Scipy, Keras
Latex	Deep knowledge, TikZ	Inkscape	Standard use
OS	Windows, macOS, Linux (Basics)		