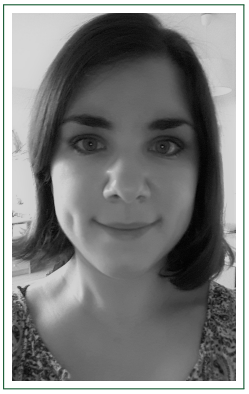

Barbara PASCAL

Curriculum Vitæ

Lille, France
barbara.pascal@univ-lille.fr
https://bpascal-fr.github.io
GitHub: bpascal-fr
French citizen
Born on December, 12 1992

Recherche

Oct. 2020 - **Post-doctoral researcher**, *CRIStAL*, University of Lille, France, Under the supervision of Rémi Bardenet.
Determinantal Point Processes, zeros of Gaussian Analytic Functions and Time-Frequency transforms.

Sept. 2017 -Sept. 2020 **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..
Regularized estimation of fractal attributes *via* convex minimization for texture segmentation. Reviewers: Bruno Torrésani 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 **Mater 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.

Supervision

May-July 2021 ***École Polytechnique* 3rd 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.

Avril-Août 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.

Education

2016-2017 **Master of Physics, concepts and applications *(Second year)***, *École Normale Supérieure de Lyon*, Lyon, France, *With honors* – Rank 3rd (over 27).

Sep. 2015 - July 2016 ***Agrégation de Mathématique*: highly competitive national exam to teach mathematics in high education**, *École Normale Supérieure de Lyon*, Option: Scientific computing – Rank 52th (over 300).

2014-2015 **Master of Physics *(First year)***, *École Normale Supérieure de Lyon*, Lyon, France, Rank 2nd (over 46).

2013-2014 **Bachelor of Physics *(Third year)***, *École Normale Supérieure de Lyon*, Lyon, France, *With honors* – Rank 7th (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.

Teaching

École Centrale Lille

Core training of engineering degree (3rd 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 – Optimal filtering
  – Non-stationary signals – Deconvolution and image processing

Bachelor of Physics

- **Signal processing - (Third year of bachelor)** *2018-2019, 2019-2020*
  Practical exercises **8h**
  – Random variables – Spectral estimation
  – Random processes and 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 – Insert tables, figures and mathematical formula
  – Using BibTeX to generate a bibliography

Master Complex Systems - IXXI

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

Scientific communication and participation to initiatives for the wide audience

- 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 *Révise 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.

Linguistic skills

French	Mother language	
English	Professional level	*Read, written, spoken*
Spanish	Rudiments	

Programming and office automation skills

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

Publications, communications and softwares

Journal articles

2. B. Pascal, N. Pustelnik, and P. Abry,
   "**Strongly Convex Optimization for Joint Fractal Feature Estimation and Texture Segmentation,**"
   To appear in *Applied and Computational Harmonic Analysis* (JCR), 2021. `arXiv:1910.05246 [math.OC]`

1. B. Pascal, N. Pustelnik, P. Abry, J.-C. Géminard and V. Vidal,
   "**Parameter-free and fast nonlinear piecewise fitering. Application to experimental physics,**"
   Annals of Telecommunications (JCR), 2020. `arXiv:2006.03297 [physics.data-an]`

Prepublications

1. B. Pascal, S. Vaiter, N. Pustelnik, and P. Abry,
   "**Automated data-driven selection of the hyperparameters for Total-Variation based texture segmentation,**"
   Under revision process *Journal of Mathematical Imaging and Vision* (JCR), 2020. `arXiv:2004.09434 [stat.ML]`

International conferences

4. 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.

3. 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.

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, P. Abry, and J.-C. Pesquet,
"**Block-coordinate proximal algorithms for scale-free texture segmentation,**"
IEEE ICASSP, Calgary, Alberta, Canada, April 15-20, 2018.

National conferences

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 multi-phasiques,**"
GRETSI, Lille, France, Août 26 - 29, 2019.

International workshops

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

1. **Sparsity for Physics, Signal and Learning** (Attendance), Paris, France, June 24-27, 2019.

Softwares

2. **stein-piecewise-filtering** (`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** (`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

5. Séminaire de Statistique et Optimisation, Institut de Mathématiques de Toulouse
"**Texture segmentation based on fractal attributes using convex functional minimization with generalized Stein formalism for automated regularization parameter selection**"
12 octobre 2021. Organizers: Mélisande Albert, Adrien Mazoyer, Pierre Weiss.

4. 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**"
4 février 2021. Organizers: Stéphane Jaffard and Stéphane Seuret.

3. Séminaire Signal and Image, Institut de Mathématiques de Marseille (I2M), France
"**Texture segmentation based on fractal attributes using convex functional minimization with generalized Stein formalism for automated regularization parameter selection.**"
27 novembre 2020. Organizer: Caroline Chaux.

2. Séminaire Image, Optimisation and Probabilités (IOP), Institut de Mathématiques de Bordeaux, France
"**How scale-free texture segmentation turns out to be a strongly convex optimization problem?**"
12 mars 2020. Organizers: Arthur Leclaire and Camille Male.

1. Séminaire de l'équipe SIGMA, CRIStAL Lille, France
   "**How scale-free texture segmentation turns out to be a strongly convex optimization problem?**"
   3 mars 2020. Organizers: Pierre-Antoine Thouvenin and Vincent Itier.

Scientific animation and participation in the life of scientific team

- Lecture group "**Determinantal Point Processes: theoretical bases and applications**"
  SIGMA team. Co-organization with Arnaud Poinas. *2020 -*
- **PhD students and post-doctoral researchers seminar**
  SIGMA team. Co-organization with Quentin Mayolle. *2021 -*