

Tom Szwagier

PhD candidate in geometric statistics at Inria (formerly dual-degree MSc student at Mines Paris - PSL & ENS Paris-Saclay), keenly interested in geometry, statistical learning and eager to impact the community with new ideas.

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📄 [tomszwagier.github.io](https://github.com/tomszwagier)
📌 Tom Szwagier

EDUCATION

ENS Paris-Saclay, Master MVA (Mathematics, Vision, Learning) **Paris, France**
2021-2022
Relevant Coursework: Geometry and statistical learning, Geometry of shape spaces, Convex optimization, Computational statistics, Kernel methods, Optimal transport, Advanced medical image analysis, Functional brain imaging, Sub-pixel image processing.

Mines Paris - PSL, Master in Science & Executive Engineering **Paris, France**
2018-2022
Major: Digital Engineering of Complex Systems (Physics & AI)
Relevant Coursework: Machine learning, Computer science, Statistics, Optimization, Probability theory, Differential and Integral calculus, Distribution theory, Stochastic process.

Lycée Saint-Louis, Preparatory Classes for top French engineering schools **Paris, France**
2016-2018
MP*/MPSI (Mathematics & Computer Science). **Ranking:** 120/8916.

Scientific Baccalaureate **Paris, France**
2016
Participation in the Concours Général in Mathematics and Physics.

PROFESSIONAL EXPERIENCE & PROJECTS

Inria, Research Intern in Geometric Statistics **Sophia Antipolis, France**
2022 (6 months)
Rethinking principal component analysis with flag manifolds
Lab: Epione – **Head:** Nicholas Ayache – **Supervisor:** Xavier Pennec
◦ Geometry & Optimization: development of a Riemannian optimization framework on flag manifolds
◦ Code: implementation in **geomstats**, an open-source Python package for geometric statistics
◦ Results: successful generalization of PCA as a flag optimization

Technion - Israel Institute of Technology, Deep Learning Research Intern **Haifa, Israel**
2021 (6 months)
Atrial Fibrillation diagnosis on long-term ECG recordings
Lab: AIMLab – **Head:** Joachim Behar – **Supervisors:** Joachim Behar, Shany Biton
◦ Deep Learning: implementation of cutting-edge time-series classification models
◦ Data Augmentation: development of a physiologically-inspired deep conditional autoencoder

Acoustic Wells, Machine Learning R&D Intern **Boston, MA, USA**
2020-2021 (6 months)
Machine Learning-based estimation of methane emissions in oil wells
◦ Signal Processing: sensor fusion, filtering
◦ Machine Learning: feature extraction, non-linear regression, prediction interval
◦ Active Learning: development of an original method, design of a labeling tool

INMED & CENTURI, Image Processing Research Intern **Marseille, France**
2020 (3 months)
Morphological and functional analysis of calcium imaging neuron sequences
Lab: Cossart Lab – **Head:** Rosa Cossart – **Supervisors:** Julien Denis, Robin Dard
◦ Image Processing: neuronal video denoising, adaptive thresholding, skeletonization
◦ Signal Processing: neuronal activity analysis using spike detection, signal correlation, skewness
◦ Unsupervised Learning: neuronal activity dimensionality reduction, clustering and factorization

Institut Pasteur, Image Processing Research Intern **Paris, France**
2019-2020 (6 months)
Segmentation of dendritic spines using mathematical morphology
Lab: Biological Image Analysis – **Head:** Jean-Christophe Olivo-Marin – **Supervisor:** Suvadip Mukherjee
◦ Mathematical Morphology: skeletonization, pruning, watershed

SKILLS

- **Languages:** French (mother tongue), English (professional proficiency), Spanish (conversational)
- **Computer Science:** Python, Java, Matlab, Git, LaTeX
- **Python Libraries:** Tensorflow, scikit-learn, OpenCV, scikit-image, scipy, numpy, pandas
- **Machine Learning:** Deep Learning Specialization (deeplearning.ai), Machine Learning (Stanford University)

NONPROFIT ACTIVITIES

Mines Paris - PSL, Student Union **Paris, France**
2019-2020 (1 year)
Head of external relations. VP Paris Sciences & Lettres. VP eligible candidates.
Weekly voluntary tutor for underprivileged excellent students.

INTERESTS

- **Sport:** Track & Field, Climbing, Surf.
- **Music:** Piano (18 years), Composition of electronic music, Improvisation in Jam sessions.