

Nilo Schwencke

Academic Curriculum Vitae

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Driver license



Education

- 2026–present **Postdoctoral Researcher**, *OCKHAM Team, INRIA; LIP, ENS Lyon; CNRS*, Lyon, France
Natural gradients, kernel methods and their connections to Galerkin methods, with applications to Physics-Informed Neural Networks (PINNs).
Supervisors: Elisa Riccietti and Nelly Pustelnik.
- 2023–2025 **PhD in Computer Science**, *Université Paris-Saclay*, Gif-sur-Yvette, France
Natural Gradients and Kernel Methods for Physics-Informed Neural Networks (PINNs). Defended December 8, 2025.
Supervisor: Cyril Furtlehner (TAU Team, INRIA Saclay – A&O–LISN–Paris-Saclay University–CNRS).
- 2018–2023 **Master degree**, *Karlsruhe Institute of Technology (KIT)*, Karlsruhe, Germany
Theoretic and applied mathematics.
- 2015–2018 **Engineer degree**, *École polytechnique*, Palaiseau, France
Engineering cycle with focus on Computer Sciences, and both theoretic and applied mathematics.
Last year Major in Data sciences
- 2013–2015 **Bachelor**, *Paris-Sud University*, Orsay, France
Major in theoretic and applied mathematics. Minor in Computer Sciences.

Publications

- MARIE-ANNE, J., C. ROUSSELOT, N. SCHWENCKE, AND A. SHILOVA (2025): “Implicit Function Theorem in Physics-Informed Neural Networks to Solve Parameterized Differential Equations,” in *EurIPS 2025 Workshop: Differentiable Systems and Scientific Machine Learning*.
- SCHWENCKE, N. AND C. FURTLERHNER (2025): “ANaGRAM: A Natural Gradient Relative to Adapted Model for Efficient PINNs Learning,” in *The Thirteenth International Conference on Learning Representations*.
- SCHWENCKE, N., C. ROUSSELOT, A. SHILOVA, AND C. FURTLERHNER (2025): “AMStramGRAM: Adaptive Multi-Cutoff Strategy Modification for ANaGRAM,” arXiv Preprint.

Talks and posters in international conferences

- 10/2025 **CRUNCH Group Seminar**, *Brown University*, Providence, Rhode Island, USA
Kernelization of Natural Gradient Methods for Physics Informed Neural Networks
- 09/2025 **European Conference on Numerical Mathematics and Advanced Applications (ENU-MATH)**, Heidelberg, Germany
Unifying PINNs and FEMs through the notion of Natural Neural Tangent Kernel
- 04/2025 **International Conference on Learning Representations (ICLR)**, *Thirteenth edition*, Singapore
ANaGRAM: A Natural Gradient Relative to Adapted Model for efficient PINNs learning
- 02/2025 **Infinite-dimensional Geometry: Theory and Applications (Thematic Programme)**, *Erwin Schrödinger International Institute for Mathematics and Physics (ESI)*, Vienna, Austria
Kernelizing natural gradient, with applications to PINNs

07/2024 **Seminar of the Institute for Applied and Numerical Mathematics, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany**
ANaGRAM: A Natural Gradient Relative to Adapted Metrics for efficient PINNs learning

Talks and posters in French workshops and seminars

- 06/2026 **ML & AD in JAX for Scientific Computing Workshop**, *Université de Strasbourg*, Strasbourg, France
Efficient PINNs and Natural Gradients in JAX
- 06/2026 **47e Congrès National d'Analyse Numérique (CANUM)**, Saint-Jacut-de-la-Mer, France
Adaptive Sampling in PINNs through the lens of Kernel Theory
- 06/2026 **47e Congrès National d'Analyse Numérique (CANUM)**, Saint-Jacut-de-la-Mer, France
Toward a Unified Framework for PINNs and FEMs: A Petrov–Galerkin perspective through the lens of kernel theory
- 05/2026 **HACE Workshop – HPC/AI Hybridization**, *AISSAI*, Toulouse, France
Natural Gradients and Kernel Methods for PINNs
- 02/2026 **Thalès CortAIx Lab Seminar**, *Thalès*, Saclay, France
Kernelization of Natural Gradient Methods for Physics Informed Neural Networks
- 01/2026 **MIA Paris-Saclay Seminar**, *AgroParisTech-INRAE*, Paris-Saclay, France
Kernelization of Natural Gradient Methods for Physics Informed Neural Networks
- 01/2026 **Machine Learning and Signal Processing Seminar**, *ENS Lyon*, Lyon, France
Kernelization of Natural Gradient Methods for Physics Informed Neural Networks
- 12/2025 **PhD Defense**, *Université Paris-Saclay – LISN*, Gif-sur-Yvette, France
Natural gradients and kernel methods for Physics Informed Neural Networks (PINNs)
- 11/2025 **PDEs Seminar**, *IRMA–Université de Strasbourg*, Strasbourg, France
Kernelization of Natural Gradient Methods for Physics Informed Neural Network (PINNs) with connections to Galerkin methods
- 11/2025 **MILES Group Seminar**, *Université Paris Dauphine*, Paris, France
Kernelization of Natural Gradient Methods for Physics Informed Neural Networks
- 06/2025 **Numerical Analysis school**, *EDF*, Palaiseau, France
ANaGRAM : A Natural Gradient Relative To Adapted Model for efficient PINNs learning (poster)
- 06/2025 **12th French Biennial of Applied and Industrial Mathematics (SMAI)**, Carcans Maubuisson, France
ANaGRAM : A Natural Gradient Relative To Adapted Model for efficient PINNs learning
- 03/2025 **Mécanique-Énergétique (ME) and Algorithmes Apprentissage et Calcul (AAC) departments Day**, *LISN–Université Paris-Saclay*, Gif-sur-Yvette, France
Geometrical perspectives on Physics-Informed Neural Networks
- 02/2025 **SCALP ANR Kick-Off Meeting**, *LISN–Université Paris-Saclay*, Gif-sur-Yvette, France
Addressing Spectral Bias in PINNs
- 11/2024 **ACSIOM Group Seminar**, *Institut Montpellierain Alexander Grothendieck (IMAG)*, Montpellier, France
ANaGRAM: A Natural Gradient Relative to Adapted Model for efficient PINNs learning
- 10/2024 **SCOOL Group Seminar**, *INRIA Lille*, Villeneuve-d'Ascq, France
ANaGRAM: A Natural Gradient Relative to Adapted Model for efficient PINNs learning
- 09/2024 **TAU Group Seminar**, *LISN–Université Paris-Saclay*, Gif-sur-Yvette, France
ANaGRAM: A Natural Gradient Relative to Adapted Model for efficient PINNs learning

Organization of scientific events

- 06/2025 **mini-symposium**, *12th French Biennial of Applied and Industrial Mathematics (SMAI)*, Carcans Maubuisson, France
Apprentissage Automatique pour la Résolution de Problèmes Directs et Inverses en Équations aux Dérivées Partielles (Machine Learning for Solving Direct and Inverse Problems in Partial Differential Equations)

Reviews for international conferences

- 2026 **Neural Information Processing Systems (NeurIPS)**, *Fortieth edition*
- 2026 **International Conference on Machine Learning (ICML)**, *Forty-Third edition*
- 10/2025 **International Conference on Learning Representations (ICLR)**, *Fourteenth edition*
- 10/2024 **International Conference on Learning Representations (ICLR)**, *Thirteenth edition*

Invitations to other departments

- 06-07/2024 **Research Group: Numerics of Partial Differential Equations**, *Karlsruhe Institute of Technology (KIT)*, Karlsruhe, Germany
Collaboration with Tim Laufer and Dr Mehdi Elasmı under the supervision of Pr Willy Dörfler, two months.

Supervision

- 2025 **Julien Marie-Anne**, *M2 level (Master MVA)*, six months, co-supervised with Alena Shilova.
Subject: Learning HJB Viscosity Solutions with PINNs for Optimal Control and Continuous-Time Reinforcement Learning.
Led to a workshop publication (Marie-Anne et al., 2025).
- 2025 **Sheng Wan**, *Undergraduate level (first year of École polytechnique)*, two months, co-supervised with Cyril Furtlehner.
Subject: Kernel based Approach to Collocation Points Adaptation Strategy.

Teaching

- 2023–2024 **Teaching Assistant**, *Université Paris-Saclay*, Orsay, France
Introduction to Algorithms and Graphical Programming (Undergraduate, Year 2)
- 2021 **Teaching Assistant**, *CentraleSupélec and IUT d'Orsay*, Gif-sur-Yvette, France
Deep Learning (Master MVA) and Introduction to Python
- 2019–2020 **Teaching Assistant**, *Karlsruhe Institute of Technology (KIT)*, Karlsruhe, Germany
First-Year Linear Algebra (*taught in German*)
- 2016–2017 **Mathematics Oral Examiner (*Khôlleur*)**, *Lycée Blaise Pascal*, Orsay, France
Preparatory Class for Engineering Schools (MPSI level)

Languages

Spanish	native speaker	French	native speaker
English	fluent	German	advanced
Chinese	basics		

Computer skills

Languages	Python, C/C++, PHP, JavaScript, Java, Ocaml	Machine-learning	JAX, Torch, TensorFlow, NumPy, Scikit-learn, SciPy, Keras, Optax, Pandas, Jupyter
Miscellaneous	Git, \LaTeX , GNU/Linux advanced		