Stéphane Rivaud

Curriculum Vitae

TAU Team
INRIA Saclay
(+33) 06 77 07 80 89
stephane.a.rivaud@inria.fr
stephane-rivaud.github.io
Github *Linkedin* *Scholar* *ORCID*

Professional Summary

Postdoctoral researcher focused on functional optimization for neural architecture growth and decentralized machine learning for hardware acceleration, developing methods that blend domain expertise with scalable optimization. Leads initiatives on AI coding assistance, designing agentic workflows that accelerate research and development. Expertise in developing efficient training methods, generative modeling, and integrating domain knowledge into deep learning systems. Strong publication record at top-tier venues (ICLR, ICML) with patents in audio processing.

Research Interests: Distributed/Decentralized Computing, Functional Optimization, Generative Modeling, Geometric Deep Learning, Signal Processing, Agentic Coding

Education

2016–2020 **PhD in Artificial Intelligence**, *Sony CSL and Université de Reims*, Paris.
Integration of Expert Knowledge in Generative Modeling: Application to Music Production. Developed constrained sampling methods for music score generation and perceptual GANs for audio synthesis. Results led to patent US 11363377 and commercial applications.

Advisors: Emmanuel Deruty (Sony CSL)

Thesis: Available online

2014–2015 **Master in Acoustics, Signal Processing and Computer Science applied to Music (ATIAM)**, *IRCAM, Centre Georges Pompidou*, Paris.
Specialized program at the intersection of signal processing, machine learning, and music technology.

2013 **Agrégation of Mathematics with major in Computer Science**, *ENS Rennes*, Rennes.
Competitive national examination for teaching and research positions.

2010–2014 **Magistère of Mathematics**, *ENS Rennes*, Rennes.
Elite mathematics program with focus on theoretical foundations.

Research Experience

Postdoctoral Research

Sep. 2024 – present **Neural Architecture Growth for Frugal AI**, *INRIA Saclay, TAU Team*.
- Developing novel neural network growth methods within functional gradient descent framework
- Contributing to MANOLO European project on efficient AI architectures
- Published growth strategies for DAG architectures (ESANN 2025)

Advisor: Dr. Guillaume Charpiat, Chargé de Recherche, INRIA

May 2022 – May 2024 **Decentralized Training of Deep Neural Networks**, *ISIR, Sorbonne Université*.
- Developed PETRA algorithm for parallel end-to-end training with reversible architectures (ICLR 2025 Spotlight)
- Investigated forward gradient methods matching backpropagation performance (ICML 2023)
- Co-supervised PhD student Louis Fournier on local and distributed training approaches
- Contributed to ANR ADONIS project and PEPR IA SHARP project

Advisor: Dr. Edouard Oyallon, Chargé de Recherche CNRS

Publications

2025 S. Rivaud, L. Fournier, T. Pumir, E. Belilovsky, M. Eickenberg, and E. Oyallon. Petra: Parallel end-to-end training with reversible architectures. In *International Conference on Learning Representations (Spotlight)*, 2025.

2025 S. Douka, M. Verbockhaven, T. Rudkiewicz, S. Rivaud, F. Landes, S. Chevallier, and G. Charpiat. Growth strategies for arbitrary dag neural architectures. In *European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning (ESANN)*, 2025.

2023 L. Fournier, S. Rivaud, E. Belilovsky, M. Eickenberg, and E. Oyallon. Can forward gradient match backpropagation? In *International Conference on Machine Learning*, pages 10249–10264. PMLR, 2023.

2016 S. Rivaud, F. Pachet, and P. Roy. Sampling markov models under binary equality constraints is hard. In *Journées Francophones sur les Réseaux Bayésiens et les Modèles Graphiques Probabilistes*, Clermont-Ferrand, France, 2016.

Patents

2022 E. Deruty and **S. Rivaud**. *Addressing interferences in multi-channel audio mixing*. US Patent 11363377, June 2022.

2020 S. Rivaud. *Integration of Expert Knowledge in Generative Modelling: Application to Music Generation*. PhD thesis, Université de Reims, 2020.

2017 S. Rivaud and F. Pachet. Sampling markov models under constraints: Complexity results for binary equalities and grammar membership. *arXiv:1711.10436*, 2017.

Selected Presentations

Apr. 2025 **PETRA: Parallelizable end-to-end training of Reversible Architectures**, *ICLR 2025 – Poster (Spotlight)*, Singapore.

Dec. 2024 **Growing Modules: Implementing Neural Network Growth**, *MANOLO bi-annual meeting*, Nuremberg.

Nov. 2024 **Functional Gradient Descent for Neural Network Growth**, *Ateliers Franco-Taïwanais*, Taipei.

July 2023 **Can Forward Gradient match Backpropagation?**, *ICML 2023 – Poster*, Honolulu.

June 2019 **The How to of Generative Adversarial Networks**, *ROMI Meeting*, ENS Lyon.

March 2018 **Constraint Programming and Statistical Sampling for Music Score Generation**, *Collegium Musicæ "Analyse | Création"*, IRCAM.

Sep. 2018 **Deep Learning and Neural Networks**, *Etincelle Seminar*, Sony CSL Paris.

Teaching

Fall 2025 **Mathematics for Data Science**, *M1 Artificial Intelligence, Université Paris-Saclay*, Practical Sessions.

Fall 2024–2025 **Applied Statistics**, *M1 Artificial Intelligence, Université Paris-Saclay*, Lectures & Practical Sessions.
Course design and delivery for 50+ students

Fall 2023 **Advanced Machine Learning and Deep Learning**, *M2 DAC, Sorbonne Université*, Practical Sessions.

Fall 2019 **Introduction to Neural Networks**, *M2 Computer Science, Université de Reims*, Lectures.

Fall 2017–2018 **Introduction to Artificial Intelligence**, *M1 & M2 Computer Science, Université de Reims*, Lectures.

Fall 2013 **Analysis and Algebra**, *L3 Mathematics, Université de Rennes*, Oral Examiner.

Supervision & Mentorship

2025 **Léo Burgund**, *M1 Research Intern*.
Transformer Architecture Growth. Université Paris-Saclay.

2022–2024 **Louis Fournier**, *PhD Student*, Co-supervised with Dr. Edouard Oyallon.
Parallelizable training in deep learning through local and distributed approaches. Published 2 papers at ICLR and ICML.

2022 **Bozhang Huang**, *M2 Research Intern*, Co-supervised with Dr. Olivier Schwander.
Bird Vocalization Classification with Few-Shot Learning.

Research Grants & Projects

2024–present **MANOLO**, *European Horizon Project*, Consortium Member, Grant 101135782.
Machine learning for neural network optimization and learning online.

2023–present **SHARP**, *PEPR IA (French National Program)*, Consortium Member, ANR-23-PEIA-0008.
Safe and Human-centered AI for Responsible Processing.

2022–2024 **ADONIS**, *ANR Young Researcher Project*, Team Member, ANR-21-CE23-0030.
Asynchronous Decentralized Optimization for Machine Learning Models. PI: Edouard Oyallon.

2017–2018 **ROMI**, *European Horizon 2020*, Team Member, Grant 773875.
Robotics for Microfarms. PI: Peter Hanappe.

2016–2017 **Flow Machines**, *European ERC Advanced Grant*, Team Member, Grant 641187.
Artificial intelligence for music composition. PI: François Pachet.

Technical Skills

Scientific Computing	Python & PyTorch (expert), SciPy, Scikit-learn
AI Inference	Distributed training, Hardware-aware optimization
CI/CD Pipelines	GitHub Actions, GitLab CI/CD, automated testing workflows
Deep Learning	Model architectures, Generative modeling, Functional optimization, Neural architecture search
Applications	Computer Vision, Sound Processing, NLP
Languages	French (native), English (fluent), Spanish (fluent), Creole (native)

Referees

Dr. Guillaume Charpiat
INRIA Tenure Track
TAU Team
INRIA Saclay
✉ guillaume.charpiat@inria.fr

Dr. Edouard Oyallon
CNRS Tenure Track
ISIR
Sorbonne Université
✉ edouard.oyallon@cnrs.fr

Mr. Emmanuel Deruty
(Former) Team Leader
Music Technology Department
Sony CSL
✉ derutycsl@gmail.com