DARIO SHARIATIAN

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Paris, France

Final year CS PhD student at ENS Paris, PSL. Working in diffusion-based Generative AI.

EDUCATION

PhD in Computer Science, ENS Paris, *France* *October 2023 - 2026*
Inria, Sierra project team, advised by Umut Simsekli and Alain Durmus
Developing methodologies for diffusion-based generative models. See my Github for associated repos.

MSc in Mathematics - Part C (Distinction), University of Oxford, *UK* *2022 - 2023*
Main focus on ML, deep learning, statistics. Various broadening courses, e.g., random matrices, differential geometry, algebraic topology

BSc/MSc in Applied Mathematics, École Polytechnique, *France* *2019 - 2022*
Ingénieur Polytechnicien program. Major in ML/probability/stats. Minor in CS, pure maths, theoretical physics, and humanities

PREPRINTS AND PUBLICATIONS

arXiv – Latent Discrete Diffusion Models *2025*
***Shariatian, D.**, Durmus, A.O., & Peluchetti, S.*
We augment the masked process over tokens with a process on continuous embeddings, enabling cross-token modeling (entirely discarded otherwise). This yields improvements, e.g., in few-step generation.

NeurIPS 25 – Algorithm- and Data-Dependent Generalization Bounds for Diffusion Models *2025*
Shariatian, D., Dupuis, B.*, Haddouche, M.*, Durmus, A.O., & Simsekli, U.*
We establish novel algorithm- and data-dependent generalization bounds for score-based generative models (SGMs), accounting for optimization dynamics, with supporting empirical results.

ICML 25 – Bit-Level Diffusion with Discrete Markov Probabilistic Models (DMPM) *2025*
Shariatian, D., Pham, L.T.N.*, Ocello, A., Conforti, G., & Durmus A.O.*
We improve discrete diffusion on bit data, beating state-of-the-art MD4 and discrete flow matching on binarized MNIST with 2.5x fewer network calls, and develop the accompanying theoretical study.

ICLR 25 – Heavy-Tailed Diffusion with Denoising Lévy Probabilistic Models (DLPM) *2024*
***Shariatian, D.**, Simsekli, U., & Durmus, A.O.*
We develop a diffusion-model framework to improve modeling of heavy-tailed and imbalanced data.

NeurIPS 24 – Piecewise Deterministic Generative Models *2024*
*Bertazzi, A., **Shariatian, D.**, Durmus, A.O., Simsekli, U., & Moulines, É*
We introduce a class of generative models based on Piecewise Deterministic Markov Processes (PDMPs), featuring deterministic motion with random jumps at random times; we report promising experiments.

WORK EXPERIENCE

Research Intern, Sakana AI, *Tokyo, Japan* *May–September 2025*
- Developed Latent Discrete Diffusion Models for categorical data modeling, like text.
- Ran larger scale training with experiments on multiple H200 nodes.
- Proposed and co-organized the first Sakana AI research retreat, a 5-day trip with the research staff.

Quantitative Research Intern, Squarepoint Capital, *London, UK* *March–August 2022*
- Developed predictive mathematical models for mid-frequency equities.
- Shared a novel approach across several teams.

Software Engineer Intern, Ledger, *Paris, France* *June–September 2021*
• Wrote an emulator for the Ledger Nano X in C, streamlining debugging and accelerating development.

Research Intern, Gendarmerie Elite Unit (GIGN), *Versailles, France* *November–April 2020*
• Led a small team developing tools to support the elite unit (noise reduction, object detection, etc.).
• Coordinated with field agents, technical teams, and French institutions to optimize project outcomes.

ACADEMIC EXPERIENCE

Organizer Reading group on diffusion models, Inria Paris *2025*
Organizer Sakana AI research retreat *2025*
Reviewer ICML24, NeurIPS24, AAAI25, TMLR, ICLR25, ICML25
Teaching Assistant MAA106 Numerical Analysis, École Polytechnique *March–June 2024*
Oral Examiner MSc Data Science for Business/Finance, X-HEC *2024, 2025*
Oral Presentations
• Heavy-Tailed Diffusion with DLPMs, Alan Turing Institute, *London*, *June 2024*
• Heavy-Tailed Diffusion with DLPMs, Ecole Polytechnique, *Paris*, *February 2025*
• Heavy-Tailed Diffusion with DLPMs, Oberwolfach MFO, *Oberwolfach*, *February 2025*
• Bit-Level Diffusion with DMPMs, Sakana AI, *Tokyo*, *July 2025*
• Generalization Bounds for Diffusion Models (oral), GDR IASIS, ENS Lyon, *Lyon*, *October 2025*
• Latent DDMs, ENS Lyon, *Lyon*, *November 2025*

Research Visit Università degli Studi di Padova, Departments of Mathematics & Physics and Astronomy, *Padova, Italy* *March 2025*
• Initiated a joint Math/Physics project applying diffusion-based generative models to cosmology: emulating evolution from CMB initial conditions and exploring cosmological fractal super-resolution.

PRE-PHD RESEARCH / SELECTED PROJECT WORK

An Alternative to the Log-Likelihood (Master thesis) *December–April 2023*
Department of Statistics, University of Oxford, supervised by Dr. Gonzalo Mena
• Study on Sinkhorn EM, an alternative to log-likelihood for parameter estimation inspired by entropic optimal transport, in the non-asymptotic regime.

Discrete Morse Theory for Relative/Persistent Cosheaf Homology *March 2023*
Department of Mathematics, University of Oxford, Supervised by Dr. Vidit Nanda
• Explored discrete Morse theory to accelerate homology computations in various contexts.

On-Board Computer (OBC) for Nano-Satellite, IONSAT project *2020–2021*
Space Center of École Polytechnique
• Led team designing OBC architecture with FPGA. Collaborated with CNES on multi-core systems.
• Project presented at Dubai IAC 2021.

SKILLS

Programming	Python, C/C++, q/KDB, Java, Ocaml, SQL
Tools, Softwares	PyTorch, PyTorch Lightning, Slurm, git, gdb, Qt, OpenGL
Languages	English *(fluent)*, French *(native)*, Spanish *(notions)*, Persian *(notions)*

VARIOUS

• **Music** Guitar, bass, drums.
• **Sports** Volleyball, ski, kung-fu, surf, sky-diving
• **Community Involvement** Rehabilitation of Chateau de Guédelon, in France