Gaspard BEAUDOUIN

Engineering Student in Machine Learning

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Research interests: diffusion models and flow matching, large language models, discrete diffusion for text generation.

EDUCATION

École Normale Supérieure Paris-Saclay   Paris, France
MVA Master — Mathematics, Vision, Learning   2025 – 2026

− Coursework: Object recognition and computer vision, Convex optimization, Optimal Transport, Deep Learning, Theoretical Foundations of DL, Statistical learning, Text and graph learning, RL, Geometric data analysis, Generative models, Geometry processing, Computational statistics.

École Nationale des Ponts et Chaussées — Institut Polytechnique de Paris   Paris, France
Department of Mathematics and Computer Science   2022 – 2025

− **Specialization** Deep Learning, Computer Vision, Statistics, Stochastic Processes, Advanced Programming, Data Science, Convex Optimization.
− **Extra** Transformers, LLMs, NLP, Diffusion Models, Reinforcement Learning, GPU acceleration.

Fénelon Sainte-Marie   Paris, France
Preparatory Classes in Mathematics and Physics   2020 – 2022
Two-year intensive program preparing for competitive entrance exams to top-tier French Grandes Écoles.

− **1st Year** PCSI (Physics, Mathematics, Chemistry, Engineering Sciences).
− **2nd Year** PSI* (Physics, Mathematics, Engineering Sciences).

EXPERIENCE

Research Intern — Harvard University   Boston, USA
Harvard AI and Robotics Lab   Feb 2025 – Aug 2025

− Flow Matching and Diffusion Models for text-to-image editing: study of inversion-free Rectified Flows and Score Distillation Sampling.
− Discrete Diffusion Models for text generation; 4D Vision research.
− Collaborated with Minghan Li, Sunghoon Yoon, Jaeyeon Kim, Kaichen Zhou, Fangneng Zan (Harvard & MIT).

Machine Learning Engineer Intern — Sinequa   Paris, France
Research Team   Aug 2024 – Jan 2025

− LLMs, Transformers, and AI agents; literature review in NLP.
− Instruction fine-tuning (LoRA & full) with distributed training on H100 GPUs.
− Evaluation of function-calling / tool-use models; dataset augmentation.
− RLHF and DPO for improving reasoning abilities (o1-style).

Mathematics Tutor   Paris, France
Private tutoring (L1 & L2) in Algebra and Analysis   2022 – 2024

PUBLICATIONS

Delta Velocity Rectified Flow for Text-to-Image Editing *Preprint, Under Review.*
G. Beaudouin, M. Li, J. Kim, S.-H. Yoon, M. Wang.
ArXiv: 2509.05342

SplitFlow: Flow Decomposition for Inversion-Free Text-to-Image Editing *Preprint, Under Review.*
S.-H. Yoon, M. Li, G. Beaudouin, C. Wen, M. R. Azhar, M. Wang

Masked Diffusion for Text Generation (working title) *In preparation for ICLR 2026.* Work with J. Kim.

4D Vision Model (working title) *In preparation for ICLR 2026.* Work with K. Zhou.

Others

− **Notes** *My notes on LLMs: From Pre-Training to RLHF (Draft)* — GitHub
− **Poster** *Drug Design with Diffusion Models* — GitHub

PROJECTS

GPT Transformer from Scratch — Personal Project
Built a small Transformer in PyTorch and generated French fables from synthetic poetry data. — 2024

Drug Design with Diffusion Models — École des Ponts
Implemented DDPM, explored DiffDock for drug binding site discovery. Supervised by researchers & Sanofi. — 2024

Trading Web Platform and Options Pricer — École des Ponts
Monte Carlo pricing for European & American options; implemented Longstaff–Schwartz. — 2023

Edge Detection in Images — École des Ponts
C++ research on perceptual boundary saliency; implemented detection algorithms. — 2022

SKILLS

Languages French (native), English (fluent), Spanish (proficient)

Technical Python (PyTorch, Transformers, Pandas, Scikit-learn), Docker, Slurm, C++, SQL, R, LaTeX

MISCELLANEOUS

Sports Member of École des Ponts first football team; competitive tennis

Interests Passionate about AI, actively following scientific publications