# Gaspard BEAUDOUIN

Engineering Student in Machine Learning
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Research interests: large language models, diffusion & flow models, masked diffusion language models.

## Education

**École Normale Supérieure Paris-Saclay** — Paris, France
*MVA Master — Mathematics, Vision, Learning* — *2025 – 2026*
– Coursework: Advanced learning for text/graphs, Deep Learning, Optimal Transport, Robotics, Probabilistic Graphical Models, Large-Scale LLM Training, Deep Learning theorical foundations, Multimodal xAI, Generative Modelling, RL, LLM for code and proof.

**École Nationale des Ponts et Chaussées — Institut Polytechnique de Paris** — Paris, France
*Mathematics and Computer Science Department* — *2022 – 2026*
– Focus: Deep Learning, Machine Learning, Computer Vision, Statistics, Convex Optimization, Stochastic Processes, Avanced Progamming, Control Theory and Functional Analysis.

**Fénelon Sainte-Marie** — Paris, France
*Preparatory Classes in Mathematics and Physics* — *2020 – 2022*
– 1st Year: PCSI; 2nd Year: PSI* (Physics, Mathematics, Engineering Sciences).

## Experience

**Research Intern — Harvard University** — Boston, USA
*Harvard AI and Robotics Lab, MEE* — *Feb 2025 – Aug 2025*
– Diffusion & Rectified Flows for text-to-image editing (inversion-free and Score Distillation Sampling).
– Masked Diffusion Language Models and 4D Vision models (collaboration with Harvard & MIT researchers).

**ML Engineer Intern — Sinequa** — Paris, France
*Research Team* — *Aug 2024 – Jan 2025*
– LLMs and AI agents litterature review (SFT and RL); evaluation of function-calling models, data augmentation.
– Instruction fine-tuning (LoRA & full) and DPO on H100 clusters for tool / function-calling.

**Mathematics Tutor** — Paris, France
*Private tutoring (Algebra and Analysis)* — *2022 – 2024*

## Publications

**PAGE-4D: Disentangled Pose and Geometry for 4D Perception** *Under Review at ICLR 2026.*
*K. Zhou, Y. Wang, G. Chen, G. Beaudouin, F. Zhan, P. Liang, M. Wang*

**Delta Velocity Rectified Flow for Text-to-Image Editing** *Under Review at AAAI 2026, Preprint ArXiv: 2509.05342.*
*G. Beaudouin, M. Li, J . Kim, S.-H. Yoon, M. Wang*

**SplitFlow: Flow Decomposition for Inversion-Free Editing** Accepted at NeurIPS 2025.
*S.-H. Yoon, M. Li, G. Beaudouin, C. Wen, M. Azhar, M. Wang*

***(In preparation: Masked Diffusion Language Model)*** Work with J . Kim.

## Projects

**GPT Transformer from Scratch** — Personal Project
*Implemented and trained a PyTorch Transformer in order to generate French poetry. I also generated some synthetic training data, and wrote my notes on LLMs: From Pre-Training to RLHF (Draft)* — *2024*

**Drug Design with Diffusion Models** — École des Ponts
*Implemented DDPM, explored DiffDock for drug binding discovery (with Sanofi). Poster Available.* — *2024*

**Options Pricer** — École des Ponts
*Monte Carlo pricing website for European & American options (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), Docker, Slurm, C++, SQL, R, LaTeX

## Miscellaneous

**Sports** École des Ponts football team; competitive tennis

**Interests** Passionate about ML research, actively following scientific publications