

Quentin FRUYTIER

Ph.D. Candidate

UT Austin

M.Sc. & B.Sc. Graduate

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Available: Summer 2027

Ph.D. Supervisors

Aryan Mokhtari

Sujay Sanghavi

M.Sc. Supervisors

Abbas Khalili

Tim Hoheisel

Patents

Latent Distribution Shaping:

App No. 19/337202 2026

Skills

Python (PyTorch, TensorFlow, NumPy, pandas, scikit-learn), **C**, **C++**, Matlab, R.

Tools: Linux, Slurm clusters, Git, Hugging Face, Flask, $\LaTeX$.

Models: Transformers / ViT, Autoencoders, Mixtures of Experts, Diffusion (continuous & discrete).

Graduate Coursework

Probability & Statistics:

Probability & Stochastic Processes, Advanced Probability, Mathematical Statistics I–II, Generalized Linear Models, Regression & ANOVA.

Optimization: Convex Optimization, Large-Scale Optimization, Linear Optimization, Online Learning, Continuous Algorithms.

Machine Learning: Statistical ML, Theory of ML, Generative Models, Deep Reinforcement Learning, Applied ML, Computer Vision.

Languages & Citizenship

French (native), English. **U.S., Canadian and Belgian citizen.**

Research Interests

Any problem where machine learning meets mathematics. Trained in pure mathematics and computer science at McGill, now building provable and efficient learning methods at UT Austin: convergence theory for EM on mixtures of experts (ICML 2025), distribution shaping of latent spaces (SDM 2026, patent pending) and, most recently, fast parallel decoding for diffusion language models (PIG, 2026 preprint with public code and Hugging Face models).

Education

UT Austin • Ph.D. in Electrical Engineering • 4.0/4.0 GPA

Expected 2028

McGill University • Master's in Mathematics • 4.0/4.0 GPA

August 2023

M.Sc. thesis: A Review of the Expectation-Maximization Algorithm and its Applications to Mixture Models

McGill University • Joint Honours Math & Comp. Sci. • 3.8/4.0 GPA

June 2021

Publications

Parallel Inconsistency Guidance for Diffusion LM (arXiv preprint) [code] [models] 2026

Q. Fruytier, A. Xue, S. Shakkottai, S. Sanghavi

Built a $\sim 2\text{M}$ -parameter adapter that predicts parallel-vs-sequential decoding divergence from one forward pass, yielding up to **$1.7\times$ more tokens/forward-pass at matched accuracy** over Fast-dLLM at $<0.1\%$ overhead, on LLaDA-8B-Instruct and Nemotron-Diffusion-3B.

Sculpting the Latent Space With MMD (accepted at SDM 2026) [code]

2026

Q. Fruytier, A. Malhotra, S. Hamidi-Rad, A. Sant, A. Mokhtari, S. Sanghavi

Introduced the Latent Predictability Score, an unsupervised lower bound on latent entanglement; VAE and adversarial baselines fail to learn independent representations. Used MMD to sculpt the aggregate posterior onto arbitrary priors — **70% reduction in detected entanglement** over the best baseline with no reconstruction trade-off.

Learning Mixtures of Experts with EM (ICML 2025)

2025

Q. Fruytier, A. Mokhtari, S. Sanghavi

Proved a novel equivalence between EM and Projected Mirror Descent for Mixtures of Experts, establishing matching local linear convergence rates for both EM and SGD; in small-scale experiments, EM reached a better optimum in fewer iterations than SGD.

Projects

Back Propagation Through Time for Flow Matching [code]

2026

Trained flow-matching models the way they are sampled: unroll the solver for L steps and backpropagate through time. Showed the unrolled ELBO is single-step flow matching plus cross-terms whose gradient variance scales as $\text{Var}(x_0 | x_t)^L$, so detaching them recovers consistency and shortcut models. From-scratch 35M U-Net reaches FID 5.28 on CelebA 64×64 .

Work Experience

Machine Learning Research Intern

May – Dec 2025

InterDigital Communications AI Lab

Los Altos, CA

Built the Latent Distribution Shaping framework (MMD control of a model's aggregate posterior); applied it to **wireless CSI representation learning, cross-model interoperability and quantization**. Co-inventor on U.S. patent application 19/337202; results became the SDM 2026 paper.

Data Science Intern at Nectar

Summer 2021

Nectar Technologies Data Science

Montreal, QC

RNN and AE training on time series sensor data collected from within beehives.

Software Engineer Intern at Matrox/Akamai

Summers 2019/2020

Akamai Technologies Image Manager

Montreal, QC/Ottawa, ON

Teaching & Service

Graduate Teaching Assistant

Spring 2026

UT Austin Electrical and Computer Engineering Department

Austin, TX

Generative Models in ML (ECE 381V / CS 395T), with Prof. Sujay Sanghavi.

Reviewer, ICML 2026 — Silver Reviewer Award (top reviewers)

May 2026

Awards

Basdall Gardner Memorial Graduate Fellowship in Engineering

2023 – 2026

UT Austin fellowship for academic excellence

Graduate Excellence Fellowship Award

May 2022

McGill University award for academic excellence