

EDUCATION

Harvey Mudd College

Claremont, California

*B.S. in Joint Computer Science & Physics: GPA 3.93**Expected Graduation: May 2028*

- **Relevant Coursework:** Statistical Mechanics, Probability, Statistics, Differential Equations, Graph Theory

TECHNICAL SKILLS

Languages: C++, Python, R, SQL, Java**Statistical Physics & ML Methods:** stochastic processes, mean-field theory & critical phenomena, Monte Carlo, RL post-training (GRPO, PPO), transformers, sparse autoencoders, dimensionality reduction, probabilistic inference**Tools:** NumPy, Pandas, PyTorch, scikit-learn, verl, SAELens, Git, Docker, Linux, HPC

RESEARCH EXPERIENCE

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*Student Researcher, Computational Physics & Machine Learning (Prof. Bilin Zhuang)**Statistical Physics of Deep Neural Networks**Mar. 2026 – Present*

- Modeling forward signal propagation as an iterated random map; deriving fixed-point and stability conditions on the variance–correlation recursion via mean-field theory to predict maximum trainable network depth
- Locating the order-to-chaos phase boundary and its dependence on weight and bias variance, connecting the edge-of-chaos critical point to gradient stability and trainable initialization

*Unsupervised Classification of Water Structure – first-author ACS Central Science manuscript**Oct. 2025 – Feb. 2026*

- Reduced 20 molecular-dynamics trajectories (20,480 configurations) to a four-dimensional order-parameter representation via Python pipelines (NumPy, Pandas, MDtraj)
- Applied K-Means, GMM, DBSCAN, and UMAP to resolve two latent structural populations, tuning hyperparameters by silhouette score and validating against an independent oxygen–oxygen structure factor held out from the classifier

Algoverse

Remote

*Mechanistic Interpretability Researcher (Supervisor: Cole Blodin, Amazon Web Services)**Jan. 2026 – Present*

- Built an end-to-end pipeline (PPO fine-tuning in verl with FSDP + vLLM, activation caching across 8 checkpoints and 4 residual-stream layers, TopK sparse-autoencoder training) to quantify how reinforcement learning reshapes a model's internal representation geometry
- Trained 32 warm-start sparse autoencoders with feature indices aligned across checkpoints, making decoder cosine-similarity a well-defined drift metric on high-dimensional feature space

INDUSTRY EXPERIENCE

Alkera AI, Inc. (YC-S26)

San Francisco, California

*Machine Learning Engineering Intern (Report to: Andrew Tran, CTO)**May. 2026 – Present*

- Built an end-to-end GRPO policy-optimization harness in verl for an LLM data agent, spanning agent-loop routing, a DuckDB-backed task runner, and an episode-scoring reward pipeline that raised task success from 10.5% to 46.2%
- Containerized training and evaluation with Docker on Linux for deterministic, versioned experiments that reproduce reliably across HPC nodes

Ersilia Open Source Initiative

Remote, Barcelona, Spain

*Machine Learning Research Intern (Supervisor: Miquel Duran-Frigola)**Mar. 2026 – Present*

- Built an in-context TabPFN fusion ensemble (KS-gated AUC selection, 1,458→200 feats); matched grid-tuned RF/XGBoost across 9 endpoints × 10 stratified splits (n=89, paired Wilcoxon)

PROJECTS

LangAlpha | *React 19, Vite, Tailwind, TypeScript, FastAPI, SSE/WebSocket*

- Contributed to an open-source agentic investing platform (1.5k+ GitHub stars) delivering live market data, inline financial time-series charts, and TradingView integration for systematic research workflows
- Built streaming pipelines over SSE and WebSockets to render real-time market data and per-turn source provenance for long-running background research tasks

SPEQTRO | *Python, PyTorch, Agentic AI, MCP, Computer Vision**Jan. 2026 – Present*

- Built auto-detecting multi-format spectral parsers (JCAMP-DX, Bruker FID) as ingestion layer for ML inference
- Designed multi-modal cross-verification across NMR, IR, and MS spectroscopy for automated structure elucidation

AWARDS

UK Chemistry Olympiad: Round 1 Gold Medalist (2023, 2024), Silver Medalist (2022)**Canadian Chemistry Olympiad:** Round 2 Gold Medalist (2024), Round 1 Gold Medalist (2022)