ZHIQI GAO

📞 608-421-3829 ✉ zhiqi@cs.wisc.edu in linkedin.com/in/zhiqi-gao2001/ 🌐 Personal Website

Bio

I am a third-year PhD student in CS at the University of Wisconsin-Madison, advised by Professor Frederic Sala. My research focus is on large language models and foundation models; I am particularly interested in i) how to improve their performance, particularly via data selection and curation and ii) how to evaluate them.

Education

University of Wisconsin-Madison	**Sep. 2023 – Expected: Aug. 2028**
Ph.D in Computer Science	*Madison, Wisconsin*
University of Wisconsin-Madison	**Sep. 2019 – May 2023**
Bachelor of Science in Computer Science & Mathematics, GPA 3.8/4.0	*Madison, Wisconsin*

Publications

Pretrained Hybrids with MAD Skills

*Nicholas Roberts, Samuel Guo, **Zhiqi Gao**, Satya Sai Srinath Namburi GNVV, Sonia Cromp, et al. Frederic Sala.*

- Conference on Language Modeling (COLM), 2025

Theoretical Physics Benchmark (TPBench)
– a Dataset and Study of AI Reasoning Capabilities in Theoretical Physics

*Daniel J.H. Chung, **Zhiqi Gao**, Yurii Kvasiuk, Tianyi Li, Moritz Münchmeyer, Maja Rudolph, Frederic Sala, et al.*

- Machine Learning: Science and Technology (MLST), 2025 (Impact Factor 4.6)
- Midwest Machine Learning Symposium (MMLS) **Lightning Talk**, 2025

Test-time Scaling Techniques in Theoretical Physics
– A Comparison of Methods on the TPBench Dataset

***Zhiqi Gao**[*], Tianyi Li[*], Yurii Kvasiuk, et al., Frederic Sala, Moritz Münchmeyer*

- NeurIPS 2025 Machine Learning and the Physical Sciences (ML4PS) Workshop

Re-Structuring CLIP's Language Capabilities

***Zhiqi Gao**, Frederic Sala*

- Midwest Machine Learning Symposium (MMLS), 2025

Research Experience

Evaluating & Improving LLM Capabilities in Theoretical Physics	**Sep. 2025 – Present**
Graduate Student Researcher, Advisor: Prof. Frederic Sala & Prof. Moritz Münchmeyer	*UW-Madison*

- Developed the first benchmark dataset of research-level theoretical physics problems to rigorously evaluate the scientific reasoning capabilities of frontier LLMs.
- Investigate how fine-tuning and inference-time strategies to enhance LLM performance and logical consistency on complex, multi-step physics problems in multiple domains.

Optimizing Data Mixtures for Foundation Models	**Jul. 2025 – Present**
Graduate Student Researcher, Advisor: Prof. Frederic Sala	*Sprocket Lab, UW-Madison*

- Investigate how different data mixture and selection strategies in post-training can improve LLMs' reasoning capabilities.

Improving CLIP's Via Geometric Structure	**Jan. 2024 – Apr. 2024**
Graduate Student Researcher, Advisor: Prof. Frederic Sala	*Sprocket Lab, UW-Madison*

- Developed a technique to enhance CLIP's few-shot classification by incorporating inter-class geometric relationships derived from a confusion matrix.

Tessellations on the Poincaré Half-Plane and Disk	**Jul. 2022 – Aug. 2022**
Undergraduate Student Researcher, Advisor: Prof. Andrew Zimmer	*NSF-supported REU, UW-Madison*

- Developed a visualization tool to demonstrate principles of hyperbolic geometry for education purposes, allowing users to generate and explore tessellations on the Poincaré disk and half-plane, aiding students in comprehending complex concepts.

Random Walks on Groups   Jan. 2022 – May 2022

Undergraduate Student Researcher: Advisor: Nate Fisher   *Madison Experimental Mathematics Lab, UW-Madison*

- Implemented Mathematica simulations to investigate the asymptotic properties of random walks on algebraic structures like $\mathbb{Z}^n$ and the Heisenberg group, quantifying metrics and analyzing their long-term pattern, such as expected travel distance, expectation of hitting time, and distribution of hitting location.

Industry Experience

Roblox Corporation   May. 2023 – Aug. 2023

Software Engineer Intern   *AI/ML Team*

- Designed, developed, and deployed a full-stack project with a Slack Bot that integrates Vector Database & Large Language Models (LLMS) which can perform complex Q&A based on custom knowledge by Retrieval-Augmented Generation (RAG), resulting in a better solution that outperformed the existing Question Answering Slack Bot within the company.
- Created an efficient data pipeline, ingesting diverse documents (Confluence, Stackoverflow, Github) and generating vector embeddings for rapid retrieval.

Technical Skills

Programming Languages: Python, Java, C/C++, SQL, Wolfram
ML Framework: PyTorch, Huggingface Transformers, vLLM, deepspeed, accelerate

Teaching Experience

University of Wisconsin-Madison   Aug. 2023 – May 2025

Teaching Assistant   *Madison, Wisconsin*

- Work as a teaching assistant for CS 540, Introduction to Artificial Intelligence. Mentoring students on core AI concepts and machine learning basics. (Fall 2024, Spring 2025)
- Work as a teaching assistant for CS 300, Programming II. Help students to understand principles of Object-Oriented programming, advanced data structures, and general debugging procedures in Java. (Fall 2023, Spring 2024)

Service

Reviewer: NeurIPS 2025, 2024   ES-FoMo@ICML 2024