Divit Rawal

divit.rawal@berkeley.edu | Google Scholar | LinkedIn | divitr.github.io

Research Interests: statistical learning theory; generalization and implicit bias in overparameterized models; stochastic processes and statistical physics of learning.

Education

University of California, Berkeley — Berkeley, CA
B.A. Statistics, Physics, Computer Science — *2023 – 2027*

Relevant Coursework: Statistical Learning Theory†; Theoretical/Mathematical Statistics†; Convex Optimization; Learning for Dynamics and Control†; Probability and Random Processes; Statistical/Thermal Physics; Randomized Linear Algebra, Optimization, Large-Scale Learning†; Statistical Computing. († denotes graduate-level coursework)

Teaching: Head TA (Sp26), Reader (Sp25) for Communication Networks (EE 122). Developed lab curriculum, wrote and graded exams, and led weekly recitation sessions.

Publications and Preprints

Minimax Rates for Hyperbolic Hierarchical Learning 2026
Divit Rawal, Sriram Vishwanath
Submitted, Conference on Learning Theory (COLT). [arXiv]

ALPHANSO: Open-Source (α,n) Neutron Source Terms 2026
Divit Rawal, Anthony J. Nelson, William Zywiec, Daniel Siefman
Accepted to American Nuclear Society Student Conference; under review at Nuclear Instruments and Methods in Physics Research A (NIM-A). [GitHub]

Awards and Grants

VESSL AI Academia Grant Aug 2025
- Awarded academic grant for independent research into embeddings and information geometry; sole undergraduate awardee among recipients primarily comprising Ph.D. students and postdoctoral researchers.

Research Experience

Nirvana AI Jan 2026 – Present
Machine Learning Researcher — *New York, NY*
- Investigating energy-based learning frameworks as alternatives to backpropagation, focusing on implicit differentiation, equilibrium models, and learning dynamics defined by energy minimization.

Lawrence Livermore National Laboratory Mar 2025 – Present
Researcher (Nuclear Science and Security Consortium Fellow) — *Livermore, CA*
- Developed ALPHANSO, an open-source computational framework for deterministic modeling of (α,n) neutron production using continuous slowing-down approximations and modern evaluated nuclear data.
- Formulated and implemented stochastic and deterministic transport models for neutron yield and spectral prediction, benchmarking against legacy codes and experimental datasets.
- Conducted quantitative validation against experimental neutron yield and spectral benchmarks, analyzing model error and sensitivity to nuclear cross-section data; demonstrated improved predictive accuracy and extensibility relative to legacy SOURCES-based pipelines.

Berkeley Artificial Intelligence Research (BAIR) Sep 2024 – Present
Researcher, DeWeese Lab — *Berkeley, CA*
- Analyzed in-context learning in kernel ridge regression via eigenlearning, deriving mode-wise error dynamics and conditions for generalization without representation change.
- Connected ICL behavior to spectral bias in kernel methods (eigenvalue decay, target alignment), clarifying how contextual examples induce effective adaptation in fixed-feature models.
- Ongoing: developing a commutator-based theory of feature acquisition from kernel evolution, predicting stage-wise learning order/timing and diagnosing feature interference via kernel-response dynamics.

UC Irvine, Department of Physics & Astronomy Feb 2022 – Jul 2023
Researcher, Whiteson Lab — *Irvine, CA*

- Developed deep learning models using TensorFlow/Keras for high-energy particle collision analysis, achieving 90% accuracy (vs. 80% baseline) in particle identification.
- Simulated particle collisions using MadGraph, Pythia8, Delphes, and ROOT; implemented reconstruction algorithms in C++ and Python achieving 2% mass prediction error.
- Contributed to arXiv:2412.01600 and arXiv:2412.01548, both published in *Reports on Progress in Physics*.

Industry Experience

Cisco Systems (Foundation AI) Jun 2025 – Aug 2025
Software Engineer (Intern) *San Francisco, CA*

- Contributed to post-training and evaluation of cybersecurity-specialized LLMs built on Llama 3.1 8B, including reasoning, instruction tuning, and preference alignment (RLHF) for security dialogue and workflows.
- Supported open-weight releases Foundation-Sec-8B and Foundation-Sec-8B-Instruct, and contributed to the accompanying technical reports documenting data curation, training methodology, and benchmark evaluation.

ExperienceFlow AI May 2024 – Sep 2024
Machine Learning Engineer (Intern) *Remote*

- Modeled finite state machine (FSM) transition dynamics using transformer, state-space, and graph architectures, evaluating generalization and sample efficiency in low-label sequence prediction settings.
- Developed reinforcement-learning-based control policies (Deep Q-Learning, SARSA) for dynamic state reasoning systems, improving stability and convergence in sequential decision tasks.

Amazon Aug 2023 – Dec 2023
Software Engineer (Intern) *Remote*

- Implemented a K-means clustering module in Java for the OpenSearch ml-commons repository, contributing to distributed ML functionality and increasing unit test coverage from 66% to 78%.
- Diagnosed and resolved production data pipeline failures affecting 1M+ users, improving system reliability and reducing query latency in large-scale ML search infrastructure.

Technical Skills

Programming: R, Python, C++, Java, MATLAB, Julia, SQL, Mathematica, LaTeX.
Scientific Computing: NumPy, SciPy, SciKit-Learn, Monte Carlo methods, randomized algorithms.
ML/AI: PyTorch, JAX, TensorFlow, OpenAI Gym, HuggingFace, Isaac Sim.
Tools: Git, Google Cloud, AWS, Docker, Linux, Jupyter, Matplotlib, Pandas, BeautifulSoup, Selenium.