Dr. Krish Desai

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Ph.D. Candidate in Physics specializing in AI/ML techniques, statistical modelling, and algorithm development for analyzing complex, noisy, high-dimensional datasets. Published researcher in top venues (NeurIPS, Physical Review D) with applied experience at Lawrence Berkeley National Lab, Microsoft Research and Bridgewater Associates, consistently delivering high-impact results through rigorous quantitative methods and creative problem-solving. Passionate about leveraging quantitative skills and innovative ML methods, mathematical modeling, and high-performance computing to answer impactful questions.

EDUCATION

UC Berkeley: PhD Physics   (3.81GPA)   August 2020 – May 2025
Thesis: Machine learning methods for particle collider data. (Advisor: Dr. Benjamin Nachman.)

Yale University, BS & MS with Distinction   (3.85 GPA)   August 2017 – May 2020
M.S. Mathematics.
B.S. Mathematics (Intensive) with Distinction, Physics (Intensive) with Distinction.

CORE COMPETENCIES & SKILLS

– AI/ML: Deep learning, generative models, Bayesian networks, statistical modelling, algorithm design, deconvolution & denoising.
– Programming & Tools: Python, TensorFlow, PyTorch, Keras, Pandas, Scikit-learn, NumPy, SciPy, Git, C, Mathematica.
– Research Methods: Experimental design, statistical analysis, data visualization, algorithmic optimization, quantitative analysis.
– Test Scores: ACT: 36/36, SAT II: Physics 800/800, Math II 800/800, Chemistry 800/800, GRE: Quant 169/170, Verbal: 167/170.

PROFESSIONAL EXPERIENCE

Lawrence Berkeley National Lab   *Machine Learning Researcher*   October 2020 – Present
– Invented novel ML architectures for high energy physics data analysis, resulting in 6 peer reviewed publications (NeurIPS 2024 × 2, 2022, 2021), Physical Review D (2022, 2024). (GitHub Repository).
– Developed cutting edge deconvolution techniques to recover particle physics signals from distorted, noisy data.
– Led interdisciplinary collaborations to implement and optimize high performance algorithms to process petabyte-scale datasets.

Bridgewater Associates   *Investment Analyst Intern*   June 2023 – August 2023
– Engineered Bayesian Hierarchical Networks to predict liquidity & transaction costs, updating economic priors with market data.
– Developed systematic trading strategies to optimally execute alpha signals through multi-factor modelling.
– Implemented and optimized trading strategies, translating complex market analyses into actionable, high-value portfolios.
– Formulated strategic investment input to some of the world's most sophisticated capital pools, impacting high level decision-making

Microsoft Research   *PhD Research Intern*   May 2022 – August 2022
– Collaborated directly with Jaron Lanier (Chief Unifying Scientist) on "Non-local Field Theory from Matrix Models" (arXiv:2206.13458), developing mathematical methods that bridge discrete and continuous structures.
– Formulated analytical approaches using stochastic calculus and operator theory to establish quantitative relationships between conventional local interactions and emergent non-local dynamics.
– Implemented numerical simulations to validate theoretical predictions about high-dimensional mathematical structures with applications to optimization problems.
– Contributions acknowledged in arXiv:2206.13458 for providing significant mathematical formalism and technical implementation.

University of California, Berkeley   *Associate Instructor*   August 2020 – December 2024
– Head Associate Instructor for Introductory Physics, managing 12 teaching assistants and 600+ students.
– Associate Instructor: Introduction to Mathematical Physics, Data Science Applications in Physics, Introduction to Computational Techniques in Physics, Physics for Scientists and Engineers.
– Designed, developed, and delivered computational modules integrating data science methods with physics concepts.

Purple Gaze Inc.   *Software Developer Intern*   May 2020 – August 2020
– Engineered AI-driven glint detection algorithms for eye-tracking software, improving detection accuracy.
– Developed production-quality code in Python and C++ for real-time image processing applications.
– Collaborated in an agile startup environment, meeting tight deadlines while maintaining high-quality standards.

RESEARCH & PUBLICATIONS

Journal Articles

Unbinned Inference with Correlated Events	arXiv:2504.14072	
Moment Unfolding	*Physical Review D* (GitHub Repository)	2024
SymmetryGAN	*Physical Review D* (GitHub Repository)	2022
Closed Geodesics on Flat Surfaces	*Journal of Geometry*	2021
Reweighting Adversarial Networks		In preparation

Conference proceedings

Multidimensional Deconvolution with Profiling	*NeurIPS*	2024
Neural Posterior Unfolding	*NeurIPS*	2024
Deconvolving Detector Effects for Distribution Moments	*NeurIPS*	2022
Symmetry Discovery with Deep Learning	*NeurIPS*	2021

Theses

Padé Approximants & Anharmonic Oscillators	Yale University MS Mathematics
Supersymmetry and Morse Theory	Yale University BS Mathematics (Intensive)
A Review of String Theory Methods	Yale University BS Physics (Intensive)
Machine Learning Methods for Cross Section Measurements	UC Berkeley PhD Physics

SELECTED TALKS & CONFERENCES

NeurIPS	*Neural Posterior Unfolding*	December 2024, Vancouver, Canada
NeurIPS	*Multidimensional Deconvolution with Profiling*	December 2024, Vancouver, Canada
CERN	*CMS Seminar*	June 2024, Geneva, Switzerland
PHY-STAT Unfolding Conference	*Moment Unfolding*	June 2024, Paris, France
NeurIPS	*Deconvolving Detector Effects*	December 2022, New Orleans, LA
Machine Learning for Jets	*Moment Unfolding with Deep Learning*	November 2022, New Brunswick, NJ
Korea Institute for Advanced Study	*High Energy Physics Seminar*	June 2022, Seoul, South Korea
American Physical Society	*Moment Unfolding using Deep Learning*	April 2022, New York NY
NeurIPS	*Symmetry Discovery with Deep Learning*	November 2021, Virtual
Perceive Deep Learning AI Conference	*Symmetry Discovery with Deep Learning*	October 2021, Virtual
American Physical Society	*Symmetry Discovery using Machine Learning*	April 2021, Virtual

SERVICE & LEADERSHIP

Journal of High Energy Physics	*Invited journal peer reviewer*	2025
NeurIPS	*Invited conference peer reviewer*	2022, 2024
UC Berkeley Graduate Assembly	*Campus Affairs Vice President, Rules Officer, Physics Delegate*	2021 – 2024
UC Berkeley Physics Faculty Search	*Graduate Student Representative*	2020 – 2023
Yale Political Union	*Vice President*	2019

SELECTED FELLOWSHIPS & AWARDS

Election to Sigma Xi	*Scientific Research Honor Society, Full Membership*	2025
Election to Sigma Pi Sigma	*Physics Honor Society, Lifetime Membership*	2021
Howard L. Schultz Prize	*The most outstanding graduating senior in physics*	2020
George J. Schulz Summer Fellowship	*Excellence in physical science research*	2020
Howard Robert Topol Fellowship	*Excellence in physical science research*	2019
James A. Helzer Fellowship	*Excellence in physical science research*	2018
SUMRY Fellowship	*For mathematics research*	2019
Yale First-Year Research Fellowship	*For research in the physical sciences*	2018
Benjamin F. Barge Prize	*Most outstanding first-year student in mathematics*	2018