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Christos Giannakopoulos

Research Scientist

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Professional Overview

Research Scientist with **5+ years** of experience applying advanced mathematical, statistical, and machine learning techniques to multi-terabyte datasets, extracting high-impact scientific results. Proven track record of turning complex data problems into accurate and meaningful insights to guide data-driven decisions.

Technical Skills

Programming Skills **Proficient:** Python, MATLAB
 Advanced: JavaScript, HTML, CSS, Bash

Tech Stack TensorFlow, Keras, sklearn, Pandas, SciPy, SymPy, Matplotlib
 Docker, Git/Github, LaTeX, Inkscape, SLURM

Experience

Research Scientist — Physics Dept.

January 2021–February 2026

University of Cincinnati

- Led instrumental systematic-error studies in a cross-disciplinary team of PIs, postdoctoral scholars, engineers, and project managers within the BICEP/Keck Collaboration—an experimental cosmology team, leading the field in measurements of the Cosmic Microwave Background (CMB) polarization.
- Designed and implemented scalable algorithms using advanced mathematical methods (PCA/SVD, GPs, FFTs/SHTs), improving end-to-end pipeline runtime by $8\times$ and enabling near real-time data quality reporting.
- Built end-to-end calibration data analysis pipelines using physical models and domain-specific expertise, fully resolving previously unaddressed instrumental systematic errors.
- Conceived and executed novel calibration measurements that reduced calibration-based detector time-constant measurement uncertainty by 50%.
- Extended the CMB simulation pipeline to directly quantify previously unmeasured systematics, leading to new constraints on polarization leakage in modern CMB instruments.
- Set the standard for polarized mapmaking using calibration data, with [published formalism and results](#).
- Architected a Retrieval-Augmented Generation (RAG) LLM to provide collaboration-specific answers, leveraging principles of transfer learning to mitigate the small-training-set problem.
- Served as subject-matter expert in detector optical characterization and mentored collaborators in measurement and analysis best practices.

Teaching Assistant — Physics Dept.

August 2019–January 2021

University of Cincinnati

- Taught recitations for 200+ students, implementing active-learning techniques to improve engagement and outcomes.

Education

Ph.D. in Physics

University of Cincinnati

August 2019–February 2026

Cincinnati, OH

Bachelor of Science: Physics

Hillsdale College

August 2015–May 2019

Hillsdale, MI

Professional Development

Machine Learning Specialization – *DeepLearning.AI*

- Completed a 3-course ML specialization covering advanced supervised and unsupervised learning algorithms, including Neural Networks, CNNs, Random Forests, Reinforcement Learning, Anomaly Detection, and Clustering.

Control Systems and Instrumentation – *Harvard University*

- Built and characterized calibration equipment used to probe systematic errors in measuring primordial gravitational waves.

Receiver Testing – *California Institute of Technology*

- In-lab testing of a state-of-the-art instrument for experimental cosmology, the BICEP Array 150GHz receiver.