Neil Goeckner-Wald email: ngoecknerwald@stanford.edu

Education

Ph.D. in Physics, University of California, Berkeley 2019
A Measurement of the Degree Scale B-mode Cosmic Microwave Background Angular Power Spectrum from the POLARBEAR Experiment

B.S. in Electrical and Computer Engineering with Honors, Carnegie Mellon University 2013

B.S. in Physics with Honors, Carnegie Mellon University 2013

Selected coursework

Applications of Parallel Computers
Introduction to Computer Systems
Machine Learning
Linear Algebra

Skills

Programming and data analysis Analysis of terabyte-scale astronomical datasets using advanced statistics and machine learning; major contributor to several 100,000+ line PYTHON / C image reconstruction and data reduction codebases

• PYTHON (including libraries `numpy`, `scipy`, `TensorFlow`, `PyTorch`), Unix and shell scripting, C, C++

Mathematics Machine learning and computer vision, linear algebra, differential equations, Bayesian statistics

Teaching and Communication Taught two introductory physics courses for scientists and engineers, primary author of the flagship results paper from a 50-person collaboration, mentored graduate students at University of California at Berkeley and Stanford University

Professional Experience

KIPAC Postdoctoral Fellow, Chao-Lin Kuo lab, Stanford University 2019 - present

• Wrote and maintained several large and critical components of the South Pole Telescope (SPT-3G) instrument characterization and image reconstruction software

• Delivered accurate camera calibration data products with robustly understood uncertainties within tight deadlines

• Coordinated sharing of code and data between independent analyses saving significant time and computational resources

• Implemented a `PyTorch` convolutional variational auto-encoder framework to leverage unsupervised machine learning to identify anomalous features in telescope images

• Co-organized the KIPAC statistics and machine learning journal club

Graduate Student Researcher, Adrian Lee lab, University of California Berkeley 2014 - 2019

• Led the analysis of a large and complex astronomical dataset from the POLARBEAR experiment

• Demonstrated a new approach to measuring the polarization of the cosmic microwave background; primary author of the main science results paper from a 50-person collaboration

• Designed, implemented, and analyzed massive end-to-end physical simulations of the POLARBEAR-1 camera to search for spurious features in the dataset

Graduate Student Instructor, UC Berkeley 2013 - 2014

• Taught one semester of Physics 7B (electromagnetism) and Physics 7C (modern physics).

Open Source Projects

Kaggle `TensorFlow` Great Barrier Reef Computer Vision Competition 2022

• Implemented a `TensorFlow` model based on the Faster R-CNN algorithm to detect invasive starfish in underwater images of the Great Barrier Reef

• Demonstrated modestly successful performance in a challenging computer vision setting detecting small and partially occluded objects against a complex background; identified directions for future improvements

• Code made publicly available at `https://github.com/ngoecknerwald/starfish-perception-telescope`