Micah Buuck PhD

Physicist • Data Scientist • Future Climate Technologist

micahbuuck.com buuck micah-buuck mbuuck@gmail.com (952)797-3742

Professional Experience

SLAC NATIONAL ACCELERATOR LABORATORY | Postdoctoral Research Associate

August 2019–May 2023 | Menlo Park, California

Data science with Machine Learning

- Developed technique to identify the 3D location (with uncertainty quantification) of an electron for a novel telescope design with a CNN in TensorFlow. Published in The Astrophysical Journal.
- Detected particle interactions misclassified by standard techniques in a dark matter detector by developing an NLP-inspired classifier for experimental data with TensorFlow.
- Mentored student through the development of an AdaBoost decision tree classifier with scikit-learn which achieved 80% accuracy on events missed by standard techniques.

Visualization and monitoring of big data movement

- Enabled critical monitoring of a data pipeline moving up to 20 TB/day to data centers around the world by building a user-facing interactive dashboard with Plotly Dash.

UNIVERSITY OF WASHINGTON | Graduate Research Assistant

September 2013–August 2019 | Seattle, Washington

Distributed computing

- Simulated a terabyte-scale detailed model of a particle detector with 100s of components using job scheduling on supercomputers. (Python, C++, bash)

Complex optimization and statistical analysis

- Identified multiple candidate sources of radiation for a particle detector using complex optimization and advanced statistics.
- Calculated key parameters for the measurement of a rare physical process, published in Physical Review Letters (h5-index: 207).

Independent Projects

CAISO POWER DEMAND FORECASTING | Python, SARIMAX

January 2023

- Identified hourly and daily variation in power generation through exploratory data analysis and data visualization.
- Created a SARIMAX forecast for the dispatchable power required to supply grid demand at 1 hr frequency with <4% mean squared error.

Awards and Selected Publications

- Climatebase Fellow, Cohort 3, May 2023-Present
- **M. Buuck**, A. Mishra, E. Charles, N. Di Lalla, O. Hitchcock, M. E. Monzani, N. Omodei, T. Shutt. *Low-Energy Electron-Track Imaging for a Liquid-Argon Time-Projection-Chamber Telescope Concept using Probabilistic Deep Learning*. The Astrophysical Journal. 942 77 (2022). https://doi.org/10.3847/1538-4357/aca329
- Kenneth Bloom, Veronique Boisvert, Daniel Britzger, **Micah Buuck**, Astrid Eichhorn, Michael Headley, Kristin Lohwasser, Petra Merkel. *Climate Impacts of Particle Physics*. 2022. arXiv:2203.12389

Skills

PROGRAMMING

Expert:
C++ • Python

Experienced:
bash • Cython • LaTeX

Familiar:
SQL • C • HTML • CSS • R

LIBRARIES/FRAMEWORKS

NumPy • Pandas • matplotlib
Plotly Dash • scikit-learn
TensorFlow • statsmodels
numba • Jekyll • Jax

TOOLS/PLATFORMS

git • SLURM • Redis
Docker • Rancher

Education

UNIV. OF WASHINGTON

Doctor of Philosophy: Physics
Sep 2012-Aug 2019 | Seattle, WA

SAINT OLAF COLLEGE

Bachelor of Arts in Physics, Mathematics, and Statistics
Sep 2008-May 2012 | Northfield, MN

References

Tom Shutt
Professor of Astrophysics and Particle Physics
SLAC National Accelerator Laboratory
tshutt@slac.stanford.edu

Jason Detwiler
Associate Professor of Physics
University of Washington
jasondet@uw.edu

Maria Elena Monzani
Lead Scientist
SLAC National Accelerator Laboratory
monzani@slac.stanford.edu