

Micah J. N. Buuck

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Summary

I am a physicist with extensive software and data science skills looking to break into the field of climate tech

Skills

Big data analysis, machine learning (scikit-learn, Tensorflow/Keras), Python, Docker containers, git, Plotly dash, C++, collaborative research in both small and large groups

Professional experience

Research Associate: Particle physics · SLAC National Accelerator Laboratory, Menlo Park, CA

August 2019 – Present

- **Coordination and monitoring of big data movement:** My experiment deals with petabytes of data, which must be synchronized at data centers in both the US and UK. I worked on the data movement team and created a system to monitor the health and reliability of data transfer and synchronization in real time. It includes a web component implemented in Python using the Dash library and Flask and is deployed remotely via the Rancher framework (Kubernetes).
- **Big Data Science:** The experiment produces a large and rich dataset, which requires significant effort by over 100 scientists across the globe for full analysis. I have implemented multiple algorithms and complex statistical analyses in both C++ and Python, including a plugin using the ONNX framework to enable machine learning analyses trained in Python to be used in our C++ based production environment.
- **Data science with Machine Learning:** Our dataset presents significant opportunities for machine-learning-based analyses. I have experience training decision tree, clustering, and deep learning models in both Scikit-learn and TensorFlow/Keras, including with GPUs
- **Communication of concepts and results:** Communication and coordination between scientists is critical to the success of a large project. I have extensive experience preparing presentations and communicating results and findings to different people with a broad range of familiarity with my research. This includes both presentations to the entire scientific collaboration, public and conference talks, and mentoring undergraduate and master's students.

Research Assistant: Nuclear physics · University of Washington, Seattle, WA

March 2014 – August 2019

- **Simulation of large datasets with supercomputers:** My graduate dissertation work required the generation of terabytes of particle physics simulations. I used a combination of

my own Python code, my own modifications to existing C++ software packages, and shell scripts to run jobs on what was at the time the 5th most powerful supercomputer in the world, using shell scripts and the SLURM job scheduler.

- **Complex optimization and statistical analysis:** I built a set of software tools in Python to solve a complex optimization problem using data from the experiment I worked on, and the dataset I simulated. I made use of Cython, numba, and NumPy to obtain the performance needed to do the analysis, since native Python can be quite slow.
- **Development of collaborative C++ software packages:** I made significant contributions to a primarily C++ codebase, and have extensive experience working with git, GitHub, and GitLab

Education

PhD in Physics · University of Washington, Seattle, WA

September 2012 – August 2019

Dissertation: [A Radiogenic Background Model for the MAJORANA DEMONSTRATOR](#)

GPA: 3.83

BA in Physics, Mathematics, and Statistics · St. Olaf College, Northfield, MN

September 2008 – May 2012

GPA: 3.83, Magna Cum Laude

Selected Publications

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”. **2022**. arXiv:2207.07805

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

Awards

2016: Travel Award from APS Division of Nuclear Physics to attend the 2017 APS April Meeting

2016: Selected to attend 2016 National Nuclear Physics Summer School

2015: Travel Award from APS Forum on Graduate Student Affairs to attend the 2015 SLAC Summer Institute: The Universe of Neutrinos

2008 – 2012: St. Olaf Presidential Scholarship