

NOAH ZIPPER

📍 Denver, CO 📞 (914) 815-4417 ✉️ noahzipper@gmail.com 🔗 nzipper.github.io in noah-zipper 🌐 nzipper

EDUCATION

University of Colorado, Boulder
Ph.D. - Physics (3.88 GPA)

📅 2025

Relevant Coursework

- High performance/throughput computing, machine learning, neural networks and deep learning, SQL/NoSQL databases, stream processing, datacenter scale computing, Markov processes, algorithms

University of Michigan, Ann Arbor
B.S. - Physics (3.74 GPA)

📅 2018

EXPERIENCE

University of Colorado, Boulder / CMS Experiment, CERN
📍 Boulder, CO / Geneva, Switzerland

Postdoctoral Researcher

📅 May 2025 – Present

- Developed MLOps CI/CD pipelines for automated training, hardware deployment, and monitoring of ML models in high-throughput physics environments, leading to faster deployments and robust model improvement metrics
- Guided research projects and mentored multiple junior graduate and undergraduate students

Graduate Researcher

📅 June 2019 – May 2025

- Built unsupervised deep learning anomaly detection algorithms for streaming data on FPGAs to achieve nanosecond latency in event selection ^[1,3,4]
- Developed particle tracking algorithms in Vivado HLS for microsecond-speed hardware reconstruction and used ML-driven multivariate classification and likelihood fits to measure particle identification efficiencies, enabling high-precision tests of fundamental theories for rare B particle decays ^[2,5]
- Designed scalable data acquisition system for future hardware upgrades, aimed at 100% rejection kHz-scale stream of background noise while preserving rare signal processes^[6]
- Collaborated with $\mathcal{O}(100)$ researchers across US, Europe, and Asia in a fast-paced, results-driven environment, leading weekly data-driven discussions, presenting technical updates, and contributing to high-impact decision-making on large-scale projects

Lawrence Livermore National Laboratory
📍 Livermore, CA

Summer Research Scholar

📅 June 2018 – August 2018

- Developed Bayesian estimation and Markov Chain Monte Carlo models in MATLAB for photon temperature estimation and hardware diagnostics
- Analyzed X-ray spectra from relativistic electron plasmas to model photon energy distributions in laser wakefield acceleration experiments

ACHIEVEMENTS

- American Physical Society 4 Corners Harry Lustig Award Finalist for outstanding graduate research (2024)
- CU Boulder GPSG Student Travel Grant Recipient (2024)
- National Science Foundation GRFP Honorable Mention (2020)
- University of Michigan James B. Angell Scholar (2018)

SKILLS

- **Programming Languages:** Python, C++, Bash, SQL, MATLAB, LaTeX, Mathematica, HLS, VHDL
- **Programming Tools:** Numpy, Pandas, SQLite, MongoDB, Git, GitLab CICD/GitHub Actions, Docker/Singularity, Dask, Apache Spark, Matplotlib/Seaborn, Jira
- **Machine Learning Packages:** scikit-learn, PyTorch, Keras/QKeras, Tensorflow, XGBoost, MLFlow, Weights & Biases, hls4ml

SELECTED PUBLICATIONS & TALKS

1. N. Zipper, *Real-Time Anomaly Detection in the CMS Experiment*, Fast Machine Learning for Science Conference 2024, West Lafayette, Indiana, USA, October 2024.
2. N. Zipper, *Precision Flavor Measurements and Real-Time Anomaly Detection at the CMS Detector*, APS 4 Corners Meeting 2024, Flagstaff, Arizona, USA, October 2024.
3. CMS Collaboration, “2024 Data Collected with AXOL1TL Anomaly Detection at the CMS Level-1 Trigger,” *CMS Detector Performance Summary* (2024), cds.cern.ch/record/2904695.
4. N. Zipper, *Testing a Neural Network for Anomaly Detection in the CMS Global Trigger Test Crate during Run 3*, Topical Workshop on Electronics for Particle Physics 2023, Geremeas, Sardinia, Italy, October 2023.
5. CMS Collaboration, “Search for electroweak production of charginos and neutralinos at $\sqrt{s} = 13$ TeV in final states containing hadronic decays of WW, WZ, or WH and missing transverse momentum,” *Phys. Lett. B* **842**, 137460 (2023), arXiv:2205.09597.
6. FACET Collaboration, “FACET: a new long-lived particle detector in the very forward region of the CMS experiment,” *Journal of High Energy Physics* **6** (2022) 110, doi:10.1007/jhep06(2022)110.

PROJECTS

Kaggle March Machine Learning Mania

- Predicted matchup outcomes in the NCAA men's and women's basketball tournament using deep learning tools, as well as analyzed historical performances of college programs over time to project impact on future performance (GitHub repo)

COURSES & CERTIFICATIONS

- MongoDB Python Developer Track: MongoDB University