Noah Zipper

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Education

University of Colorado Boulder — Boulder, CO
Ph.D. in High-Energy Physics, Advisor: Keith Ulmer — 2022–Current

University of Colorado Boulder — Boulder, CO
M.S. in High-Energy Physics, Advisor: Keith Ulmer — 2019–2022

University of Michigan Ann Arbor — Ann Arbor, MI
B.S. in Physics, GPA: 3.74/4.00 — 2014–2018

Experience

University of Colorado Boulder — Boulder, CO
Graduate Researcher for CMS Group — Summer 2019–Current

- Measuring lepton flavor anomalies with CMS detector data
- Developing nanosecond-fast machine learning algorithm implementations on FPGAs for data selection
- Designing efficient data selection (trigger) systems for future long-lived particle detector proposal
- Optimized real-time particle track identification pipeline using HLS for CMS upgrades
- Calculated heavy flavor particle-tagging efficiencies for supersymmetry search

University of Michigan — Ann Arbor, MI
Undergraduate Researcher for ATLAS Group — Fall 2015 –Winter 2018

- Validated FPGA signal performance circuits using VHDL for upgrades to ATLAS muon spectrometer
- Performed thermal testing for detector cooling enclosures
- Optimized isolation scale factors for photon identification in electromagnetic calorimeter

Lawrence Livermore National Laboratory — Livermore, CA
Summer Research Scholar — Summer 2018

- Analyzed X-Ray spectra of relativistic electron plasmas to study laser wakefield accelerators
- Used MATLAB to build models for calculating photon temperatures

CERN — Geneva, Switzerland
Research Intern — Winter 2018

- Background estimation for ATLAS analysis of Higgs boson with associate top quark
- Calculated signal purities for Higgs boson coupling categories using a 2D Sideband method

Selected Publications

1. A. Tumasyan *et al.* [CMS Collaboration], "Search for higgsinos decaying to two Higgs bosons and missing transverse momentum in proton-proton collisions at $\sqrt{s} = 13$ TeV," JHEP **2022**, 14 (2022) [arXiv:2201.04206 [hep-ex]].

2. CMS and ATLAS Collaborations, "Snowmass White Paper Contribution: Physics with the Phase-2 ATLAS and CMS Detectors," CERN Report, CMS-PAS-FTR-22-001, ATL-PHYS-PUB-2022-018 (2022).

3. A. Tumasyan *et al.* [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 [hep-ex]].

4. CMS Collaboration, "Combined search for electroweak production of winos, binos, higgsinos, and sleptons in proton-proton collisions at *sqrts* = 13 TeV," CMS-PAS-SUS-21-008 (2023), [https://cds.cern.ch/record/2853345].

5. A. Tumasyan *et al.* [CMS Collaboration], "Anomaly Detection in the CMS Global Trigger Test Crate for Run 3," CMS Detector Performance Summary (2023), [https://cds.cern.ch/record/2876546].

Talks

1. N. Zipper, *Search for Electroweak SUSY in Hadronic Final States with the CMS Detector*, The XXIX International Conference on Supersymmetry and Unification of Fundamental Interactions, University of Ioannina, Ioannina, Greece, June 2022.

2. 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 (TWEPP) 2023, Geremeas, Sardinia, Italy, October 2023.

Skills

- **Programming Languages:** Python, C++, Shell Scripting, MATLAB, some HTML & CSS
- **Python Libraries:** Numpy, Pandas, Scikit-Learn, TensorFlow (Keras), hls4ml, SQLite, Dask, ROOT
- **Programmable Logic/Hardware:** HLS and VHDL for FPGAs, Soldering
- **Operating Systems:** MacOS, UNIX
- **Other Software Tools:** Git, Docker, LaTeX, Microsoft Office, Adobe Illustrator

Languages

- **English:** Mother tongue
- **Italian:** Conversational proficiency

Teaching

- **Teaching Assistant** at CU Boulder — Fall 2019
  General Physics 1
- **Teaching Assistant** at CU Boulder — Spring 2020
  Experimental Physics 1
- **Teaching Assistant** at CU Boulder — Fall 2020
  Experimental Physics 2

Awards

- NSF GRFP Honorable Mention — 2022
- Student Travel Grant, APS DPP — 2018
- James B. Angell Scholar — 2018
- Poster presentation, US ATLAS Workshop — 2017
- University Honors — 2014, 2015, 2017