Jingjing Pan

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POSITION

Humboldt fellow, **Karlsruhe Institute of Technology** 2025.10.1 - present

Research Affiliate, **Lawrence Berkeley National Lab** 2022.5.1 - 2025.8.31

EDUCATION

Ph.D. in Physics, **Yale University** 2018.9.1 - 2024.12.19

- Dissertation: *Exploring the Standard Model and Beyond through the Lens of Jet Substructure and Deep Learning with the ATLAS Experiment*
- Advisory Committee: Profs. Keith Baker, Helen Caines, Sarah Demers, Ian Moult, Benjamin Nachman

B.S. in Physics, Math, **Penn State University** 2015.9.1 - 2018.8.21

- GPA: 3.95/4.00
- Advisor: Prof. Mikael Rechtsman

RESEARCH

The ATLAS Experiment at the LHC 2019-present

- **First measurement of jet track functions**, Analysis Contact
  - First application of an unbinned, high-dimensional unfolding method OmniFold for moment measurements
  - Developed the analysis to also first measure the renormalization group flow of jet track functions
  - **Responsible for:** sample production, statistical analysis, plotting framework, physics interpretation, analysis strategy, drafts editing
- **Deep learning techniques**
  - Improved the precision, robustness, efficiency of OmniFold and deployed it in the full ATLAS Run2 dataset
  - Led the invention of a normalizing flow-based method Neural Posterior Unfolding, which can give fast access to the full posterior via amortized learning
  - Experienced with the LBNL national supercomputing facility
- **Hidden sector search via the Higgs portal**, Analysis Contact
  - **Responsible for:** signal MC validation, sample production framework, cutflow studies, plotting framework development

- **Jet calibration for the HL-LHC**
  - Performed pile-up mitigation and jet energy scale & resolution calibration, implemented for ATLAS Phase 2 Upgrade studies

The H1 Experiment at HERA 2023-present

- **First analysis of unfolding full phase space of H1 data**
  - First measurement of all particles in the H1 data
  - First measurement of Energy Correlators beyond the laboratory frame

Computational Photonics 2017-2019

- **Trapping light in an open system**
  - Predicted a photonic bound state enabled by the symmetries of an open system (that can be used for new efficient laser).

AWARDS/ FELLOWSHIPS

- Main contributor (7/9 pages) of the Yale High Energy Group Department of Energy (DOE) grant (for Baker Group 2023-26 fiscal years) 2021 Dec.
- Research affiliate with the ML4HEP group at LBNL 2021-present
- US ATLAS ATC Research Award (for visit at LBNL) 2022
- Lead Teaching Fellowship (Yale Physics) 2019
- Yale Early Start Research Grant 2018
- Downsbrough Chair in Physics Research Award 2018
- Department of Physics Teaching Award (1st undergrad recipient) 2018
- Bert Elsbach Scholarship (for academic performance) 2017
- Sigma Pi Sigma (Physics honor society) 2017
- Dean's List 2015-2018

INVITED / PLENARY TALKS

Simulation-based inference for particle physics (talk) AI@LHC, 2026.5.26

Measurement of Jet Track Functions with OmniFold in ATLAS Run 2 Data (talk) ATLAS Machine Learning Forum, 2025.2.6

Measurement of jet track functions with OmniFold-based binning corrections with the ATLAS experiment (talk) ML4Jets, Paris, 2024.11.7

Jet substructure measurements in multijet production with the ATLAS experiment (talk) BOOST, Genoa, 2024.7.30

Enabling Specialized Unfolding Methods with Modern Deep Learning Techniques (talk) France-Berkeley PHYSTAT Workshop, Paris, 2024.6

Probing higher order DGLAP evolution using OmniFold and Energy Correlators (talk) BOOST, Berkeley, 2023.8.2

SEMINARS

Improving and Extending Precision Jet Substructure Measurements with Deep Learning Techniques — LBNL HEP Seminar, 6/2024

Improving and Extending Precision Jet Substructure Measurements with Deep Learning Techniques — Yale Wright Lab Seminar, 04/2022

Overview of Jet Calibration Techniques on ATLAS (session co-chair) — Hadronic Calibration Workshop, 08/2021

TEACHING

Yale Univeristy

- Mathematical Methods — Fall 2022
  - Guest lecture on Group Theory (notes)
- Nuclear and Particle Physics — Spring 2022
  - Guest lecture on research in ML techniques for jet studies
- Classical Mechanics — Fall 2021
  - Guest lecture on Path Integrals (notes)
- Introductory Physics Lab — Fall 2018-Spring 2020
  - Lead Teaching Fellow
  - Designed exam rubrics, organized grading, facilitated exam reviews and lab sessions, graded reports

Pennsylvania State University

- Statistical Mechanics — Spring 2018
  - Led recitations and reviews, helped with assignments
- Introductory Modern Physics — Spring 2018
  - Helped with assignments and held reviews
- Theoretical Mechanics — Fall 2017
  - Wrote psets and led in-class practice sessions

MENTORSHIP

Yale Univeristy

- Nathan Suri (graduate student, formerly at Caltech) — 05/2022-
  - *ML Pileup Mitigation for HL-LHC*
- Neal Ma (undergrad in Physics & Computer Science) — 04/2022-
  - *Optimizing step2 of OmniFold*
- Vinicius Da Silva (undergrad, now at Fermilab) — 10/2020-07/2021
  - *Search for $H \to Za \to 4l$ $(l = e, \mu)$ in ATLAS Run2 data*
- Asmaa Aboulhorma (grad student in Morocco, on Z_d) — 09/2021-05/2022
- Zainab Soumaimi (grad student in Morocco, on Z_d) — 06/2021-01/2022

LANGUAGES/ SKILLS

Coding: Python, C++, Scheme (functional), MATLAB

Tools: GNU/Linux, ROOT, NumPy, Uproot/Awkward, pandas, TensorFlow, Keras, PyTorch (basic), Matplotlib, LaTeX, Delphes, Mathematica, Horovod, COMSOL, MPB, MEEP

Languages: English (proficient), Mandarin (native), Japanese (intermediate), Cantonese (intermediate)

OUTREACH/ SERVICE

- Reviewer, Machine Learning for Physical Sciences (ML4PS) Workshop (Neural Information Processing Systems (NeurIPS) Conference, 2024)
- Organizer, ATLAS Group Journal Club (Yale, 2022-2024)
- Moderator, Kimball Smith Series (Yale Jackson School of Global Affairs, 2023)
- TA, US ATLAS Machine Learning Training (LBNL, 2023)
- Mentor, Yale Women in Physics (2019-22)
- Reviewer, Proceedings A
- Organizer, Conference for Undergraduate Women in Physics (Yale, 2020)
- Attendant, Conference for Undergraduate Women in Physics (Princeton, 2017; Columbia, 2018)
- Volunteer, Science Booth Outreach at central PA Arts Fest (2017)