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Toronto, ON, Canada
(Relocation Flexible)

Yifei Han

Physicist / Data Scientist

Google Scholar Profile
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SKILLS

Tools and Languages	C++, Python, Git, \LaTeX , Valgrind, Artificial Intelligence, Deep Learning
Distributed Computing	HTCondor, Linux, Rucio, AWS, Docker
Productivity	Agile Methodologies, Jira, Slack
Quantitative Research	Probability Modelling, ROOT, ROOFIT
Communication	English (native), Chinese (native), Japanese (JLPT N2)

EXPERIENCE

Researcher - Data Analysis

September 2017 - 2022

ATLAS Experiment | CERN

Toronto, Canada

ATLAS is a general-purpose particle physics experiment at the Large Hadron Collider at CERN designed to answer questions about the fundamental forces of nature. As of 2022, it has over 5000 collaborating members from 181 institutions in 42 countries.

- Led efforts in a team of 10 to improve data quality and increased the expected statistical significance from 99.4% to over 99.9999999% (4σ to 6.5σ), vastly outperforming the goal of 5σ set by the collaboration
- Corrected for mis-modelling in physics simulation with data-driven methods, and calibrated data objects to correct for biases and errors in the detector
Software used include C++, python, Git, and ROOT (similar to R)
- Skim data sets for final analysis use over distributed computing resources, from 1000+ TB to less than 10 GB
Software used include the LHC computing grid (similar to AWS) and rucio (a scientific data management tool)
- Optimized deep neural nets with feature engineering and recursive feature elimination, increasing signal acceptance by a factor of 3 from 543.05 events to 1713.2 events
- Led a team of 5 scientists in the development of a probability model with 3 observed data sets and 100+ nuisance parameters
- Collaborated closely with other project teams to ensure compatibility in analysis methods and prepared for combined statistical interpretations across multiple projects
- Documented and edited over 500 pages of notes for internal use, and presented monthly status updates to lead physicists using a variety of data visualization tools
- Addressed different requirements from all collaborating institutions and iterated analysis methods to satisfy all 3000 scientific authors whose names will appear on the final paper
- Communicated research results and findings to non-specialists in outreach talks and events

Developer - Detector Simulation

August 2017 - September 2021

ATLAS Experiment | CERN

Toronto, Canada

- Used a multi-thread physics engine ([acts](#)) to simulate detector response to charged particles
- Optimized physics simulation time with a library of pre-processed detector responses as a function of input parameters
Software used include C++, python, Docker, Valgrind, and Git CI/CD
- Improved simulation time by a factor of 10, from 28.1s/event to 2.82s/event

Teaching Assistant

September 2016 - September 2021

University of Toronto

Toronto, Canada

- Ran weekly tutorials, hosted office hours, and graded exams for undergraduate physics courses of up to 150 students
- Topics taught include mechanics, electromagnetism, quantum mechanics, and relativity

EDUCATION

PhD in Physics, University of Toronto

September 2016 - 2022

Bachelor of Science in Physics and Mathematics, University of California, Los Angeles

September 2012 - June 2016

SELECT PUBLICATIONS

As an ATLAS author, I have my name on every published ATLAS paper. I contributed significantly to these following publications:

ATLAS Collaboration, Measurement of fiducial and differential W^+W^- production cross-sections at $\sqrt{s} = 13$ TeV with the ATLAS detector. The European Physical Journal C, 79(10), Oct 2019. [arXiv:1905.04242\[hep-ex\]](#)

ATLAS Collaboration, Search for electroweak diboson production in association with a high-mass dijet system in semileptonic final states in pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector. Phys. Rev. D 100, 032007. [arXiv:1905.04242 \[hep-ex\]](#)

ATLAS Collaboration, The Fast Simulation Chain in the ATLAS experiment. EPJ Web Conf. 251 03012 (2021). DOI:

[10.1051/epjconf/202125103012](https://doi.org/10.1051/epjconf/202125103012)

HOBBIES

- Music production: making original music and music videos since 2018, with works published on [SoundCloud](#) and [bilibili.tv](#)