(647) 671-3764
Toronto, ON
(Relocation Flexible)

Yi Fei Han

Physicist / Data Scientist

Google Scholar
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Skills

Tools and Languages	C++, Python, Git, LaTeX, Valgrind
Distributed Computing	HTCondor, Linux, Rucio, AWS, Docker
Quantitative Research	Probability Modelling, ROOT, ROOFIT
Communication	English (native), Chinese (native), Japanese (JLPT N1)

Technical Experience

Researcher - Data Analysis **Sept 2017 —**
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.

- Lead efforts in team of 10 to improve data quality and increased the expected statistical significance from 99.4% to over 99.9999999% (4σ to 6.5σ)
- 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 NNs with feature engineering and recursive feature elimination, increasing signal acceptance by a factor of 3 from 543.05 events to 1713.2 events
- Lead a team of 5 scientists on the development on a probability model with 3 observed data sets and 100+ nuisance parameters
- Documented and edited over 500 pages of notes for internal use, and presented monthly status updates to lead physicists

Developer - Detector Simulation **Aug 2017 – Sept 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 **Sept 2016 — Sept 2021**
University of Toronto *Toronto, Canada*

- Ran weekly tutorials and host office hours for undergraduate physics courses
- Graded lab reports, essays, assignments and exams, for classes of up to 150 students
- Topics taught include mechanics, electromagnetism, quantum mechanics, and relativity

Education

PhD in Physics, *University of Toronto* 2022
Bachelor of Science in Physics and Mathematics, *University of California, Los Angeles* 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 $\sqrt{s} = 13\mathrm{TeV}$ 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

Hobbies

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