GABRIEL MADIGAN, PhD

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EXECUTIVE SUMMARY

I have 10 years of experience as a data scientist, where I have helped international scientific collaborations analyze terabytes of data and publish results in peer-reviewed journals. I have led a search for new physics at the highest-energy particle accelerator in the world by developing Python-based data processing frameworks, building and training ML models, and applying statistical methods that resulted in a peer-reviewed journal publication I co-authored. My current projects involving ML technologies include natural language processing and computer vision.

EDUCATION

Northeastern University *Boston, MA*
PhD, MSc, Department of Physics *Sept 2016 – May 2023*

Doctoral thesis: *A search for leptoquarks decaying to muons and bottom quarks*

University of Massachusetts Amherst *Amherst, MA*
BSc, Department of Physics *Sept 2013 – May 2016*

TECHNICAL SKILLS

Languages - Python, SQL, C++, Git
Tools - PyTorch, Keras, Scikit-learn, Pandas, NumPy, SciPy, Matplotlib, Jupyter Notebooks, SpaCy, Gensim, ROOT
Machine Learning - Deep learning (NN, RNN, LSTM, CNN), classification, regression, decision trees, gradient boosting
Mathematics - Probability and statistics, partial differential equations, linear algebra

WORK EXPERIENCE

Research Physicist *Sept 2016 – July 2023*
CMS Collaboration *Geneva, Switzerland*

- Searched for new fundamental physics alongside 4000 scientists from over 50 countries by analyzing terabytes of record-breaking high-energy particle collisions at CERN's Large Hadron Collider
- Co-authored a research paper constraining searches for a theorized elementary particle by placing the most stringent lower bound to date on the particle's mass at a 95% confidence level
- Enhanced the sensitivity of an analysis to new physics by 10% after training machine learning models on terabytes of noisy particle collision data
- Presented research at international conferences and participated in feedback cycles as both a reviewer and author of collaboration papers seeking publication

Teaching Assistant *Sept 2016 – May 2018*
Northeastern University College of Science *Boston, MA*

- Led 40 undergraduates through weekly four-hour-long experimental physics labs covering physics theory, experimental techniques, and statistical analysis

NSF Undergraduate Research Fellow (REU) *May 2015 – August 2015*
Telescope Array *Salt Lake City, UT*

- Contributed research into the origins and composition of ultra-high-energy cosmic rays by characterizing atmospheric conditions used in a publication, resulting in an uncertainty estimate of 8.5% on cosmic ray energy measurements
- Operated the Telescope Array detectors for data acquisition of cosmic ray showers and identified damaged detectors on a three-person team during a 24-hour on-site shift

Undergraduate Research Assistant *Jan 2014 – May 2016*
ATLAS Collaboration *Amherst, MA*

- Searched for new fundamental physics alongside 6000 scientists from over 40 countries by analyzing terabytes of record-breaking high-energy particle collisions at CERN's Large Hadron Collider
- Tested exotic theories predicting extra spatial dimensions by placing lower bounds on the energy scale of these phenomena and developed an analysis framework in C++ to process recorded collision data