Nathan E. Mirman

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PROFILE

Highly motivated PhD with a strong quantitative background, broad scientific knowledge, and multiple years of experience in analyzing large datasets. Excellent communication skills. Experienced in utilizing statistical models and machine learning techniques to develop rigorous, creative solutions to challenging problems.

EDUCATION

Cornell University, Ithaca, New York   **2010 − 2017**
MS & PhD Experimental High Energy Physics

University of Minnesota, Minneapolis, Minnesota   **2006 − 2010**
BS Physics & Mathematics, *summa cum laude*

TECHNICAL SKILLS

Analysis: Statistical data analysis, machine learning, data mining, statistical inference and modeling, hypothesis testing, maximum likelihood estimation, optimization, regression analysis.
Programming: C/C++, Python, SQL, NumPy, Pandas, scikit-learn, ROOT.

RESEARCH EXPERIENCE

Cornell University, Ithaca, New York   **2010 − 2017**
Graduate Researcher
- Lead a research program in top quark physics and developed analysis tools for exotic particle searches using data from the Large Hadron Collider at CERN.
- Analyzed 50 TB datasets containing billions of proton-proton collisions.
- Developed over 10,000 lines of C++ code for private analysis and collaboration-wide use.
- Performed statistical modeling and maximum likelihood estimation with numerical optimization to determine the mass of the top quark.
- Employed a Gaussian process machine learning technique to model probability density functions obtained from Monte Carlo simulation.
- Carried out sensitivity studies using Fisher information and statistical bootstrapping techniques.
- Developed and maintained a classification algorithm used by exotic particle searches to identify rare signal events in high-rate background scenarios.
- Nominated as contact person for the collaboration's top quark analysis group. Provided data analysis recommendations for more than 50 ongoing analyses, reviewed analysis documents and preliminary results, and contributed to projections of future performance.
- Contributed to one first-author, and two co-author publications. Gave talks and poster research presentations at major international conferences, workshops, and university seminars.

University of Minnesota, Minneapolis, Minnesota   **2008 − 2010**
Undergraduate Researcher
- Conducted sensitivity studies for an analysis of Large Hadron Collider data.
- Proposed a classification algorithm for particle identification in a challenging detector region.

HONORS & AWARDS

Hagstrum Award in Physics, University of Minnesota   **2010**

Edmond G. Franklin Scholarship in Physics, University of Minnesota   **2009 − 2010**

Ella Thorpe Scholarship in Mathematics, University of Minnesota   **2009 − 2010**

SELECTED PUBLICATIONS

[1] CMS Collaboration, "Measurement of the top quark mass in the dileptonic $t\bar{t}$ decay channel using the mass observables $M_{b\ell}$, M_{T2}, and $M_{b\ell\nu}$ in pp collisions at $\sqrt{s} = 8$ TeV," arXiv:1704.06142. *Submitted to Physical Review D.*

[2] CMS Collaboration, "Performance of the CMS missing transverse energy reconstruction in pp data at $\sqrt{s} = 8$ TeV," *Journal of Instrumentation* **10**, 02006 (2015).

[3] CMS Collaboration, "Measurement of masses in the $t\bar{t}$ system by kinematic endpoints in pp collisions at $\sqrt{s} = 7$ TeV," *European Physical Journal C***73** 2494 (2013).