

# Michael Cooke, Ph.D.

*Particle Physicist & Data Scientist*

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## Profile

- Scientist Perform rigorous scientific research on very large data sets and interpret results
- Programmer Significant experience with object-oriented coding, algorithms, scripting and Unix
- Writer Excellent communication skills, clear technical writing, exciting public articles
- Educator Ability to translate complex research techniques and results for the lay audience
- Focused Self-starter works well independently, as part of a team, and when under pressure

## Education

- 2008 **Ph.D. Physics**, *Rice University*, Houston, TX  
Received Wilson Award for most outstanding thesis in the Physics & Astronomy Department
- 2005 **M.S. Physics**, *Rice University*, Houston, TX
- 2001 **B.S. Physics**, *Carnegie-Mellon University*, Pittsburgh, PA  
Graduated with Honors and accepted into *Sigma Xi*, The Scientific Research Society

## Experience

- 2008–Present **Research Associate**, *Fermi National Accelerator Laboratory*, Batavia, IL  
Calculate, interpret and present complex results in meaningful way to diverse range of groups
  - Analyze very large data set of over 10 billion particle collisions for evidence of the Higgs boson
  - Determine quantitative scientific conclusions based on rigorous statistical analysis, implementing both Bayesian and frequentist statistical analysis approaches and multivariate analysis techniques
  - Document results for internal review, scientific publication, and public dissemination to both scientific community and general public
  - Perform numerous public presentations at conferences, university seminars, and local schools
- 2001–2008 **Graduate Student**, *Rice University*, Houston, TX  
Analyzed particle physics data and supported highly specialized hardware and software systems
  - Performed precise fundamental physics measurements and tested validity of physics models
  - Developed and maintained software to monitor live performance of particle collider operations
  - Administrated local Unix computing cluster for Rice University
- 2000–2001 **Undergraduate Researcher**, *Carnegie-Mellon University*, Pittsburgh, PA  
Research in hydrodynamics, including development and execution of experiments and data analysis
- 1997–1999 **Technical Aide**, *Mitretek Systems*, McLean, VA  
Implemented, automated, and quantitatively demonstrated improvement of a new method for estimating crime rates for the Federal Bureau of Investigation Uniform Crime Report

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## Leadership

- 2009–Present **Lead algorithms and analysis groups within the DZero collaboration**
- Direct efforts of a team of analyzers focused on isolating a small signal from enormous background
  - Oversee development and release of code critical to entire collaboration's data analysis
  - Conceive and implement improvements to fundamental algorithms used by collaboration
- 2010–Present **Mentor undergraduate and high-school students in physics analysis**  
Supervise student research and organize student efforts into creating new analysis aimed for publication
- 2010–Present **Dean of the *University of DZero* scientific lecture series**  
Organize lectures aimed at furthering the education of particle physicists ([www-d0.fnal.gov/UD0](http://www-d0.fnal.gov/UD0))
- 2010–2012 **Elected to Fermilab Users Executive Committee and appointed Quality of Life Chair**  
Represented user community to laboratory directorate, organized new programs and mediated disputes

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## Communication

- 2004–Present **Primary author of eleven peer-reviewed scientific publications, including:**
- "Search for the standard model Higgs boson in  $\ell\nu$ +jets final states in  $9.7 \text{ fb}^{-1}$  of  $p\bar{p}$  collisions with the D0 detector", Accepted by Phys. Rev. D [arXiv:1301.6122]
  - "Evidence for a particle produced in association with weak bosons and decaying to a bottom-antibottom quark pair in Higgs boson searches at the Tevatron," Phys. Rev. Lett. 109, 071804
  - "Limits on anomalous trilinear gauge boson couplings from  $WW$ ,  $WZ$  and  $W\gamma$  production in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96 \text{ TeV}$ ," Phys. Lett. B 718, 451
- 2006–Present **Present results at numerous scientific conferences and university seminars, including:**
- "Measurement of Higgs Boson Couplings and Properties at the Tevatron," for the CDF and DZero Collaborations at the 48<sup>th</sup> Rencontres de Moriond on QCD, La Thuile, Italy, Mar. 10, 2013
  - "The Higgs Boson and Beyond," Public lecture and colloquium at Missouri State University, Springfield, MO, Feb. 13, 2013
  - "Celebrating 30 Years of K-12 Educational Programming at Fermilab," presented with M. Bardeen at the Meeting of the Division of Particles and Fields of the APS, Providence, RI, Aug. 10, 2011
- 2011–Present **Author of *Result of the Week* column in the online periodical *Fermilab Today***  
Translate recent scientific results for the general public on a biweekly basis ([www.fnal.gov/today](http://www.fnal.gov/today))
- 2011–2012 **Educated congressional representatives on importance of funding basic research**  
Promoted science in Washington, DC, as a member of the Fermilab Users Executive Committee

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## Computer Skills

- OS Windows XP/Vista/7, Mac OS X, Local administrator for Unix/Linux cluster
- Software Microsoft Word, Excel and PowerPoint, OpenOffice Suite, L<sup>A</sup>T<sub>E</sub>X
- Coding Significant experience with C++, Python and Unix shell scripting, interest and ability to learn new languages quickly
- Analysis Significant experience the ROOT statistical analysis framework, familiarity with Mathematica

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## Additional Information

- Award Received the 2010 Fermilab Director's Award for Exceptional Volunteer Service to Fermilab K-12 Education Programs
- Outreach Volunteer for scientific community outreach, including demonstrations in classrooms, at open house events, take your daughters and sons to work day, and at national science expos