

# CURRICULUM VITAE

Mark Charles Kruse

Fuchsberg-Levine Family Professor of Physics  
Department of Physics, Duke University, Durham, NC 27708-0305  
Web: <http://www.phy.duke.edu/~mkruse/>  
Nationality: New Zealand (U.S. permanent resident)

---

## PROFESSIONAL

**2014 - present**, Fuchsberg-Levine Family Professor of Physics, Duke University.  
**2012 - 2014**, Fuchsberg-Levine Family Associate Professor of Physics, Duke University.  
**2007 - 2012**, Associate Professor of Physics (with tenure), Duke University.  
**2001 - 2007**, Assistant Professor of Physics, Duke University.  
**1996 - 2000**, Postdoctoral Fellow, University of Rochester (New York).  
**1990 - 1996**, Research Assistant, Purdue University (Indiana, USA).  
**1989 - 1990**, Scientist, National Radiation Laboratory, Christchurch, New Zealand.

---

## EDUCATION

**Ph.D.**, Purdue University, 1996 (Particle Physics). Thesis: “Observation of  $t\bar{t}$  Production in the Dilepton + Jets Decay Channel from Proton-Antiproton Collisions at  $\sqrt{s} = 1.8$  TeV”  
**M. Sc.**, University of Auckland (New Zealand), 1988 (Physics, 1<sup>st</sup>-class honours)  
**B. Sc.**, University of Auckland (New Zealand), 1986 (Physics)

---

## SELECTED PROFESSIONAL ACTIVITIES

Sir Thomas Lyle Fellow, University of Melbourne (2013)  
Bass Fellow, Duke University (2012 - present), for “excellence in teaching and research”  
US ATLAS Transition Radiation Tracker Manager (2013 - present)  
US ATLAS Outreach and Education Coordinator (2012 - present)  
Partner Investigator of the Australian Research Council “Centre of Excellence for Particle Physics at the Terascale”, University of Melbourne (2010 - present)  
Member, ATLAS collaboration, Large Hadron Collider (2006 - present)  
Recipient of the inaugural 2012-2013 Dean’s leadership award  
Group leader, CDF Higgs Discovery Group (2007 - 2009)  
Group leader, CDF Top-Quark Physics Group (1999 - 2001)  
Member, CDF collaboration, Fermilab (1992 - present)

## PH.D. STUDENTS MENTORED AND THESES ADVISED

(For more information, including links to theses, see: <http://www.phy.duke.edu/~mkruse/Students.html>)

**Doug Davis** (2015 - present); ATLAS

**Pingchuan Zhao** (2015 - present); ATLAS

**Kevin Holway** (2014 - present); ATLAS

**Chen Zhou** (2010 - 2016) [now postdoc at University of Wisconsin, Madison]  
Simultaneous measurement of  $t\bar{t}W$  and  $t\bar{t}Z$  using the AIDA technique

**Kevin Finelli** (2009 - 2013) [now postdoc at University of Sydney]  
"Simultaneous measurement of processes with a dilepton final state at ATLAS"

**Dean Hidas** (2003 - 2009) [now staff scientist at BNL]  
"Search for  $H \rightarrow WW$  at CDF using multivariate techniques"

**Sebastian Carron Montero** (2001 - 2007) [now staff scientist at SLAC]  
"Simultaneous measurement of SM processes in the dilepton final state at CDF"

**Shan-Huei Chuang** (2003 - 2007, U. of Wisconsin) [now at Instituto de Fisica de Cantabria, Spain]  
"Search for  $H \rightarrow WW$  at CDF"

---

## UNDERGRADUATE STUDENTS MENTORED

**Eric Scotti** (2013 - 2015); ATLAS; graduate student at Brown University (2015 - present)

**Alejandro Cortese** (2010 - 2012); ATLAS; graduate student at Cornell (2012 - present)

**Ariana Minot** (2008 - 2010); ATLAS; graduate student at Harvard (2011 - present)

**John Phillips** (2008 - 2010); ATLAS; graduate student at UC Irvine (2010 - present)

**Stephen M. Smith** (2007 - 2009); CDF; graduate student at UC San Diego (2009 - present)

**Richard Wall** (2006-2008); ATLAS; graduate student at Yale (2008 - 2013); postdoc at Rice U. (2013)

---

## POSTDOCS MENTORED

**Dr. Andrea Bocci** (2006 - present); ATLAS

**Dr. Antonio Limosani** (2010 - 2013) [University of Melbourne, Australia]

**Dr. Esben Klinkby** (2008 - 2010); ATLAS; now scientist at the European Spallation Source (ESS)

**Dr. Valentin Necula** (2007 - 2008); CDF; now research scientist at U. of Florida working on LIGO

**Dr. Mircea Coca** (2004 - 2006); CDF; now pursuing a career in medical physics

**Dr. Susana Cabrera** (2001 - 2004); CDF; now physics faculty at U. of Valencia, Spain

## SELECTED PUBLICATIONS

In large High-Energy Physics collaborations, the publication process and protocol for an analysis of data is somewhat different than in other fields, and even subfields within physics. Typically a given analysis is done by a small group of physicists within the collaboration, involves many detailed studies and cross-checks lasting many months, and can take months (and even years) of intense internal review before being allowed to be submitted to a journal for publication. Publications include the names of all collaborators listed alphabetically, even though only a few were the primary authors of the analysis. The publications listed below are only those that I led or was significantly involved with. There are many others I played a secondary role in, mostly by providing input as my role as a convener of the physics group through which the analysis was being internally approved. For my full list of publications visit (over 700): <http://inspirehep.net/author/M.C.Kruse.1/> which also lists my conference proceedings not included here.

1. C. Zhou, M. Kruse (Duke), A. Paramonov (BNL), K. Finelli (Sydney), with the ATLAS collaboration, “Measurement of the  $t\bar{t}W$  and  $t\bar{t}Z$  Production Cross Sections in  $pp$  Collisions at  $\sqrt{s} = 8$  TeV with the ATLAS Detector”, JHEP 11 (2015) 172.

*Duke PhD thesis of Chen Zhou*

2. K. Finelli, M. Kruse (Duke), A. Limosani, A. Saavedra, K. Varvell (Sydney), with the ATLAS collaboration, “Simultaneous measurements of the  $t\bar{t}$ ,  $W^+W^-$ , and  $Z/\gamma^* \rightarrow \tau\tau$  production cross-sections in pp collisions at  $\sqrt{s} = 7$  TeV with the ATLAS detector”, Phys. Rev. D 91, 052005 (2015), arXiv:1407.0573.

*Duke PhD thesis of Kevin Finelli*

3. M. Kruse, A. Limosani, C. Zhou (Duke), with the CDF collaboration, “Search for production of an Upsilon(1S) meson in association with a W or Z boson using the full 1.96 TeV proton anti-proton collision data set at CDF”, Phys. Rev. D91 (2015) 052011, arXiv:1412.4827.
4. CDF and DØ collaborations, “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 (2012).

*This is the culmination of the many years of Higgs searches at the Tevatron, which I led from 2007 to 2009*

5. M. Bauce (Padova), D. Benjamin, M. Kruse, A. Limosani (Duke), with the CDF Collaboration, “Novel inclusive search for the Higgs boson in the four-lepton final state at CDF”, Phys. Rev. D86, 072012 (2012).
6. D. Hidas, M. Kruse (Duke U.) with A. Abulencia *et al.* (CDF collaboration), “Measurement of the  $W^+W^-$  production cross section and search for anomalous  $WW\gamma$  and  $WWZ$  couplings in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV”, Phys. Rev. Lett. 104, 201801 (2010).
7. D. Hidas, M. Kruse (Duke U.), M. Herndon, J. Pursely (Wisconsin), with A. Abulencia *et al.* (CDF collaboration), “Inclusive Search for Standard Model Higgs Boson Production in the WW Decay Channel using the CDF II Detector”, Phys. Rev. Lett. 104, 061803 (2010).
8. CDF and D0 Collaborations (T. Aaltonen *et al.*), “Combination of Tevatron searches for the standard model Higgs boson in the  $W^+W^-$  decay mode”, Phys. Rev. Lett. 104, 061802 (2010).

9. D. Benjamin, D. Hidas, M. Kruse (Duke U.), with A. Abulencia *et al.* (CDF collaboration), “Search for Higgs Bosons decaying to pairs of  $W$ -Bosons”, Phys. Rev. Lett. 102, 021802 (2009); arXiv:0809.3930.
10. S. Carron, M. Kruse (Duke U.), with A. Abulencia *et al.* (CDF collaboration), ”Cross Section Measurements of High- $p_T$  Dilepton Final-State Processes Using a Global Fitting Method”, Phys. Rev. D78, 012003 (2008).
11. M. Coca, M. Kruse (Duke U.), S. Chuang (U. of Wisconsin), with A. Abulencia *et al.* (CDF Collaboration), “Search for a Neutral Higgs Boson Decaying to a  $W$  Boson Pair in  $p\bar{p}$  Collisions at  $\sqrt{s} = 1.96$  TeV”, Phys. Rev. Lett. 97, 081802 (2006); hep-ex/0605124.
12. M. Brozovic, A. Goshaw, M. Kruse, W. Robertson (Duke U.), with D. Acosta *et al.* (CDF Collaboration), “Search for  $W$  and  $Z$  bosons in  $p\bar{p} \rightarrow 2$  jets +  $\gamma$  at  $\sqrt{s} = 1.8$  TeV”, Phys. Rev. D73, 012001 (2006).
13. S. Cabrera, M. Kruse (Duke U.), D. Waters (UCL), with D. Acosta *et al.* (CDF Collaboration), “Measurement of the  $W^+W^-$  Production Cross Section in  $p\bar{p}$  Collisions at  $\sqrt{s} = 1.96$  TeV Using Dilepton Events”, Phys. Rev. Lett. 94, 211801 (2005); hep-ex/0501050.
14. M. Kruse (Duke U.) and W. Yao (LBL), with D. Acosta *et al.* (CDF Collaboration), “Search for Higgs Bosons Decaying into  $b\bar{b}$  and Produced in Association with a Vector Boson in  $p\bar{p}$  Collisions at  $\sqrt{s} = 1.8$  TeV”, Phys. Rev. Lett. 95, 051801 (2005).
15. S. Cabrera, A. Goshaw, Y. Huang, M. Kruse (Duke U.), with D. Acosta *et al.* (CDF Collaboration), “Search for  $ZZ$  and  $ZW$  Production in  $p\bar{p}$  Collisions at  $\sqrt{s} = 1.96$  TeV”, Phys. Rev. D71, 091105 (2005). e-Print: hep-ex/0501021.
16. D. Acosta *et al.* (CDF Collaboration), “Measurement of the  $t\bar{t}$  Production Cross Section in  $p\bar{p}$  Collisions at  $\sqrt{s} = 1.96$  TeV Using Dilepton Events”, Phys. Rev. Lett. 93, 142001 (2004). e-Print: hep-ex/0404036.
17. G. Apollinari, M. Barone, D. Benjamin, W.C. Carithers, T. Dorigo, I. Fiori, M. Franklin, P. Giromini, F. Happacher, J. Konigsberg, M. C. Kruse, S. Miscetti, A. Parri, F. Ptohos, G. Velev, “Additional Studies of the Probability that the Events with a Superjet Observed by CDF are Consistent with the Standard Model Prediction”, Phys. Rev. D65 :032004, 2002.
18. T. Affolder *et al.* (CDF Collaboration), “Measurement of the  $t\bar{t}$  Production Cross-Section in  $p\bar{p}$  Collisions at  $\sqrt{s} = 1.8$  TeV”, Phys. Rev. D64:032002 (2001).
19. J. Cassada, P. Tipton (U. of Rochester), M. Kruse (Duke U.), with T. Affolder *et al.* (CDF Collaboration), “Search for New Particles Decaying to  $t\bar{t}$  in  $p\bar{p}$  Collisions at  $\sqrt{s} = 1.8$  TeV”, Phys. Rev. Lett. 85, 2062 (2000).
20. C. Grosso-Pilcher (U. of Chicago), J. Konigsberg (Harvard U.), M. Kruse (U. of Rochester), with F. Abe *et al.* (CDF Collaboration), “Measurement of the top quark mass and  $t\bar{t}$  production cross section from dilepton events at the Collider Detector at Fermilab”, Phys. Rev. Lett. 80, 2779 (1998). e-Print: hep-ex/9802017. (My PhD thesis)
21. F. Abe *et al.* (CDF Collaboration), “Measurement of the  $t\bar{t}$  production cross-section in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.8$  TeV”, Phys. Rev. Lett. 80:2773-2778 (1998). e-Print: hep-ex/9710008.

22. F. Abe *et al.* (CDF Collaboration) “Observation of top quark production in  $\bar{p}p$  collisions”, Phys. Rev. Lett. 74:2626-2631 (1995).

## SELECTED CONFERENCES AND INVITED TALKS

1. December 10, 2014, "Understanding the Universe at the LHC: an ATLAS perspective", Invited Plenary talk at *10th Asia-Pacific Symposium on Cosmology and Particle Astrophysics (CosPA)*, Auckland, New Zealand,
2. December 11, 2013, Public lecture in Melbourne, Australia, "The Universe and the Large Hadron Collider: Is the truth really out there ?"
3. March 25, 2013, "ATLAS overview of recent results, and prospects for the future", 1st IAS-CERN Workshop on Particle Physics and Cosmology, Nanyang Technological University, Singapore. Written up in: [news.phy.duke.edu/2013/04/kruse-speaks-at-first-ias-cern-workshop/](http://news.phy.duke.edu/2013/04/kruse-speaks-at-first-ias-cern-workshop/)
4. February 15, 2013, "Why we care about the Large Hadron Collider", colloquium at East Carolina University, NC.
5. October 28, 2012, Invited by the Council for the Advancement of Science Writing to give lecture on the Higgs discovery at the "New Horizons in Science" symposium, Raleigh, NC. Written up in: [news.phy.duke.edu/2012/11/prof-kruse-talks-about-the-higgs-at-science-writers-conference/](http://news.phy.duke.edu/2012/11/prof-kruse-talks-about-the-higgs-at-science-writers-conference/)
6. July 12, 2012, Public lecture in Auckland, New Zealand, "Why we care about the Large Hadron Collider". Written up in: [news.phy.duke.edu/2012/08/prof-kruse-gives-public-talk-to-packed-auditorium-2/](http://news.phy.duke.edu/2012/08/prof-kruse-gives-public-talk-to-packed-auditorium-2/)
7. November 15, 2011, Invited presentation at the "Rutherford Centennial Colloquium", CERN: [indico.cern.ch/conferenceDisplay.py?confId=1474209](http://indico.cern.ch/conferenceDisplay.py?confId=1474209)
8. October 28, 2011, Public lecture at Augusta State University, "The Large Hadron Collider as a probe to the very early Universe", Augusta, GA. News release at: <http://www.asupr.com/2011/10/world-renowned-scientist-to-speak-at-asu/>
9. April 22, 2011, Public lecture at Duke University, "The Large Hadron Collider". Written up in: <http://www.research.duke.edu/blog/2011/04/super-physics>
10. March 26, 2011, "How the Large Hadron Collider probes the very early Universe (and how it will change our view of it)", Invited plenary talk (non-technical) at the *Spring Meeting of the North Carolina Section of the Association of American Physics Teachers*, Wake Technical Institute, Raleigh, North Carolina.
11. December 29, 2010, "The Large Hadron Collider and how it will change our view of the Universe", Invited plenary talk at *Symposium on Horizons in Astronomy and Physics Education*, University of North Carolina, Chapel Hill, North Carolina.
12. March 5, 2010, "Particle Physics at the Energy Frontier", Colloquium at the University of Kentucky, Lexington.
13. November 13, 2009, "The ATLAS experiment at the LHC", *76th Annual meeting of the Southeastern Section of APS*, Atlanta, GA.
14. July 28, 2009, "Searches for the Higgs Boson", Invited plenary talk at *The Division of Particles and Fields (DPF) American Physical Society (APS) meeting*, Detroit, MI.

15. June 9, 2009, “Particle Physics at the Energy Frontier”, Invited talk at the *Workshop on probing the fundamental properties of nature and exploring their role in the cosmos*, UNC Chapel Hill.
16. March 16, 2009, “Study of multi-muon events at CDF”, Invited seminar at State University of New York, Stony Brook, New York.
17. February 12, 2009, “Study of multi-muon events at CDF”, Invited seminar at Brookhaven National Laboratory, New York.
18. December 18, 2008, “Study of multi-muon events at CDF”, Invited plenary talk at the *XIV IFT-UAM/CSIC Christmas Workshop*, Madrid, Spain
19. October 2, 2008, “Closing in on the Higgs Boson”, Invited lecture at the LHC seminar series, Lisbon, Portugal.
20. August 5, 2008, “Closing in on the Higgs Boson”, Colloquium at University of Melbourne, Australia.
21. January 5, 2008, “The Road to the Higgs Boson at the Tevatron (2 lectures)”, Plenary talks at the *20th Nordic Particle Physics Meeting*, Spaaatind, Norway.
22. May 7, 2007, “The Race for the Higgs Boson“, Plenary talk at the *2007 Phenomenology Symposium: Prelude to the LHC*, Madison, Wisconsin.
23. January 9, 2007, “Properties of the Top Quark”, Plenary talk at the *2007 Aspen Winter Conference on Particle Physics*, Aspen, Colorado.
24. April 13, 2006, “Particle Physics at the Energy Frontier”, Colloquium at Syracuse University, New York.
25. April 7, 2006, “Particle Physics at the Energy Frontier”, Colloquium at University of North Carolina, Wilmington, NC.
26. May 2005, “Diboson Physics at CDF”, Invited talk at *Frontiers in Contemporary Physics*, Vanderbilt University, Nashville, TN.
27. November 2004, “W’s, Z’s, top quarks and Higgs bosons: Status of measurements and searches at CDF”, Invited seminar at University of California, San Diego, CA.
28. June 21, 2004, “Silicon Detectors at CDF: Performance and Importance for Physics Discovery”, *New Zealand & Australia Semiconductor Instrumentation Workshop*, Wellington, New Zealand.
29. June 2, 2004, “Top, Electroweak, and Exotics results from CDF”, *Fermilab Users Meeting, Batavia, Illinois* (selected to represent the CDF collaboration).
30. June 2003, “Top and Electroweak Physics from the Tevatron”, *XXIII Physics In Collision (PIC)*, Zeuthen, Germany.
31. November 2002, “Past, Present and Future Highlights from CDF”, *The X Mexican School of Particles and Fields*, Playa del Carmen, Mexico.
32. July 2002, “Silicon Detector upgrades for the Tevatron Run 2”, *The 31st International Conference on High Energy Physics (ICHEP)*, Amsterdam, The Netherlands.

33. January 2002, “Studies on combining Higgs decay channels in setting cross section limits, with results from CDF Run 1”, *The 18th International Workshop on Weak Interactions and Neutrinos*, University of Canterbury, Christchurch, New Zealand.
34. March 2001, “What Top can tell us: Expectations for the next decade”, *Frontiers of Contemporary Physics 2001*, Vanderbilt University, Nashville, TN.
35. April 2000, “Status of the Standard Model : Top and Electroweak measurements”, Invited plenary talk at *APS 2000*, Long Beach, CA.
36. March 2000, “Incorporating systematic uncertainties in CL limits”, *Workshop on Confidence Limits*, Fermilab, Batavia, Illinois.
37. April 1999, “Standard Model Higgs Searches at CDF”, Invited plenary talk at *Pheno99 Symposium: Phenomenology for the third millennium*, University of Wisconsin, Madison.