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## Education

- Ph.D. Experimental Particle Physics, University of Wisconsin-Madison, summer 2010.
  - *Graduate Minor*: Mathematics
- B.S., University of Wisconsin-Madison, 2003.
  - *Majors*: Physics, Mathematics, Astronomy

## Fields of Interest

High Energy Physics, Phenomenology of particles and fields, Standard Model Higgs Boson, Data Analysis and Computational Methods

## Academic Experience

*Texas A&M University, Department of Physics and Astronomy*

- Visiting Scientist, starting August 2013
- Post-doctoral Researcher, Supervisor: David Toback, July 2010-July 2013.
- CDF Top Dilepton Group Co-convener, May 2013-present.

*University of Wisconsin-Madison, Department of Physics*

- Research Assistant, Advisor: Matthew Herdon, Standard Model Higgs Boson and Electroweak Physics, Jan. 2006-June 2010.
- CDF (Collider Detector at Fermilab) Particle Detector Operator, Oct. 2008-Jan.2009
- Teaching Assistant: General Physics and Pre-Calculus, Jan. 2005 - Aug. 2005; Pre-Calculus, Aug. 2005 - Dec. 2005.
- Research Assistant for University of Wisconsin's Pine Bluff Astronomical Observatory, Telescope Operation and Data Reduction, Dec. 2001 - June 2003.

## Research Activities

- Texas A&M Post-doctoral Research: Photons with a delayed arrival time, Standard Model Higgs boson, Standard Model electroweak WZ Dibosons, Forward-Backward Asymmetry of top-quark decays in the dilepton signature.
- Texas A&M Post-doctoral hardware group: I am on the CDF silicon detector group. The silicon detector is the component of the CDF detector that is closest to proton-antiproton interactions and provides precise tracking of the charged particles that result from such collisions.
- Ph.D. Dissertation: *Search for the Standard Model Higgs Boson in the  $VH \rightarrow VWW$  Decay to Three Leptons Channels*. This was the world first search for the standard model Higgs boson in the three-lepton signature. The CDF  $H \rightarrow WW$  high mass Higgs boson group primarily searches the  $H \rightarrow WW \rightarrow l\nu l\nu$  channel via the gluon fusion process. I constructed CDF's Higgs boson search in the  $VH \rightarrow VWW \rightarrow '3 \text{ lepton}'$  channel, exploring the  $WH$  and  $ZH$  associated production channels. This contribution to the CDF  $H \rightarrow WW$  group's result has provided a substantial observed and expected improvement. This trilepton search has since become a critical component to achieving Standard Model sensitivity in the high mass Higgs boson search at CDF.
- Measurement of the WZ Diboson Cross Section in the Three Lepton Channel: Experimental discovery of the WZ diboson channel and a measurement of its cross section was first published by CDF in 2007 with  $1.1 \text{ fb}^{-1}$  of collected data. I have constructed an independent analysis measuring the WZ diboson cross section with  $5.9 \text{ fb}^{-1}$ , then  $7.1 \text{ fb}^{-1}$ , of collected data that provides a substantial improvement over the previous result and excellent agreement with theoretical prediction. The final result is blessed for public release and in the publication review process.

## Selected Publications

### Primary Author

- [1] Ph.D. Dissertation: *"The Search For  $VH \rightarrow VWW$  Standard Model Higgs Production In The Trilepton Signature With  $5.9 \text{ fb}^{-1}$  Of Data From  $p\bar{p}$  Collisions At  $\sqrt{s} = 1.96 \text{ GeV}$ "*
- [2] *"A signature-based search for delayed photons in exclusive photon plus missing transverse energy events from  $p\bar{p}$  collisions with  $\sqrt{s} = 1.96 \text{ TeV}$ "* (<http://arxiv.org/abs/1307.0474>) submitted to *Phys. Rev. D Rapid Communication* on 1 July 2013
- [3] *Measurement of the WZ Cross Section and Search For Anomalous Triple Gauge Couplings in  $p\bar{p}$  Collisions* (*Phys. Rev. D Rapid Communication* **86** 031104 2012)

### Contributing Author

- [4] *"Searches for the Higgs boson decaying to  $W^+W^- \rightarrow l^+\nu l^-\bar{\nu}$  with the CDF II detector"* (<http://arxiv.org/abs/1306.0023>, submitted to *Phys. Rev. D* on 31 May 2013)
- [5] *"Combination of searches for the Higgs boson using the full CDF data set"*
- [6] *"Combined CDF and Do Upper Limits on Standard Model Higgs Boson Production with up to  $8.2 \text{ fb}^{-1}$  of Data"*
- [7] *"Inclusive Search for Standard Model Higgs Boson Production in the WW Decay Channel using the CDF II Detector"*
- [8] *"Combined Tevatron upper limit on  $gg \rightarrow H \rightarrow W+W-$  and constraints on the Higgs boson mass in fourth-generation fermion models"*

- [9] “Combination of Tevatron searches for the standard model Higgs boson in the  $W+W-$  decay mode”.

### Contributing Scientific Work

- [10] “Spectroscopic and Spectropolarimetric Observations of V838 Mon”, *Astrophys.J.* 588 (2003) 486-493. I contributed telescope operation and data reduction for the observation of this study while I was an undergraduate.
- (A full author list available. Papers not listed above with my name as an author were not explicitly worked on by myself, but I am listed on the author list because I was active in the collaboration.)

### Selected Scientific Documentation

#### Primary Author

- CDF Internal Note 10789 (PRL Draft): *The Search For New Physics in Exclusive Delay Photons + MET*
- CDF Internal Note 10788 (Public Note): *The Search For New Physics in Exclusive Delay Photons + MET*
- CDF Internal Note 10787 (Analysis Note): *The Search For New Physics in Exclusive Delay Photons + MET*
- CDF Internal Note 10255: *Building the Basic Structure for an Stntuple Analysis (v2)*
- CDF Internal Note 10254 (Ph.D. Dissertation): *The Search for  $H \rightarrow WW^*$  in the Trilepton Signature*
- Public Release Website: <http://www-cdf.fnal.gov/physics/ewk/2010/WZ/WZwebpage.html>
- CDF Internal Note 10176: Public release note for the WZ cross section measurement.
- CDF Internal Note 10138: *Measurement of the WZ Diboson Production Cross Section using  $5.9 \text{ fb}^{-1}$ , (Updated:  $7.1 \text{ fb}^{-1}$ )*[193]
- CDF Internal Note 10020: *Search for  $VH \rightarrow VWW$  SM Higgs Production in the Trilepton Signature*[194]

#### Contributing Author

- CDF Note 10790: *Background Estimation Methods in the Exclusive Delayed Photon + MET Final State*
- CDF Internal Note 10785 (Public Note): *Search for  $H$  to WW Production using  $9.7 \text{ fb}^{-1}$*
- CDF Internal Note 10773: *Rejecting  $e \rightarrow \gamma_{fake}$  Candidates With Loose Track Matching*
- CDF Internal Note 10760 (Analysis Note): *Search for  $H$  to WW Production using  $9.7 \text{ fb}^{-1}$*
- CDF Internal Note 10713 (PRL Draft): *Measurement of the WZ Diboson Cross Section in  $p\bar{p}$  Collisions*
- CDF Internal Note 10626: *Combined CDF and Do upper limits on the Fermiophobic Higgs Model with up to  $8.2 \text{ fb}^{-1}$  of data*
- CDF Internal Note 10607: *Calibration and Performance of the EMTiming and COT System for use in Exclusive Photon+MET Analysis*
- CDF Internal Note 10599 (Public Note): *Search for  $H$  to WW production using  $8.2 \text{ fb}^{-1}$*
- CDF Internal Note 10561: *Search for  $H$  to WW production using  $8.2 \text{ fb}^{-1}$*
- CDF Note 10432 (Public Note): *Search for  $H \rightarrow WW^*$  Production at CDF Using  $7.1 \text{ fb}^{-1}$  of Data*

- CDF Note 10397: Search for  $H \rightarrow WW^*$  production using  $7.1 \text{ fb}^{-1}$
- CDF Note 10086: Search for  $H \rightarrow WW$  Production Using  $5.3 \text{ fb}^{-1}$ . I authored the chapter on the  $VH \rightarrow VWW$  trilepton search.[197]
- CDF Note 10102: Search for  $H \rightarrow WW$  Production Using  $5.3 \text{ fb}^{-1}$  of Data [Text for public webpage release]. I authored the contents on the  $VH \rightarrow VWW$  trilepton search.[196]

## Conference Presentations

- Moriond 2013 (La Thuile, Italy): New Physics Searches at the Tevatron
- Supersymmetry 2011 (U. of Chicago): Secondary High Mass SM Higgs Searches at the Tevatron
- CDF Collaboration Meeting 2010 (Fermilab): WZ diboson cross section measurement with  $5.9/\text{fb}$  presented.
- American Physical Society (APS) April 2010 Conference Presentation (Washington, D.C.) Session Q9: Higgs Searches III. Using tri-lepton events to improve SM Higgs search in  $VH \rightarrow VWW$  decay channel at CDF
- Fermilab 2009 Users Meeting Poster Presentation (Fermilab): Current and Proposed Improvements in the Search for Standard Model Higgs Bosons Using  $H \rightarrow WW^*$

## Godparenting Committees

I was the a member of the godparenting (internal review) committee for the following analyses:

- Search for a New Heavy Gauge Boson  $W'$  with Electron + Missing  $E_T$  Event Signature in  $p\bar{p}$  Collisions at  $\sqrt{s} = 1.96 \text{ TeV}$  [198]
- WH - WWW (Fermiophobic Search and cross check of the main WH-WWW analysis) [199]

## Miscellaneous

- *Computer Skills*: C, C++,  $\text{\LaTeX}$ , Linux, HTML, CSS, Javascript and jQuery, Python, iPython and iPython Notebook

## References

- [1] J. M. Nett, "The Search For  $VH \rightarrow VWW$  Standard Model Higgs Production In The Trilepton Signature With  $5.9 \text{ fb}^{-1}$  Of Data From  $p\bar{p}$  Collisions At  $\sqrt{s} = 1.96 \text{ GeV}$ ,"
- [2] T. Aaltonen *et al.* [CDF Collaboration], <http://arxiv.org/abs/1307.0474>
- [3] T. Aaltonen *et al.* [CDF Collaboration], "Measurement of the  $WZ$  Cross Section and Triple Gauge Couplings in  $p\bar{p}$  Collisions at  $\sqrt{s} = 1.96 \text{ TeV}$ ," [Phys. Rev. D 86, 031104 (2012)] Published Thu Aug 23, 2012 arXiv:1202.6629 [hep-ex].
- [4] T. Aaltonen *et al.* [CDF Collaboration], arXiv:1306.0023 [hep-ex]
- [5] T. Aaltonen *et al.* [CDF Collaboration], "Combination of searches for the Higgs boson using the full CDF data set," arXiv:1301.6668 [hep-ex].
- [6] T. Aaltonen *et al.* [CDF and Do Collaboration], "Combined CDF and Do Upper Limits on Standard Model Higgs Boson Production with up to  $8.2 \text{ fb}^{-1}$  of Data," arXiv:1103.3233 [hep-ex].
- [7] T. Aaltonen *et al.* [The CDF Collaboration], "Inclusive Search for Standard Model Higgs Boson Production in the  $WW$  Decay Channel using the CDF II Detector," arXiv:1001.4468 [hep-ex].
- [8] T. Aaltonen *et al.* [CDF and Do Collaboration], "Combined Tevatron upper limit on  $gg \rightarrow H \rightarrow W+W-$  and constraints on the Higgs boson mass in fourth-generation fermion models," arXiv:1005.3216 [hep-ex].
- [9] T. Aaltonen *et al.* [CDF and Do Collaborations], "Combination of Tevatron searches for the standard model Higgs boson in the  $W+W-$  decay mode," Phys. Rev. Lett. **104**, 061802 (2010) [arXiv:1001.4162 [hep-ex]].
- [10] J. P. Wisniewski *et al.*, "Spectroscopic and Spectropolarimetric Observations of V838 Mon," Astrophys. J. **588**, 486 (2003) [arXiv:astro-ph/0301237].  
*The following are publications whose author list does contain my name for being an active member in the Collider Detector at Fermilab collaboration, but I did not directly work on.*
- [11] T. Aaltonen *et al.* [CDF Collaboration], "Search for  $B_s \rightarrow \mu^+ \mu^-$  and  $B_d \rightarrow \mu^+ \mu^-$  decays with the full CDF Run II data set," arXiv:1301.7048 [hep-ex].
- [12] T. Aaltonen *et al.* [CDF Collaboration], "Updated search for the standard model Higgs boson in events with jets and missing transverse energy using the full CDF data set," arXiv:1301.4440 [hep-ex].
- [13] T. Aaltonen *et al.* [CDF Collaboration], "Measurement of the cross section for prompt isolated diphoton production using the full CDF Run II data sample," arXiv:1212.4204 [hep-ex].
- [14] T. Aaltonen *et al.* [CDF Collaboration], "Search for a two-Higgs-boson doublet using a simplified model in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96 \text{ TeV}$ ," arXiv:1212.3837 [hep-ex].
- [15] T. Aaltonen *et al.* [CDF Collaboration], "Search for Resonant Top-antitop Production in the Semi-leptonic Decay Mode Using the Full CDF Data Set," arXiv:1211.5363 [hep-ex].
- [16] T. Aaltonen *et al.* [CDF Collaboration], "Measurement of  $W$ -Boson Polarization in Top-quark Decay using the Full CDF Run II Data Set," arXiv:1211.4523 [hep-ex].
- [17] T. Aaltonen *et al.* [CDF Collaboration], "Measurement of the top quark forward-backward production asymmetry and its dependence on event kinematic properties," arXiv:1211.1003 [hep-ex].

- [18] T. Aaltonen *et al.* [CDF Collaboration], “Measurement of the Mass Difference Between Top and Anti-top Quarks at CDF,” arXiv:1210.6131 [hep-ex].
- [19] T. Aaltonen *et al.* [CDF Collaboration], “Search for a heavy vector boson decaying to two gluons in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV,” Phys. Rev. D **86**, 112002 (2012) [arXiv:1210.5686 [hep-ex]].
- [20] T. Aaltonen *et al.* [CDF Collaboration], “Measurement of the  $B_c^-$  meson lifetime in the decay  $B_c^- \rightarrow J/\psi \pi^-$ ,” Phys. Rev. D **87**, 011101 (2013) [arXiv:1210.2366 [hep-ex]].
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- [22] T. Aaltonen *et al.* [CDF Collaboration], “Measurements of the Top-quark Mass and the  $t\bar{t}$  Cross Section in the Hadronic  $\tau +$  Jets Decay Channel at  $\sqrt{s} = 1.96$  TeV,” arXiv:1208.5720 [hep-ex].
- [23] T. Aaltonen *et al.* [CDF Collaboration], “Search for the standard model Higgs boson produced in association with top quarks using the full CDF data set,” arXiv:1208.2662 [hep-ex].
- [24] T. Aaltonen *et al.* [CDF Collaboration], arXiv:1207.7138 [hep-ex].
- [25] T. Aaltonen *et al.* [CDF Collaboration], “Precision Top-Quark Mass Measurements at CDF,” arXiv:1207.6758 [hep-ex].
- [26] T. Aaltonen *et al.* [CDF and Do 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) [arXiv:1207.6436 [hep-ex]].
- [27] T. Aaltonen *et al.* [CDF Collaboration], “Search for a Higgs boson in the diphoton final state using the full CDF data set from proton-antiproton collisions at  $\sqrt{s} = 1.96$  TeV,” arXiv:1207.6386 [hep-ex].
- [28] T. Aaltonen *et al.* [CDF Collaboration], “An inclusive search for the Higgs boson in the four-lepton final state at CDF,” arXiv:1207.5016 [hep-ex].
- [29] T. Aaltonen *et al.* [CDF and Do Collaborations], arXiv:1207.2757 [hep-ex].
- [30] T. Aaltonen *et al.* [CDF Collaboration], “Measurement of the difference of CP-violating asymmetries in  $D^0 \rightarrow K^+K^-$  and  $D^0 \rightarrow \pi^+\pi^-$  decays at CDF,” arXiv:1207.2158 [hep-ex].
- [31] T. Aaltonen *et al.* [CDF Collaboration], “Search for the standard model Higgs boson decaying to a  $b\bar{b}$  pair in events with no charged leptons and large missing transverse energy using the full CDF data set,” arXiv:1207.1711 [hep-ex].
- [32] T. Aaltonen *et al.* [CDF Collaboration], “Combined search for the standard model Higgs boson decaying to a  $b\bar{b}$  pair using the full CDF data set,” arXiv:1207.1707 [hep-ex].
- [33] T. Aaltonen *et al.* [CDF Collaboration], “Search for the standard model Higgs boson decaying to a  $b\bar{b}$  pair in events with two oppositely-charged leptons using the full CDF data set,” arXiv:1207.1704 [hep-ex].
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