# Jon Wilson, Ph.D.

Assistant Research Scientist, Texas A&M University

jsw@fnal.gov | 1-254-723-0334 | College Station, TX, USA

## SUMMARY

I am working on the discovery of dark matter using cryogenic semiconductor detectors as a member of the SuperCDMS experimental collaboration. Currently, I am leading the drive to use simulations of our detectors to model data collected in the experimental run at Soudan, Minnesota. Without a model of the various sources of experimental backgrounds, we can only set upper limits on the presence of dark matter. To discover it, these simulations are crucial.

In order to prepare for the next experimental run, I am leading the development of a new trigger system. This trigger system will significantly expand our ability to see low-mass dark matter by improving sensitivity to low-energy interactions in our detectors.

In a post-discovery era, I plan to measure the properties of dark matter and to search for WIMPs that are not part of the Milky Way galaxy's thermalized dark matter halo. I hope to observe astrophysical and cosmological sources of such non-thermal WIMPs, effectively creating a new field of dark matter astronomy.

In the past, I have studied the top quark and the Higgs boson using data from the Collider Detector at Fermilab (CDF). I performed the first published search for the associated production of the Higgs boson and top quarks. I also made significant advances in the study of the top-quark forward-backward asymmetry, a fascinating measurement that displayed an intriguing anomaly at the Tevatron. My work on the top quark led to my appointment as co-convener of the Top and Beyond the Standard Model physics group, an international leadership position in which I have been responsible for the scientific content of a large and active segment of the CDF collaboration.

## EDUCATION

Dec 2011 ***Doctor of Philosophy*** *The Ohio State University*

Physics

Advisors: Richard Hughes and Brian Winer; Thesis: *A Search for the Standard Model Higgs Boson Produced in Association with Top Quarks*

Aug 2009 ***Master of Science*** *The Ohio State University*

Physics

Advisors: Richard Hughes and Brian Winer; Candidacy exam: *Higgs Hunting: Where and When to Find it*

May 2007 ***Bachelor of Arts*** *Baylor University*

University Scholars

Advisor: Jay Dittmann; Thesis: *A Measurement of the Z + b jet cross section at CDF*

## POSITIONS HELD

Jan 2014 – Present ***Assistant Research Scientist*** *Texas A&M University*

Jan 2012 – Jan 2014 ***Postdoctoral Research Fellow*** *University of Michigan*

Jan 2010 – Dec 2011 ***Graduate Research Associate*** *The Ohio State University*

Aug 2007 – Dec 2009 ***Graduate Teaching Associate*** *The Ohio State University*

## RESEARCH ACTIVITIES

Jan 2014 – Present ***CDMS Collaboration,*** *Texas A&M University*

- Data Acquisition System (2014 - present)
  - University Research Association (URA) Visiting Scholar Award (Spring 2014)
- Trigger development (2014 - present)
- Level 1 trigger manager (2015 - present)
- Data Analysis, search for dark matter (2014 - present)
- Paper committee for CDMSlite Run 2 (2015 - 2016)

Jun 2004 – Present

***CDF Collaboration*** *Texas A&M University, University of Michigan, The Ohio State University, Baylor University*

- Co-convener of Top and Beyond the Standard Model physics group (Dec 2012 - present)
- Studies of top quark forward-backward asymmetry (7 publications and 6 invited presentations, Jan 2012 - present)
  - University Research Association (URA) Visiting Scholar Award (Spring 2012)
- Measurement of bottom quark forward-backward asymmetry (2013 - 2014)
- Partial wave analysis of exclusive hadron pair production (2013 - 2014)
- Editorial committee for Tevatron combined top production cross section (2012 - 2013)
- Development of CDF author list tools (2013)
- Higgs searches, including first published search for $t\bar{t}H$ (2009 - 2011)
- Data preservation (2009-2011)
- Design, construction, and maintenance of computer cluster (2009 - 2011)
- Creation of testing software for Level 1 trigger upgrade (2005 - 2007)

## RECENT PUBLICATIONS

### *Projected sensitivity of the SuperCDMS SNOLAB experiment*

SuperCDMS Collaboration (R. Agnese *et al.*), Accepted for publication in Phys. Rev. D.

### *Measurement of the forward–backward asymmetry of top-quark and antiquark pairs using the full CDF Run II data set*

CDF Collaboration (T. Aaltonen *et al.*), Phys. Rev. D 93, 112005 (2016).

### *Extrapolation technique pitfalls in asymmetry measurements at colliders*

K. Colletti, Z. Hong, D. Toback, J.S. Wilson, Nucl. Instrum. Methods Phys. Res., Sect. A 830, 176 (2016).

### *New Results from the Search for Low-Mass Weakly Interacting Massive Particles with the CDMS Low Ionization Threshold Experiment*

SuperCDMS Collaboration (R. Agnese *et al.*), Phys. Rev. Lett. 116, 071301 (2016).

### *First measurement of the forward-backward asymmetry in bottom-quark pair production at high mass*

CDF Collaboration (T. Aaltonen *et al.*), Phys. Rev. D 92, 032006 (2015).

### *Measurement of central exclusive pi+pi- production in $p\bar{p}$ collisions at $\sqrt{s}$ = 0.9 and 1.96 TeV at CDF*

CDF Collaboration (T. Aaltonen *et al.*), Phys. Rev. D 91, 091101 (2015).

### *Dark matter effective field theory scattering in direct detection experiments*

SuperCDMS Collaboration (K. Schneck *et al.*), Phys. Rev. D 91, 092004 (2015).

### *Measurement of the Inclusive Leptonic Asymmetry in Top-Quark Pairs that Decay to Two Charged Leptons at CDF*

CDF Collaboration (T. Aaltonen *et al.*), Phys. Rev. Lett. 113, 042001 (2014).

### *Forward-backward asymmetry of leptonic decays of $t\bar{t}$ at the Fermilab Tevatron*

Z. Hong, R. Edgar, S. Henry, D. Toback, J.S. Wilson, and D. Amidei, Phys. Rev. D 90, 014040 (2014).

### *Measurement of the leptonic asymmetry in $t\bar{t}$ events produced in $p\bar{p}$ collisions at $\sqrt{s}$ = 1.96 TeV*

CDF Collaboration (T. Aaltonen *et al.*), Phys. Rev. D 88, 072003 (2013).

### *Measurement of the Differential Cross Section dσ/dcos θt for Top-Quark Pair Production in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.96 TeV*

CDF Collaboration (T. Aaltonen *et al.*), Phys. Rev. Lett. 111, 182002 (2013).

### *Measurement of the top quark forward-backward production asymmetry and its dependence on event kinematic properties*

CDF Collaboration (T. Aaltonen *et al.*), Phys. Rev. D 87, 092002 (2013).

### *Search for the Standard Model Higgs Boson Produced in Association with Top Quarks Using the Full CDF Data Set*

CDF Collaboration (T. Aaltonen *et al.*), Phys. Rev. Lett. 109, 181802 (2012).

## RECOGNITION AND AWARDS

Spring 2014 ***University Research Association Visiting Scholar Award*** *Texas A&M University*

Data acquisition and trigger electronics and software, SuperCDMS experiment

Spring 2012 ***University Research Association Visiting Scholar Award*** *University of Michigan*

Studies of top quark forward-backward asymmetry, CDF experiment

Spring 2009 ***Hazel Brown Teaching Assistant Award*** *The Ohio State University*

Spring 2009 ***AAPT Outstanding Teaching Assistant Award*** *The Ohio State University*

Fall 2004 – Spring 2007 ***William Carey Crane Scholar*** *Baylor University*

## INVITED TALKS

Jun 2016 ***Latest Results from the Tevatron***

Fermilab Users Meeting

Apr 2015 ***Heavy Quark Asymmetries at CDF***

Deep Inelastic Scattering

Nov 2013 ***Anomalies in the Forward-Backward Asymmetry of Top Quark Pair Production at the Tevatron***

Texas A&M University High Energy Physics Seminar

Apr 2013 ***Anomalies in the Forward-Backward Asymmetry of Top Quark Pair Production at the Tevatron***

University of Virginia High Energy Physics Seminar

Mar 2013 ***Top Pair Production and Properties at the Tevatron***

Rencontres de Moriond, Electroweak Session

Feb 2013 ***Top Pair Forward-Backward Asymmetry at CDF***

Les Rencontres de Physique de la Vallée d'Aoste

Oct 2012 ***The Top Forward-Backward Asymmetry at the Tevatron***

The Seventh International Workshop on the CKM Unitarity Triangle

Apr 2012 ***The Top Forward-Backward Asymmetry at CDF***

Hot Topics at Colliders, Princeton University

Aug 2011 ***Search for the Standard Model Higgs Boson Produced in Association with Top Quarks at the Tevatron***

Supersymmetry 2011

## SKILLS

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|---|---|
| Programming | FPGA firmware C/C++ Python Scheme/LISP Fortran |
| | Autoconf/Automake/Libtool CVS/SVN/bzr/git |
| Scientific Analysis | CERN ROOT Big data analysis Detector simulation |
| | Bayesian inference and modeling Markov chain Monte Carlo Digital signal processing |
| System Administration | Linux Cluster administration Designing and building computers and computer clusters |
| | Network administration |