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Elliot Lipeles

Contact Information

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Education and Employment

2008-present **Assistant Professor, University of Pennsylvania**
2003-2008 **Postdoctoral Fellow, University of California, San Diego**
1995-2003 **Ph.D., California Institute of Technology**
Thesis Topic: Inclusive Semileptonic B Decays at CLEO
1991-1995 **B.A., University of Chicago**
Concentrations in Physics and Mathematics
College and Departmental Honors

Honors and Fellowships

2010 Sloan Research Fellowship
2001 DPF Snowmass Fellowship
2000 John Stager Stemple Memorial Prize in Physics for outstanding progress in research as demonstrated by an excellent performance on the oral Ph.D. candidacy exam

Teaching Experience

Spring 2012 Physics 414/521: Laboratory in Modern Physics, 16 students.
Fall 2011 Physics 140/150; Principles of Physics I: Mechanics and Wave Motion, 78 students.
Spring 2011 Physics 141/151; Principles of Physics II: Electromagnetism and Radiation, 97 students.
Spring 2010 Physics 141/151; Principles of Physics II: Electromagnetism and Radiation, 51 students.

Fall 2009	Physics 140/150; Principles of Physics I: Mechanics and Wave Motion, 76 students.
Spring 2009	Physics 141/151; Principles of Physics II: Electromagnetism and Radiation, 75 students.

Graduate Student Supervision

Tatiana Rodriguez	Co-adviser with Nigel Lockyer. Tatiana completed a project with the CDF experiment and graduated in August 2011.
Josh Kunkle	Fifth year student working on ATLAS trigger and data analysis; Josh is on track to graduate in Spring 2013.
Doug Schaefer	Starting fourth year and is actively participating in the ATLAS experiment; Doug could graduate as early as Spring/Summer 2013.
Rami Vanguri	Starting fourth year and has completing two papers on the CDF experiment, and is now moving to the ATLAS experiment which will be the basis of his thesis. Rami will likely graduate in the 2014.

Committees

2009-2011	Graduate Committee; Successfully recruited six candidates for experimental high-energy physics research at Penn (Kurt Brendliger, Matthew Hickman, Jamie Saxon, and Alexander Tuna, Rob Roy Fletcher, William Parkin).
2009-2010	Colloquium Committee.

Current Research Objective

To play a major role in advancing our understanding of electroweak symmetry breaking by searching for the Higgs and the phenomena that stabilize its mass, if it exists. I will bring my experience with hadron collider data and sophisticated data analysis techniques to the Large Hadron Collider. I also plan to be active in searches for other new phenomena at the energy frontier.

Research Experience

2008-present	Contributing to ATLAS trigger menu coordination. <ul style="list-style-type: none"> • Leading the ATLAS trigger rate group • Work with Rustem Ospanov (postdoc), Doug Schaefer, and Josh Kunkle on trigger rate, processing farm load, and data bandwidth
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predictions used in the optimization of the trigger configuration for physics output.

- Work with Tae Min Hong (postdoc) on the monitoring of the trigger stability with beam configuration and instantaneous luminosity changes.

2008-present

Both postdocs and graduate students Josh Kunkle, Doug Schaefer, Rami Vanguri, and John Alison (supervised by Joe Kroll) are working on the development of modeling tools for multilepton plus missing energy events. We use this work to search for a Higgs into the WW channel. Doug Schaefer and John Alison are working on the modeling and suppression of background due to jets misidentified as leptons. Josh Kunkle, Rami Vanguri, and Rustem Ospanov are working on the modeling and suppression of background due to Drell-Yan events with false missing energy. Tae Min Hong and Rustem Ospanov are working on using multivariate techniques.

2008-present

Conceptual design of new trigger system for the Phase-II ATLAS upgrade based on moving the level 2 buffers into the front-end electronics in order to increase the level 1 trigger rate to 1 MHz.

2005-2011

Analysis program for boson pair (diboson) production in CDF data.

Ongoing Efforts

- Worked with a student (Rami Vanguri) to measure the triple gauge couplings in the WW dilepton plus dineutrino (published) and WZ trilepton final states (submitted for publication).
- Worked with a student (Tatiana Rodriguez) to improve the lepton identification package described below, update the ZZ to four leptons measurement. This result is now published.

Recent Efforts

- Major expansion of the CDF lepton identification algorithms to significantly increase the sensitivity to three and four lepton final states. The nine orthogonal selection categories in this system were implemented in a general purpose tool for which the efficiency and misidentification backgrounds were measured in data. This doubled the acceptance for WZ in the three leptons plus missing energy final state resulting in the first observation of WZ production.
- Dilepton plus missing transverse energy final state to search for the Higgs decaying to WW . In order to use the theoretical understanding of the signals and backgrounds to maximize sensitivity, I have devel-

oped with a student a matrix element fitting technique which uses calculations of the differential cross-sections to estimate event probabilities and exploit all the available information in the event. This resulted in the most sensitive limit on Higgs production relative the standard model expectation for masses above ≈ 130 GeV and is the basis for the ongoing $H \rightarrow WW$ effort at CDF.

- Completed a search for ZZ production using the same acceptance improvements and the matrix element techniques combining the four lepton and dilepton plus dineutrino channels to achieve the first evidence of ZZ production in hadron collisions.
- Worked with two students to use the lepton-neutrino plus dijet and dilepton plus dijet final states to limit nonstandard model $WW\gamma/Z$ and ZZZ couplings respectively.

2006-2008	Contributions to the CMS data acquisition system focused on the commissioning of the event builder.
2005-2006	CDF diboson subgroup co-convener.
2004-2006	Subproject leader of the CDF analysis farm.
2004-2005	Measurement of the Λ_b lifetime using the $J/\psi\Lambda$ decay mode.
2003-2004	Developed a prototype for the CDF production data processing system that is now successfully deployed.
2000-2003	Analysis of the fully differential inclusive semileptonic B decay rate in the CLEO II and II.V data samples using neutrino reconstruction.
2000	Played a key role in the commissioning of the CLEO III detector.
1995-2000	Extensive development of hardware and software for the CLEO III data acquisition system.
1997	Data acquisition for a beam test of the CLEO III RICH detector.
1993-1995	Analysis of Pioneer 10 & 11 spacecraft data on relativistic electrons in Jupiter's magnetosphere.
1992-1993	Calibration of the Energetic Heavy Ion Counter (EHIC) cosmic ray satellite.

Recent Conference Talks and Colloquia

April 2012	University of Delaware Physics Colloquium
Sept 2011	Invited Talk: "L1 track triggers for ATLAS in the HL-LHC", Topical Workshop on Electronic for Particle Physics

July 2011	Public Lecture at the Aspen Institute for Physics
March 2008	"Diboson Production at the Tevatron," Rencontres de Moriond, QCD and High Energy Interactions
February 2008	" WZ anomalous couplings and ZZ production at CDF," Fermilab Joint Experimental-Theoretical Seminar (Wine and Cheese)
July 2007	"Searches for a Higgs boson decaying to WW^* at CDF using multivariate techniques", European Physical Society Conference on High Energy Physics
October 2006	"First Observation of WZ Production," Fermilab Joint Experimental-Theoretical Seminar (Wine and Cheese)
August 2006	" WW and WZ Production at the Tevatron," XXXIII International Conference on High Energy Physics
May 2006	"Boson Production and Properties at CDF and DØ," Fermilab Users' Meeting

Publications of which I am a primary author (refereed)

1. E. Lipeles [ATLAS Collaboration], "L1 track triggers for ATLAS in the HL-LHC," JINST **7**, C01087 (2012).
2. G. Aad *et al.* [ATLAS Collaboration], "Measurement of the WW cross section in $\sqrt{s} = 7$ TeV pp collisions with the ATLAS detector and limits on anomalous gauge couplings," arXiv:1203.6232 [hep-ex] (submitted to Physics Letters B)
3. G. Aad *et al.* [Atlas Collaboration], "Performance of the ATLAS Trigger System in 2010," Eur. Phys. J. C **72**, 1849 (2012) [arXiv:1110.1530 [hep-ex]].
4. T. Aaltonen *et al.* [CDF Collaboration], "Measurement of the WZ Cross Section and Triple Gauge Couplings in $p\bar{p}$ Collisions at $\sqrt{s} = 1.96$ TeV," arXiv:1202.6629 [hep-ex].
5. G. Aad *et al.* [ATLAS Collaboration], "Search for the Higgs boson in the $H \rightarrow WW^{(*)} \rightarrow l\nu l\nu$ decay channel in pp collisions at $\sqrt{s} = 7$ TeV with the ATLAS detector," Phys. Rev. Lett. **108**, 111802 (2012) [arXiv:1112.2577 [hep-ex]].
6. G. Aad *et al.* [ATLAS Collaboration], "Measurement of the WW cross section in $\sqrt{s} = 7$ TeV pp collisions with ATLAS," Phys. Rev. Lett. **107**, 041802 (2011) [arXiv:1104.5225 [hep-ex]].
7. T. Aaltonen *et al.* [CDF Collaboration], "Measurement of ZZ production in leptonic final states at \sqrt{s} of 1.96 TeV at CDF," Phys. Rev. Lett. **108**, 101801 (2012) [arXiv:1112.2978 [hep-ex]].

8. T. Aaltonen *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 pages, [arXiv:hep-ex/0912.4500].
9. T. Aaltonen *et al.* [CDF Collaboration], “Search for WW and WZ production in lepton plus jets final state at CDF,” Phys. Rev. D **79**, 112011 (2009), 9 pages, [arXiv:hep-ex/0903.0814].
10. T. Aaltonen *et al.* [CDF Collaboration], “Search for a Higgs Boson Decaying to Two W Bosons at CDF,” Phys. Rev. Lett. **102**, 021802 (2009), 7 pages, [arXiv:hep-ex/0809.3930].
11. T. Aaltonen *et al.* [CDF Collaboration], “First Measurement of ZZ Production in $p\bar{p}$ Collisions at $\sqrt{s}=1.96$ TeV,” Phys. Rev. Lett. **100**, 201801 (2008), 8 pages, [arXiv:hep-ex/0801.4806].
12. A. Abulencia *et al.* [CDF Collaboration], “Observation of WZ Production,” Phys. Rev. Lett. **98**, 161801 (2007), 8 pages, [arXiv:hep-ex/0702027].
13. A. Abulencia *et al.* [CDF Collaboration], “Measurement of the Λ_b^0 lifetime in $\Lambda_b^0 \rightarrow J/\psi\Lambda_0$ in p anti- p collisions at $\sqrt{s} = 1.96$ -TeV,” Phys. Rev. Lett. **98**, 122001 (2007), 7 pages, [arXiv:hep-ex/0609021].
14. S. E. Csorna *et al.* [CLEO Collaboration], “Moments of the B meson inclusive semileptonic decay rate using neutrino reconstruction,” Phys. Rev. D **70**, 032002 (2004), 26 pages, [arXiv:hep-ex/0403052].
15. M. Artuso *et al.*, “Performance of the CLEO III LiF-TEA ring imaging Cherenkov detector in a high energy muon beam,” Nucl. Instrum. Meth. A **441**, 374 (2000), 31 pages, [arXiv:hep-ex/9910054].

Additional publications of which I am a primary author

1. “Measurement of the ZZ production cross section in the $ll\nu\nu$ channel in proton-proton collisions at $\sqrt{s} = 7$ TeV with the ATLAS detector”, ATLAS Collaboration, ATLAS-CONF-2012-027.
2. “Search for the Standard Model Higgs boson in the $H \rightarrow WW \rightarrow l\nu l\nu$ decay mode with 4.7 fb^{-1} of ATLAS data at $\sqrt{s} = 7$ TeV,” ATLAS Collaboration, ATLAS-CONF-2012-012.
3. E. Lipeles [for the CDF and D0 Collaborations], “ WW and WZ Production at the Tevatron,” 4 pages [arXiv:hep-ex/0701038].
4. A. Baranovski *et al.* [CDF Collaboration], “CDF II production farm project,” Nucl. Instrum. Meth. A **572**, 399-401 (2007).

5. C. Steenberg, S.H.Hsu, E. Lipeles, F. Wurthwein, "JobMon: A Secure, Scalable, Interactive Grid Job Monitor," 3 pages, *Proceedings of Computing in High-energy Physics (CHEP 06), Mumbai, India, (2006)*
6. M. Norman *et al.*, "OSG-CAF - A single point of submission for CDF to the Open Science Grid," 4 pages, *Proceedings of Computing in High-energy Physics (CHEP 06), Mumbai, India, (2006)*
7. A. Fella *et al.*, "LCGCAF - The CDF portal to the gLite middle ware", 4 pages, *Proceedings of Computing in High-energy Physics (CHEP 06), Mumbai, India, (2006)*
8. M. Casarsa, S. C. Hsu, E. Lipeles, M. Neubauer, S. Sarkar, I. Sfiligoi and F. Wurthwein, "The CDF Analysis Farm," AIP Conf. Proc. **794**, 275-278 (2005).
9. E. Lipeles, "A study of the fully differential inclusive semileptonic B meson decay rate," , 170 pages, UMI-31-51374
10. A. Bornheim *et al.* [CLEO Collaboration], "Preliminary results on $\Gamma(\text{ub})$ from inclusive semileptonic B decays with neutrino reconstruction. ((B)),", 10 pages, arXiv:hep-ex/0207064.
11. H. Schwarthoff *et al.*, "On the way to maturity: The CLEO III data acquisition and control system," , 5 pages, *Proceedings of Computing in High-energy Physics (CHEP 01), Beijing, China, (2001)*
12. H. Schwarthoff *et al.*, "Distributed Objects In Action - First Experience With The Cleo III Data Acquisition And Control System," , *Proceedings of Computing in High-energy Physics (CHEP 2000), Padova, Italy, 331-334 (2000)*
13. R. J. Mountain *et al.*, "The CLEO-III ring imaging cherenkov detector," Nucl. Instrum. Meth. A **433**, 77-86 (1999).
14. J. C. Wang *et al.*, "The CLEO-III RICH detector and beam test results," , 7 pages, arXiv:hep-ex/9903066. *Proceedings of American Physical Society (APS) Meeting of the Division of Particles and Fields (DPF 99), Los Angeles, CA, (1999)*
15. M. Artuso *et al.*, "Status of construction and first tests of the CLEO III RICH," IEEE Trans. Nucl. Sci. **45**, 643-647 (1998).
16. Schuh, S., & et al. 1999, Quantum Chromodynamics, 350
17. M. Artuso *et al.*, Nucl. Instrum. Meth. A **419**, 577-583 (1998).
18. E. Lipeles *et al.*, "CLEO-III Data Acquisition System", 7 pages, *Proceedings of Computing in High-energy Physics (CHEP 98), Chicago, Il (1998)*
19. M. Artuso *et al.*, "Beam tests of the CLEO-III LiF-TEA ring imaging Cherenkov detector," 14 pages, ICFA Instrum. Bull. **15**, 3 (1997).

20. J. Lorenc *et al.*, “The DAQ system for CLEO III,” *Comput. Phys. Commun.* **110**, 91-94 (1998).
21. K. Honscheid *et al.* [CLEO Collaboration], “The CLEO VMEchip gate array MCST and CBLT support in an Altera FPGA,” 4 pages, *Proceedings of Computing in High-energy Physics (CHEP 97), Berlin, Germany, (1997)*

I am also the author of approximately 400 additional refereed papers as a member of the CDF and ATLAS collaborations and past member of the CLEO and CMS collaborations.