

Wouter Deconinck

Activity Report, Calendar Year 2013

Major Contributions:

In the Fall of 2013, the first determination of the weak charge of the proton was published in Physical Review Letters. This landmark result by the Qweak experiment (with only 4% of the total data set) was featured in several mainstream science venues. In 2013, Deconinck supervised 4 graduate students and 9 undergraduate students. In the Spring of 2013, Deconinck taught analog electronics to 40 undergraduates, and voluntarily added an extra section to accommodate the increased enrollment. In the Fall 2013, Deconinck taught classical mechanics with a monotonically declining level of enthusiasm for the material, but students still enjoyed it.

Scholarly and Professional Activities-Research:

Invited Talks

- “Precision electroweak experiments at Jefferson Lab,” invited talk at HIGS2 workshop, Duke University, Spring 2013.
- “The Qweak Experiment: The First Determination of the Proton’s Weak Charge,” invited talk at MIT, Fall 2013.

Contributed Talks/Posters (none)

Refereed Papers Published

1. “Beam-helicity asymmetry in associated electroproduction of real photons $e p \rightarrow e \gamma \pi N$ in the Delta-resonance region,” HERMES Collaboration (A. Airapetian et al.). arXiv:1310.5081 [hep-ex], arXiv:1310.5081. 10.1007/JHEP01(2014)077. JHEP 1401 (2014) 077.
2. “Transverse target single-spin asymmetry in inclusive electroproduction of charged pions and kaons,” HERMES Collaboration (A. Airapetian et al.). arXiv:1310.5070 [hep-ex]. 10.1016/j.physletb.2013.11.021. Phys.Lett. B728 (2014) 183-190.
3. “First Determination of the Weak Charge of the Proton,” Qweak Collaboration (D. Androic et al.). arXiv:1307.5275 [nucl-ex]. 10.1103/PhysRevLett.111.141803. Phys.Rev.Lett. 111 (2013) 141803.
4. “The Q_{Weak}^p experiment,” D. Androic, D.S. Armstrong, A. Asaturyan, T. Averett, J. Balewski, J. Beaufait, R.S. Beminiwatha, J. Benesch et al. 10.1007/s10751-013-0782-0. Hyperfine Interact. 214 (2013) 1-3, 21-30.
5. “Measurement of the Parity-Violating Asymmetry in Electron-Deuteron Scattering in the Nucleon Resonance Region,” Jefferson Lab Hall A Collaboration (D. Wang et al.). arXiv:1304.7741 [nucl-ex]. 10.1103/PhysRevLett.111.082501. Phys.Rev.Lett. 111 (2013) 082501.
6. “EM Calorimeters for SoLID at Jefferson Lab,” SoLID Collaboration (Z.W. Zhao et al.). 10.1088/1742-6596/404/1/012020. J.Phys.Conf.Ser. 404 (2012) 012020.
7. “Multiplicities of charged pions and kaons from semi-inclusive deep-inelastic scattering by the proton and the deuteron,” HERMES Collaboration (A. Airapetian et al.). arXiv:1212.5407 [hep-ex]. 10.1103/PhysRevD.87.074029. Phys.Rev. D87 (2013) 074029.

Unpublished Reports

1. “Approaching the nucleon-nucleon short-range repulsive core via the $4\text{He}(e,e'pN)$ triple coincidence reaction,” I. Korover, N. Muangma, O. Hen, R. Shneur, V. Sulkosky, A. Kelleher, S. Gilad, D.W. Higinbotham et al. arXiv:1401.6138 [nucl-ex].
2. “Reevaluation of the Parton Distribution of Strange Quarks in the Nucleon,” HERMES Collaboration (A. Airapetian et al.). arXiv:1312.7028 [hep-ex].
3. “Measurement of pretzelosity asymmetry of charged pion production in Semi-Inclusive Deep Inelastic Scattering on a polarized He-3 target,” Jefferson Lab Hall A Collaboration (Y. Zhang et al.). arXiv:1312.3047 [nucl-ex].
4. “Early Results from the Qweak Experiment,” Qweak Collaboration (D. Androic et al.). arXiv:1311.6437 [nucl-ex].
5. “Single Spin Asymmetries of Inclusive Hadrons Produced in Electron Scattering from a Transversely Polarized He-3 Target,” Jefferson Lab Hall A Collaboration (K. Allada et al.). arXiv:1311.1866 [nucl-ex].
6. “Measurement of the Target-Normal Single-Spin Asymmetry in Deep-Inelastic Scattering from the Reaction $\text{He-3}(e,e')X$,” J. Katich, X. Qian, Y.X. Zhao, K. Allada, K. Aniol, J.R.M. Annand, T. Averett, F. Benmokhtar et al. arXiv:1311.0197 [nucl-ex].

Grants and Awards

- NSF MPS “Precision Electroweak Measurements using Parity-Violating Electron Scattering”, 06/2012-05/2015, \$300k.
- NSF MPS “Precision Studies of the Standard Model using Parity-Violating Electron Scattering” (as co-PI with PI David Armstrong), 08/2014-07/2017, \$906k (under review).
- NSF REU (as PI with co-PI Jack Kossler): 06/2012-05/2014, \$180k.
- NSF REU (as PI with co-PI Irina Novikova): 06/2014-05/2017, \$309k (recommended for award).
- Jefferson Science Associates “Promising Young Scientist Program,” \$2k.
- National Nuclear Physics Summer School 2014, \$60k.
- Small Hall MakerSpace (with co-founder Josh Erlich): \$10k initial + \$5k yearly.

Teaching:

Courses

- Spring 2013: PHYS252, “Electronics 1” (teaching effectiveness 3.8 on a course that has an average of 3.6), added 3rd section to deal with increase in enrollment of 40 students, introduced electronically-graded reading quizzes.
- Fall 2013: PHYS601, “Classical Mechanics” (teaching effectiveness 4.5, “As a graduate physics course, it certainly required much effort from the student (as it should). The instructor taught the course well though, and was helpful in answering questions in and out of class.”).

Senior/Honor Theses

- Rachel Taverner (honors, Summer 2013-present): Determination and simulation of kinematic parameters in the Qweak experiment at JLab. Rachel presented a poster at the APS DNP Fall meeting through the CEU program.
- Jack Anderson (senior, Spring 2013-present): Simulation of the SoLID calorimeter in Geant4. Jack presented a poster at the APS DNP Fall meeting through the CEU program.

Summer Research Students (REU)

- Adora Smith (Norfolk State University) and Nathan Miles (Florida State University): Benchmarking of in-medium nuclear effects on the reaction cross sections for electron scattering using the Genie neutrino event generator. Nate presented a poster at the APS DNP Fall meeting through the

CEU program.

Undergraduate Research Students

- Chris Haufe (junior, Spring 2013-present): Effect of different physical processes on rates in the MOLLER experiment. Chris presented a poster at the APS DNP Fall meeting through the CEU program.
- Rachel Hyneman (junior, Fall 2013-present): Compton polarimetry at Jefferson Lab. Construction of a musical Tesla Coil.
- Marcus Starman (sophomore, Fall 2013-present): Simulation of the MOLLER calorimeter using GDML.
- Melissa Guidry (freshman, Fall 2013-present): Dependence of kinematic parameters on beam slope in the Qweak experiment.
- Jeffrey Buffkin (Governor's School Spring 2013, freshman Fall 2013): Momentum transfer in the Qweak experiment.

Graduate Students

- Juan Carlos Cornejo (Fall 2010-present): Compton polarimetry for the Qweak experiment at JLab, anticipated graduation Fall 2014.
- Valerie Gray (Fall 2011-present): Track reconstruction and simulations for the Qweak experiment at JLab, finished courses Spring 2013.
- Kurtis Bartlett (Summer 2012-present): Simulation of Moller scattering in the Qweak experiment using Geant4, passed qual Winter 2014.
- Melissa Beebe (Summer 2013): Implementation of the MOLLER calorimeter in GDML.

Post Docs (none)

Service:

Department

- Fall 2010-present: Graduate admissions committee (represented department at APS March meeting and Fall DNP meeting grad school fairs, Northeast Conference for Undergraduate Women in Physics grad school fair, presentations to senior class, review of application statements for current seniors).
- Summer 2012-present: W&M Physics REU site coordinator (12-15 non-W&M students and ~20 W&M students, implemented new program components such as tutorials, poster session, power plant trip), represented program at Conference for Undergraduate Research, Fall 2013 (one invited poster by Julia Stone, who worked in Aubin's lab).
- Fall 2012-present: External relations committee (quarterly newsletters to alumni).
- Spring 2013: Nuclear and hadronic theory faculty search committee (hosted Andre Walker-Loud).
- Fall 2013-present: Small Hall MakerSpace co-founder with Josh Erlich, representation at Business School's Small Business Showcase.
- Annual review committee: Yang Wang, Melissa Cummings, Zak Brown, Josh Hoskins, Josh Magee, Jim Dowd, AJ Pyle (and own students).
- Dissertation committee: Ben Rislow (adviser: Carlson).
- Seminars: "Git version control" (Jeff King, Github), "SoLID" (J-P Chen, JLab), "Atomic hydrogen polarimetry" (Patricia Aguar Bartolome, U Mainz), "The Road to an All-Optical Quantum Network" (Patrick Vora, NRL).
- Student cohort building: canoe trip on the Rappahannock, LADEE launch at Chincoteague/Wallops, Punkin Chunkin'.

University

- Freshmen adviser, Spring 2013 (6 students), Fall 2013 (8 students). Major adviser (3 students).
- Cohen Career Center: served in panels on the academic job application process for grad students and postdocs in the sciences, and reviewed application materials during a dedicated workshop.
- Graduate Research Symposium session chair.

Physics Community

- PI on Jefferson Science Associates Initiatives Fund "Promising Young Physicist" project: selection of JLab postdocs for mock job interviews, including review and feedback on job application dossiers and presentations. Hosted Vincent Sulkosky PhD'07.
- LGBT issues/gender diversity in physics:
 - Co-organizer of discussion session at APS March 2013 meeting
 - Development of a Best Practices Guide for physics departments on improving the climate for LGBT+ physicists
- Session chair: APS March 2013 meeting.
- Organizer of Jefferson Lab Hall A Collaboration Meeting, December 2013.
- Reviewer for National Science Foundation.

Public Outreach

- Organizer of 2nd year of "Saturday Morning Physics," a monthly public lecture series, Spring 2013.
- Co-organizer Yorktown Elementary Science Night (Spring 2013), PhysicsFest (Fall 2013), Berkeley Middle School visit (Fall 2013).
- Assisted in QuarkNet masterclass, Spring 2013.