

Russell Neilson
Associate Professor, Drexel University
Philadelphia, PA 19104
neilson@drexel.edu

Education

PhD in Physics Stanford University, Stanford, CA
January 2012, Advisor: Giorgio Gratta, Dissertation: "Discovery of the two-neutrino double-beta decay of xenon-136 with EXO-200."

MSc in Physics University of Auckland, Auckland, New Zealand
May 2002, Thesis: "Investigation of the ^{22}Mg superallowed beta-decay branching ratio."

BSc in Physics and Mathematics University of Auckland, Auckland, New Zealand
May 2000

Appointments

Drexel University: Associate Professor, Sep 2020 - present

Drexel University: Assistant Professor, Sep 2014 - Aug 2020

Experimental particle physics research, including the dark matter direct detection experiments SBC and PICO and the neutrino oscillation experiment PROSPECT.

University of Chicago: Postdoctoral Associate, Dec 2011 - Aug 2014

Dark matter research with the COUPP and PICO experiments.

Stanford University: Research Assistant, Jan 2003 - Nov 2011

PhD Advisor: Giorgio Gratta

Neutrinoless double beta decay research with the EXO experiment.

Texas A&M University: Research Assistant, Jan-Dec 2001

Advisor: John Hardy

Super-allowed beta-decay research.

Australia National University: Research Assistant, Dec 1999 – Feb 2000

Mentor: David Hinde

Sub coulomb-barrier fusion cross-section measurements.

Peer Reviewed Papers

1. **A direct test of Auger induced nucleation from heavy element contamination in C₃F₈ bubble chambers** M Bressler, N Lamb, R Neilson, S Windle, *Journal of Instrumentation* 17 (2022) P03004.
2. **Joint Determination of Reactor Antineutrino Spectrum from ²³⁵U and ²³⁹P Fission by Daya Bay and PROSPECT** F. P. An *et al.* (Daya Bay and PROSPECT Collaborations), *Physics Review Letters* 128 (2022) 8 081801.
3. **Joint Measurement of the ²³⁵U Antineutrino Spectrum by PROSPECT and STEREO** H. Anlmazan *et al.* (PROSPECT and STEREO Collaborations), *Physics Review Letters* 128 (2022) 8 081802.
4. **The EXO-200 detector, part II: auxiliary systems**, N. Ackerman, *et al.* (EXO Collaboration), *Journal of Instrumentation* 17 (2022) P02015.
5. **Recommended conventions for reporting results from direct dark matter searches** D. Baxter *et al.*, *The European Physical Journal C* 81 (2021) 10 1.
6. **Limits on sub-GeV dark matter from the PROSPECT reactor antineutrino experiment** M. Andriamirado *et al.* (PROSPECT Collaboration), *Physics Review D* 104 (2021) 1 012009.
7. **Improved short-baseline neutrino oscillation search and energy spectrum measurement with the PROSPECT experiment at HFIR** M. Andriamirado *et al.* (PROSPECT Collaboration), *Physics Review D* 103 (2021) 3 032001.
8. **Physics Reach of a low threshold scintillating argon bubble chamber in coherent elastic neutrino-nucleus scattering experiments** L. J. Flores *et al.* (SBC Collaboration), *Physics Review D* 103 (2021) 9 L031301.
9. **Nonfuel antineutrino contributions in the ORNL High Flux Isotope Reactor (HFIR)**, A. B. Balantekin *et al.* (PROSPECT Collaboration), *Physics Review C* 101 (2020) 5 054605.
10. **Measurement of the scintillation and ionization response of liquid xenon at MeV energies in the EXO-200 experiment**, G. Anton *et al.* (EXO-200 Collaboration), *Physics Review C* 101 (2020) 6, 065501.
11. **Velocity Independent Constraints on Spin-Dependent DM-Nucleon Interactions from IceCube and PICO**, M. G. Aartsen *et al.* (IceCube and PICO Collaborations), *European Journal of Physics C* 80 (2020) 9, 819.
12. **A buffer-free concept bubble chamber for PICO dark matter searches**, M. Bressler, P. Champion, V. S. Cushman, A. Morrese, J. M. Wagner, S. Zerbo, R. Neilson, M. Crisler and C. E. Dahl, *Journal of Instrumentation* 14 (2019) P08019.
13. **The Radioactive Source Calibration System of the PROSPECT Reactor Antineutrino Detector**, J. Ashenfelter *et al.* (PROSPECT Collaboration), *Nuclear Instruments And Methods A* 944 (2019) 162465.
14. **A Low Mass Optical Grid for the PROSPECT Reactor Antineutrino Detector**, J. Ashenfelter *et al.* (PROSPECT Collaboration), *Journal of Instrumentation* 14 (2019) P04014.
15. **Dark Matter Search Results from the Complete Exposure of the PICO-60 C₃F₈ Bubble Chamber**, C. Amole *et al.* (PICO Collaboration), *Physics Review D* 100 (2019) 022001.
16. **Lithium-loaded Liquid Scintillator Production for the PROSPECT experiment**, J. Ashenfelter *et al.* (PROSPECT Collaboration), *Journal of Instrumentation* 14 (2019) P03026.
17. **Measurement of the Antineutrino Spectrum from ²³⁵U Fission at HFIR with PROSPECT**, J. Ashenfelter *et al.* (PROSPECT Collaboration), *Physics Review Letters* 122 (2019) 251801.
18. **The PROSPECT Reactor Antineutrino Experiment**, J. Ashenfelter *et al.* (PROSPECT Collaboration), *Nuclear Instruments and Methods A* 922 (2019) 287-309.
19. **First search for short-baseline neutrino oscillations at HFIR with PROSPECT**, J. Ashenfelter *et al.* (PROSPECT Collaboration), *Physics Review Letters* 121 (2018) 251802.

20. **Performance of a segmented ^6Li -loaded liquid scintillator detector for the PROSPECT experiment**, J. Ashenfelter *et al.* (PROSPECT Collaboration), *Journal of Instrumentation* 13 (2018) P06023.
21. **Dark Matter Search Results from the PICO-60 C_3F_8 Bubble Chamber**, C. Amole *et al.* (PICO Collaboration), *Physical Review Letters* 118 (2017) 251301.
22. **Trace radioactive impurities in final construction materials for EXO-200**, D. Leonard *et al.* (EXO Collaboration), *Nuclear Instruments and Methods A* 871 (2017) 169-179.
23. **The PROSPECT Physics Program**, J. Ashenfelter *et al.* (PROSPECT Collaboration), *Journal of Physics G* 43 (2016) 113001.
24. **Improved Dark Matter Search Results from PICO-2L Run 2**, C. Amole *et al.* (PICO Collaboration), *Physical Review D* 93 (2016) 061101.
25. **Dark Matter Search Results from the PICO-60 CF_3I Bubble Chamber**, C. Amole *et al.* (PICO Collaboration), *Physical Review D* 93 (2016) 052014.
26. **Dark Matter Search Results for the PICO-2L C_3F_8 Bubble Chamber**, C. Amole, *et al.* (PICO Collaboration), *Physical Review Letters* 114 (2015) 231302.
27. **Light Collection and Pulse-Shape Discrimination in Elongated Scintillator Cells for the PROSPECT Reactor Antineutrino Experiment**, J. Ashenfelter *et al.* (PROSPECT Collaboration), *Journal of Instrumentation* 10 (2015) P11004.
28. **Direct measurement of the bubble-nucleation energy threshold in a CF_3I bubble chamber**, E. Behnke, *et al.* (COUPP Collaboration), *Physical Review D* 88 (2013) 021101.
29. **Search for Neutrinoless Double Beta Decay in ^{136}Xe with EXO-200**, M. Auger, *et al.* (EXO Collaboration), *Physical Review Letters* 109 (2012) 032505.
30. **The EXO-200 detector, part I: Detector design and construction**, M. Auger, *et al.* (EXO Collaboration), *Journal of Instrumentation* 7 (2012) P05010.
31. **Xenon purity analysis for EXO-200 via mass spectrometry**, A. Dobi, *et al.* (EXO Collaboration), *Nuclear Instruments and Methods in Physics Research A* 675 (2012) 40-46.
32. **Observation of the two-neutrino double-beta decay of ^{136}Xe with EXO-200**, N. Ackerman, *et al.* (EXO Collaboration), *Physical Review Letters* 107 (2011) 212501.
33. **A xenon gas purity monitor for EXO**, A. Dobi, *et al.* (EXO Collaboration), *Nuclear Instruments and Methods in Physics Research A* 659 (2011) 215-228.
34. **A magnetically-driven piston pump for ultra-clean applications**, F. LePort, *et al.* (EXO Collaboration), *Review of Scientific Instruments* 82 (2011) 105114.
35. **A simple radionuclide-driven single-ion source**, M. Montero Diez, *et al.* (EXO Collaboration), *Review of Scientific Instruments* 81 (2010) 113301.
36. **Characterization of large area APDs for the EXO-200 detector**, R. Neilson, *et al.* (EXO Collaboration), *Nuclear Instruments and Methods in Physics Research A* 608 (2009) 68-75.
37. **Systematic study of trace radioactive impurities in candidate construction materials for EXO-200**, D. S. Leonard, *et al.* (EXO Collaboration), *Nuclear Instruments and Methods in Physics Research A* 591 (2008) 490-509.
38. **A microfabricated sensor for thin dielectric layers**, P. Fierlinger, R. DeVoe, B. Flatt, G. Gratta, M. Green, S. Kolkowitz, F. Leport, M. Montero Diez, R. Neilson, K. O'Sullivan, A. Pocar, J. Wodin, *Review of Scientific Instruments* 79 (2008)
39. **Observation of single collisionally cooled trapped ions in a buffer gas**, M. Green, *et al.* (EXO Collaboration), *Physical Review A* 76 (2007) 023404.
40. **A linear RFQ ion trap for the Enriched Xenon Observatory**, B. Flatt, *et al.* (EXO Collaboration), *Nuclear Instruments and Methods in Physics Research A* 578 (2007) 399-408.
41. **A liquid xenon ionization chamber in an all-fluoropolymer vessel**, F. LePort, *et al.* (EXO Collaboration), *Nuclear Instruments and Methods in Physics Research A* 578 (2007) 409-420.

42. **Isotopic dependence of fusion barrier energies in reactions forming heavy elements**, J. Hinde, M. Dasgupta, N. Herrald, R.G. Neilson, J.O. Newton, M.A. Lane, *Physical Review C* 75 (2007) 054603.
43. **Mobility of thorium ions in liquid xenon**, K. Wamba, *et al.* (EXO Collaboration), *Nuclear Instruments and Methods in Physics Research A* 555 (2005) 205-210.
44. **High Precision Measurement of the Superaligned $0^+ \rightarrow 0^+$ β Decay of ^{22}Mg** , J. C. Hardy, V. E. Jacob, M. Sanchez-Vega, R. G. Neilson, A. Azhari, C. A. Gagliardi, V. E. Mayes, X. Tang, L. Trache, and R. E. Tribble, *Physics Review Letters* 91 (2003) 082501.
45. **The use of Monte Carlo calculations in the determination of a Ge detector efficiency curve**, R. G. Helmer, J. C. Hardy, V. E. Jacob, M. Sanchez-Vega, R. G. Neilson and J. Nelson, *Nuclear Instruments and Methods in Physics Research A* 511 (2003) 360-381.
46. **Beta decay of ^{62}Ga** , C. Hyman, V. E. Jacob, A. Azhari, C. A. Gagliardi, J. C. Hardy, V. E. Mayes, R. G. Neilson, M. Sanchez-Vega, X. Tang, L. Trache, and R. E. Tribble, *Physics Review C* 68 (2003) 015501.

Invited Presentations

1. University at Albany, Physics Colloquium, October 15, 2021, Albany New York
2. Magnificent CEvNS workshop, November 16-20 2020, virtual.
3. University of Maryland, High Energy Physics Seminar, April 17, 2019; College Park, Maryland
4. Identification of Dark Matter 2018, Plenary talk, September 23-27, 2018; Providence Rhode Island
5. Drexel University, College of Arts and Sciences Deans Seminar, February 18, 2018; Philadelphia, Pennsylvania
6. Fermi National Accelerator Laboratory, Joint Theory and Experiment Seminar, July 15, 2016; Batavia, Illinois
7. University of Pennsylvania, High Energy Physics Seminar, February 9, 2016; Philadelphia, Pennsylvania
8. University of Maryland, High Energy Physics Seminar, November 5, 2014; College Park, Maryland
9. Drexel University, College of Arts and Sciences Deans Seminar, October 29, 2014, Philadelphia, Pennsylvania
10. University of Massachusetts, High Energy Physics Seminar, October 17, 2014; Amherst, Massachusetts
11. Drexel University, Physics Colloquium, April 3, 2014 Philadelphia, Pennsylvania
12. University at Albany, Physics Seminar, March 18, 2014; Albany New York
13. Aspen 2013 - Closing in on Dark Matter, Invited talk, January 28-February 3, 2013; Aspen, Colorado
14. University of Minnesota, Cosmology Lunchtime Seminar, October 15, 2012; Minneapolis, Minnesota
15. Fermilab, Astrophysics seminar, July 6, 2010; Batavia, Illinois

Contributed Presentations

1. APS DPF 2021, July 12-24; Florida State University (virtual)
2. APS April Meeting 2020, April 18-21; Washington DC (virtual)
3. APS April Meeting 2017, January 28-31, 2017; Washington DC
4. 11th Symposium on Sources and Detection of Dark Matter and Dark Energy (UCLA 2014), February 26-28, 2014; Los Angeles, California

5. Symposium on Cosmology and Particle Astrophysics (CosPA 2013), November 12-15, 2013; Honolulu, Hawaii
6. Topics in Astroparticle and Underground Physics (TAUP 2013), September 8-13, 2013; Asilomar, California
7. IceCube Particle Astrophysics Symposium (IPA 2013), May 13-15, 2013; Madison, Wisconsin
8. LHC, Particle Physics and the Cosmos, July 13-15, 2012; Auckland, New Zealand
9. 36th International Conference on High Energy Physics (ICHEP 2012), July 4-11, 2012; Melbourne, Australia
10. Neutrinos and Dark Matter in Nuclear Physics (NDM 2012), June 11-15, 2012; Nara, Japan
11. Technology and Instrumentation in Particle Physics 2011 (TIPP 2011), June 9-14, 2011; Chicago, Illinois
12. 3rd Joint Meeting of the APS Division of Nuclear Physics and the Physics Society of Japan, October 13–17, 2009; Waikoloa, Hawaii
13. Neutrino 2008 (poster and poster session mini-talk), May 25-31, 2008; Christchurch, New Zealand
14. 10th ICATPP Conference on Astroparticle, Particle, Space Physics, Detectors and Medical Physics Applications, October 8-12, 2007; Como, Italy

Courses Taught

- Undergraduate courses
 - Spring 2021 – 22 Physics 330: Introduction to Nuclear Physics
 - Winter 2021 – 22 Physics 327: Introduction to Quantum Mechanics II
 - Fall 2021 – 22 Physics 326: Introduction to Quantum Mechanics I
 - Fall 2020 – 21 University S201: Academics and Careers
 - Fall 2020 – 21 Physics 101: Fundamentals of Physics I (recitation instructor)
 - Spring 2019 – 20 Physics 102; Fundamentals of Physics II
 - Spring 2018 – 19 Physics 102: Fundamentals of Physics II
 - Fall 2018 – 19 University S201: Academics and Careers
 - Fall 2017 – 18 University S201: Academics and Careers
 - Spring 2016 – 17 Physics 102: Fundamentals of Physics II
 - Winter 2016 – 17: Physics 328: Advanced Laboratory
 - Fall 2016 – 17 University S201: Academics and Careers
- Graduate courses
 - Spring 2020 – 21: Physics 512: Electromagnetic Theory II
 - Winter 2020 – 21: Physics 511: Electromagnetic Theory I
 - Spring 2018 – 19: Physics 512: Electromagnetic Theory II
 - Winter 2018 – 19: Physics 511: Electromagnetic Theory I
 - Spring 2017 – 18: Physics 512: Electromagnetic Theory II
 - Spring 2015 – 16: Physics 512: Electromagnetic Theory II
 - Winter 2015 – 16: Physics 511: Electromagnetic Theory I
 - Spring 2014 – 15: Physics 512: Electromagnetic Theory II

Undergraduate Trainees

- Co-op students: Peter Campion (2015, 2016), Scott Cushman (2015 – 16), Cuong Trinh (2016, 2017), Salvatore Zerbo (2017), Johannes Wagner (2017, 2018), Michael Bowen (2018), Christian Nave (2019), Stephen Windle (2019, 2020), Manjinder Oueslati (2020, 2021). Dmitri LaBelle (2022)

- STAR summer research students: Karen Chu (2016), Matthew Seidman (2017), Omesh Dwivedi (2018), Rafay Ahmed (2019), Declan McCloskey (2019), Joseph Barberio (2019), Andrew Phillips (2020 – 21), Thomas Ruggiero (2020 – 21), Arnav Sharma (2021 – 22).
- Senior research students
 - Manjinder Oueslati (2021 – 22)
 - Ethan Konyk (2021 – 22)
 - Stephen Windle (2020 – 21) “Gamma-Nucleus Scattering Backgrounds in the Scintillating Bubble Chamber”
 - Christian Nave (2019 – 20) “Neutron Mobility and Cosmogenic Fast Neutron Backgrounds in the PROSPECT Reactor Antineutrino Detector.”
 - Salvatore Zerbo (2018 – 19) “Development of a Low Energy Neutron Source for Bubble Chamber Calibrations”
 - Cuong Tring (2018 – 19) “Extraction of Data from Single PMT Segment for the PROSPECT Detector”
 - Aengus Walker (2017 – 18) “Dark Matter Filtration: Developing a Recirculation System for the Drexel Bubble Chamber”
 - Ben Altieri (2017 – 18) “Calibrating PROSPECT Neutrino Detector for Low Energies”
 - Peter Campion (2016 – 17) “PICO 24mm Right-side-up Threshold”

Graduate Trainees

- Doctoral students
 - Matthew Bressler, PICO and SBC (2016 –)
 - Noah Lamb, PICO and SBC (2020 –)
 - Kendall Butler, PROSPECT (2021)
 - Virginia Price, PICO (2015)
- Masters students
 - Kevin Shine, PROSPECT (2022 –)
 - Alexander Moresse, PICO (2016 – 2017)
- Postdoctoral researchers
 - Pierce Weatherly, PROSPECT (2019 –)
 - Jonathan Insler, PROSPECT (2016 – 2018)
 - Yung-Ruey Yen, PROSPECT (2015 – 2018)

External Funding

- DOE Office of Science HEP, co-Investigator, “Experimental Particle Physics at Drexel”, \$1,122,000, June 2021 – March 2025.
- DOE Office of Science HEP, co-Investigator, “Neutrino and Dark Matter Physics at Drexel”, \$1,105,000, April 2017 – March 2021.
- Fermilab LDRD, co-Investigator, “A scintillating liquid argon bubble chamber for Weakly-interacting Massive Particle (WIMP) and Coherent Elastic Neutrino Nucleus Scattering (CEvNS)”, \$691,490, Drexel sub-award \$31,120, March 2018 – April 2021.
- DOE Office of Science HEP INRP, “PROSPECT: A Precision Reactor Oscillation and Spectrum Experiment”, \$3,000,000, Drexel sub-award \$10,000, July 2016 – June 2021

Internal Funding, Drexel University

- Research Co-op Award, Drexel University, \$7,250, September 2015 – April 2016

Academic Committee Appointments

- Department of Physics Undergraduate Curriculum Committee (2021 –)
- University Radiation Safety Committee (2017 – 20)
- Joint College of Arts and Science and School of Education Physics Education Research Hiring Committee (2016)
- Department of Physics Graduate Academic Committee (2016 – 20)
- Department of Physics Bylaws Committee (2016 – 17)
- Department of Physics Graduate Admissions Committee (2016)