Brooke Russell

Curriculum Vitae

Massachusetts Institute of Technology
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EDUCATION

Ph. D., Physics, Yale University, 2020
Dissertation title: An electron neutrino appearance search in MicroBooNE with 5×10^{19} POT
Advisor: Bonnie Fleming
M. Phil., Physics, Yale University, 2016
M. S., Physics, Yale University, 2016
A. B., Physics, Princeton University, 2011
Senior thesis: An internal liquid argon purification system for liquid argon dark matter detectors
Advisor: Frank Calaprice

EMPLOYMENT

The Neil and Jane Pappalardo Special Fellow in Physics, Massachusetts Institute of Technology, 2024-
Owen Chamberlain Postdoctoral Fellow, Lawrence Berkeley National Laboratory, 2020-2023
Graduate Research Assistant, Yale University, 2013-2019
Post-baccalaureate Research Assistant, Princeton University, 2011-2013
Undergraduate Research Assistant, University of North Carolina Chapel Hill, 2009, 2010

HONORS

Pappalardo Fellowship in Physics, Massachusetts Institute of Technology, 2024-
For Women in Science Fellowship, L'Oreal USA & American Association for the Advancement of Science, 2021
Gertrude Scharff-Goldhaber Prize, Brookhaven National Laboratory, 2019
Owen Chamberlain Postdoctoral Fellowship, Lawrence Berkeley National Laboratory, 2020-2023
Troesh Prize Postdoctoral Fellowship (declined), California Institute of Technology, 2019
Dean's Emerging Scholars Research Award, Yale University, 2016
Office of Science Graduate Student Research Award, US Department of Energy, 2016
Leigh Page Prize, Yale University Physics Department, 2013
Co-captain, Princeton University Women's Varsity Track & Field, 2011
NAACP Academic Scholarship, Santa Maria-Lompoc NAACP Chapter, 2007-2011

PUBLICATIONS

INSPIRE reports a *h-index* of 40 for citeable work and 35 for published work.

Manuscripts in Review

8. A. Abed Abud *et al.* (DUNE Collaboration), *Supernova Pointing Capabilities of DUNE*, arXiv:2407.10339 [hep-ex]. In review at *Physical Review D*

7. F.P. An *et al.* (Daya Bay Collaboration), *Measurement of Electron Antineutrino Oscillation Amplitude and Frequency via Neutron Capture on Hydrogen at Daya Bay*, arXiv:2406.01007 [hep-ex]. In review at *Physical Review Letters*

6. F.P. An *et al.* (Daya Bay Collaboration), *Search for a sub-eV sterile neutrino using Daya Bay's full dataset*, arXiv:2404.01687 [hep-ex]. In review at *Physical Review Letters*

5. A. Abed Abud *et al.* (DUNE Collaboration), *Performance of a modular ton-scale pixel-readout liquid argon time projection chamber*, arXiv:2403.03212v1 [physics.ins-det]. In review at *Instruments*

4. F.P. An *et al.* (Daya Bay Collaboration), *First measurement of the yield of ^{8}He isotopes produced in liquid scintillator by cosmic-ray muons at Daya Bay*, arXiv:2402.05383 [nucl-ex]. In review at *Physical Review Letters*

3. A. Abed Abud *et al.* (DUNE Collaboration), *Doping liquid argon with xenon in ProtoDUNE Single-Phase: effects on scintillation light*, arXiv:2402.01568 [physics.ins-det]. In review at *JINST*

2. F.P. An *et al.* (Daya Bay Collaboration), *Charged-current non-standard neutrino interactions at Daya Bay*, arXiv:2401.02901 [hep-ph]. Submitted to *JHEP*

1. J. Asaadi, D.A. Dwyer, B. Russell, *Novel Liquid Argon Time-Projection Chamber Readouts.* In review at *Annual Review of Nuclear and Particle Science.*

Refereed Journal Articles

41. F.P. An *et al.* (Daya Bay Collaboration), *Improved Measurement of the Evolution of the Reactor Antineutrino Flux and Spectrum at Daya Bay*, *Phys. Rev. Lett.* **130** (2023) 211801.

40. F.P. An *et al.* (Daya Bay Collaboration), *Precision Measurement of Reactor Antineutrino Oscillation at Kilometer-Scale Baselines by Daya Bay*, *Phys. Rev. Lett.* **130** (2023) 161802.

39. A. Abed Abud *et al.* (DUNE Collaboration), *Impact of cross-section uncertainties on supernova neutrino spectral parameter fitting in the Deep Underground Neutrino Experiment*, *Phys. Rev.* **D107** (2023) 112012.

38. A. Abed Abud *et al.* (DUNE Collaboration), *Highly-parallelized simulation of pixelated LArTPC on a GPU*, *JINST* **18** (2023) P04034.

37. A. Abed Abud *et al.* (DUNE Collaboration), *Identification and reconstruction of low-energy electrons in the ProtoDUNE-SP detector*, *Phys. Rev.* **D107** (2023) 092012.

36. A. Abed Abud *et al.* (DUNE Collaboration), *Reconstruction of interactions in the ProtoDUNE-SP detector with Pandora*, *Eur. Phys. J.* **C83** (2023) 618.

35. P. Abratenko *et al.* (MicroBooNE Collaboration), *Search for an Excess of Electron Neutrino Interactions in MicroBooNE Using Multiple Final-State Topologies*, *Phys. Rev. Lett.* **128** (2022) 241801.

34. P. Abratenko *et al.* (MicroBooNE Collaboration), *Search for an anomalous excess of inclusive charged-current ν_e interactions in the MicroBooNE experiment using Wire-Cell reconstruction*, *Phys. Rev.* **D105** (2022) 112005.

33. A. Abed Abud *et al.* (DUNE Collaboration), *Separation of track- and shower-like energy deposits in ProtoDUNE-SP using a convolutional neural network*, *Eur. Phys. J.* **C82** (2022) 903.

32. A. Abed Abud *et al.* (DUNE Collaboration), *Scintillation light detection in the 6-m drift-length ProtoDUNE Dual Phase liquid argon TPC*, *Eur. Phys. J.* **C82** (2022) 618.

31. A. Abed Abud *et al.* (DUNE Collaboration), *Low exposure long-baseline neutrino oscillation sensitivity of the DUNE experiment*, *Phys. Rev.* **D105** (2022) 072006.

30. A. Abed Abud *et al.* (DUNE Collaboration), *Design, construction and operation of the ProtoDUNE-SP Liquid Argon TPC*, *JINST* **17** (2022) P01005.

29. A. Abed Abud *et al.* (DUNE Collaboration), *Deep Underground Neutrino Experiment (DUNE) Near Detector Conceptual Design Report*, *Instruments* **5** (2021) 31.

28. P. Abratenko *et al.* (MicroBooNE Collaboration), *Cosmic Ray Background Rejection with Wire-Cell LArTPC Event Reconstruction in the MicroBooNE Detector*, *Phys. Rev. Applied* **15** (2021) 064071.

27. A. Abed Abud *et al.* (DUNE Collaboration), *Searching for solar KDAR with DUNE*, *JCAP* **10** (2021) 065.

26. P. Abratenko *et al.* (MicroBooNE Collaboration), *Measurement of the flux-averaged inclusive charged-current electron neutrino and antineutrino cross section on argon using the NuMI beam and the MicroBooNE detector*, *Phys. Rev.* **D104** (2021) 052002.

25. P. Abratenko *et al.* (MicroBooNE Collaboration), *Measurement of the atmospheric muon rate with the MicroBooNE Liquid Argon TPC*, *JINST* **16** (2021) P04004.

24. P. Abratenko *et al.* (MicroBooNE Collaboration), *Measurement of the differential cross sections for ν_μ-Ar charged-current interactions with protons and no pions in the final state with the MicroBooNE detector*, *Phys. Rev.* **D102** (2020) 112013.

23. P. Abratenko *et al.* (MicroBooNE Collaboration), *The continuous readout stream of the MicroBooNE liquid argon time projection chamber for detection of supernova burst neutrinos*, *JINST* **16** (2021) P02008.

22. B. Abi *et al.* (DUNE Collaboration), *Prospects for beyond the Standard Model physics searches at the Deep Underground Neutrino Experiment*, *Eur. Phys. J.* **81** (2021) 322.

21. B. Abi *et al.* (DUNE Collaboration), *Supernova neutrino burst detection with the Deep Underground Neutrino Experiment*, *Eur. Phys. J.* **C81** (2021) 423.

20. P. Abratenko *et al.* (MicroBooNE Collaboration), *Convolutional neural network for multiple particle identification in the MicroBooNE liquid argon time projection chamber*, *Phys. Rev.* **D103** (2021) 092003.

19. P. Abratenko *et al.* (MicroBooNE Collaboration), *Semantic segmentation with a sparse convolutional neural network for event reconstruction in MicroBooNE*, *Phys. Rev.* **D103** (2021) 052012.

18. A. Ashkenazi *et al.* (MicroBooNE Collaboration), *Neutrino event selection in the MicroBooNE liquid argon time projection chamber using Wire-Cell 3D imaging, clustering, and charge-light matching*, *JINST* **16** (2021) P06043.

17. P. Abratenko *et al.* (MicroBooNE Collaboration), *Cosmic Ray Background Rejection with Wire-Cell LArTPC Event Reconstruction in the MicroBooNE Detector*, *Phys. Rev. Applied* **15** (2021) 064071.

16. P. Abratenko *et al.* (MicroBooNE Collaboration), *Vertex-finding and reconstruction of contained two-track neutrino events in the MicroBooNE detector*, *JINST* **16** (2021) P02017.

15. P. Abratenko *et al.* (MicroBooNE Collaboration), *Measurement of space charge effects in the MicroBooNE LArTPC using cosmic muons*, *JINST* **15** (2020) P12037.

14. B. Abi *et al.* (DUNE Collaboration), *First results on ProtoDUNE-SP liquid argon time projection chamber performance from a beam test at the CERN Neutrino Platform*, *JINST* **15** (2020) P12004.

13. B. Abi *et al.* (DUNE Collaboration), *Neutrino interaction classification with a convolutional neural network DUNE far detector*, *Phys. Rev.* **D102** (2020) 092003.

12. B. Abi *et al.* (DUNE Collaboration), *Long-baseline neutrino oscillation physics potential of the DUNE experiment*, *Eur. Phys. J.* **C80** (2020) 978.

11. P. Abratenko *et al.* (MicroBooNE Collaboration), *First Measurement of Differential Charged Current Quasielasticlike ν_μ-Argon Scattering Cross Sections with the MicroBooNE Detector*, *Phys. Rev. Lett.* **125** (2020) 201803.

10. B. Abi *et al.* (DUNE Collaboration), *Deep Underground Neutrino Experiment (DUNE), Far Detector Technical Design Report, Volume III. DUNE far detector technical coordination*, *JINST* **15** (2020) T08009.

9. B. Abi *et al.* (DUNE Collaboration), *Deep Underground Neutrino Experiment (DUNE), Far Detector Technical Design Report, Volume I. Introduction to DUNE*, *JINST* **15** (2020) T08008.

8. P. Abratenko *et al.* (DUNE Collaboration), *Search for heavy neutral leptons decaying into muon-pion pairs in the MicroBooNE detector*, *Phys. Rev.* **D101** (2020) 052001.

7. C. Adams *et al.* (MicroBooNE Collaboration), *Reconstruction and measurement of $\mathcal{O}(100)$ MeV energy electromagnetic activity from $\pi^0 \to \gamma\gamma$ decays in the MicroBooNE LArTPC*, *JINST* **15** (2020) P02007.

6. C. Adams *et al.* (MicroBooNE Collaboration), *A method to determine the electric field of liquid argon time projection chambers using a UV laser system and its application in MicroBooNE*, *JINST* **15** (2020) P07010.

5. C. Adams *et al.* (MicroBooNE Collaboration), *Calibration of the charge and energy loss per unit length of the MicroBooNE liquid argon time projection chamber using muons and protons*, *JINST* **15** (2020) P03022.

4. P. Abratenko *et al.* (MicroBooNE Collaboration), *First Measurement of Inclusive Muon Neutrino Charged Current Differential Cross Sections on Argon at E_ν 0.8 GeV with the MicroBooNE Detector*, *Phys. Rev. Lett.* **123** (2019) 131801.

3. C. Adams *et al.* (MicroBooNE Collaboration), *Design and construction of the MicroBooNE Cosmic Ray Tagger system*, *JINST* **14** (2019) P04004.

2. R. Acciari *et al.*, *Convolutional neural networks applied to neutrino events in a liquid argon time projection chamber*, *JINST* **12** (2017) P03011.

1. X. Pi *et al.*, *Bmper Inhibits Endothelial Expression of Inflammatory Adhesion Molecules and Protects Against Atherosclerosis*, *Arteriosclerosis, Thrombosis, and Vascular Biology* **32** (2012) 2214.

White Papers

5. L. Alvarez-Ruso *et al.*, *Neutrino Scattering Measurements on Hydrogen and Deuterium: A Snowmass White Paper*, arXiv:2203.11298v2 [hep-ex].

4. L. Alberez-Ruso *et al.*, *Bubble chamber Detectors with Light Nuclear Targets: A Snowmass 2021 White Paper*, arXiv:2203.11319v1 [physics.ins-det].

3. A. Abed Abud *et al.* (DUNE Collaboratoin), *A Gaseous Argon-Based Neutrino Detector to Enhance the Physics Capabilities of DUNE*, arXiv:2203.06281v1 [hep-ex].

2. A. Abed Abud *et al.* (DUNE Collaboration), *Snowmass Neutrino Frontier: DUNE Physics Summary*, arXiv:2203.06100v1 [hep-ex].

1. D. Caratelli *et al.*, *Low-Energy Physics in Neutrino LArTPCs*, arXiv:2203.00740v1 [physics.ins-det].

Conference Proceedings

B. Russell, *The 2×2 Demonstrator — A demonstrator for the DUNE ND-LAr Near Detector based on the ArgonCube Design*, *PoS* **TAUP2023** (2024) 221.

Other

9. A. Abed Abud *et al.* (DUNE Collaboration), *The DUNE Far Detector Vertical Drift Technology, Technical Design Report*, arXiv:2312.03130 [hep-ex].

8. A. Abed Abud *et al.* (DUNE Collaboration), *DUNE Offline Computing Conceptual Design Report*, arXiv:2210.15665 [physics.data-an].

7. B. Abi *et al.* (DUNE Collaboration), *Experiment Simulation Configurations Approximating DUNE TDR*, arXiv:2103.04797 [hep-ex].

6. B. Abi *et al.* (DUNE Collaboration), *Deep Underground Neutrino Experiment (DUNE), Far Detector Technical Design Report, Volume IV: Far Detector Single-phase Technology*, arXiv:2002.03010 [physics.ins-det].

5. B. Abi *et al.* (DUNE Collaboration), *Deep Underground Neutrino Experiment (DUNE), Far Detector Technical Design Report, Volume II: DUNE Physics*, arXiv:2002.03005 [hep-ex].

4. R. Acciari *et al.* (DUNE Collaboration), *Long-Baseline Neutrino Facility (LBNF) and Deep Underground Neutrino Experiment (DUNE) Conceptual Design Report Volume 4: The DUNE Detectrs at LBNF*, arXiv:1601.02984 [physics.ins-det].

3. R. Acciari *et al.* (DUNE Collaboration), *Long-Baseline Neutrino Facility (LBNF) and Deep Underground Neutrino Experiment (DUNE) Conceptual Design Report Volume 1: The LBNF and DUNE Projects*, arXiv:1601.05471 [physics.ins-det].

2. R. Acciari *et al.* (DUNE Collaboration), *Long-Baseline Neutrino Facility (LBNF) and Deep Underground Neutrino Experiment (DUNE) Conceptual Design Report Volume 2: The Physics Program for DUNE at LBNF*, arXiv:1512.06148 [physics.ins-det].

1. R. Acciari *et al.* (ICARUS-WA104, LAr1-ND, and MicroBooNE Collaborations), *A Proposal for a Three Detector Short-Baseline Neutrino Oscillation Program in the Fermilab Booster Neutrino Beam*, arXiv:1503.01520 [physics.ins-det].

ORAL PRESENTATIONS

Colloquia
Physics Department Colloquium, University of Texas at Arlington, (scheduled) November 2024
Department of Physics and Astronomy Colloquium, Tufts University, (scheduled) November 2024
Physics Department Colloquium, Wellesley College, May 2022
Physics and Astronomy Department Colloquium, Dartmouth University, April 2022
Physics Department Colloquium, University of California Berkeley, March 2022
Nuclear and Particle Physics Colloquium, Massachusetts Institute of Technology, February 2022
Physics Department Colloquium, Syracuse University, March 2021

Seminars
Chemistry and Physics Seminar, Southeastern Louisiana University, (scheduled) November 2024

High Energy Physics Seminar, California Institute of Technology, October 2023
Neutrino Seminar, Fermi National Accelerator Laboratory, May 2022
High Energy Experiment Seminar, Boston University, February 2022
P3 Seminar, Los Alamos National Laboratory, June 2021
Chemistry and Physics Seminar, Southeastern Louisiana University, March 2021
Laboratory for Nuclear Science Lunchtime Seminar, Massachusetts Institute of Technology, February 2021
Scharff-Goldhaber Prize Seminar, Brookhaven National Laboratory, July 2019
Particle & Nuclear Astrophysics Dicke Candidate Seminar, Princeton University, January 2019
Research Progress Meeting, Lawrence Berkeley National Laboratory, December 2018
High Energy Physics Seminar, Northwestern University, November 2018
Particle Physics Seminar, Brookhaven National Laboratory, April 2018

Conferences
TAUP (parallel), Vienna, Austria, August 2023
CPAD (parallel), Stony Brook, New York, December 2022
Snowmass Commmunity Summer Study (parallel, invited), Seattle, Washington, July 2022
Ann Nelson Memorial Fest (plenary, invited), Seattle, Washington, July 2022
Neutrino (poster), Online, June 2022
APS April Meeting (parallel), Online, April 2021
CPAD (plenary), Online, March 2021
NNN (plenary), Vancouver, Canada, November 2018
Neutrino (poster), Heidelberg, Germany, June 2018
DPF (poster), Batavia, Illinois, July 2017
New Perspectives (plenary), Batavia, Illinois, June 2015
CIPANP (parallel), Vail, Colorado, May 2015

Workshops
The Second Wire-Cell Reconstruction Summit, Upton, New York, April 2024
Rising Stars in Physics Workshop, Palo Alto, California, April 2019
Workshop on Calibration and Reconstruction for LArTPCs, Batavia, Illinois, December 2018

PHYSICS OUTREACH

Invited Speaker
Berkowitz Elementary, Chelsea, Massachusetts, May 2024
NAACP Juneteenth Celebration (keynote), Lompoc, California, June 2022
Self e-STEM Camp, Oakland, California, February 2022
Acorn Woodland Elementary, Oakland, California, February 2021
LBNL QuarkNet, Online, July 2020/2021
Cesar E. Chavez Multicultural Academic Center, Chicago, Illinois, May 2016
Santa Maria-Lompoc NAACP Chapter Meeting, Santa Maria, California, July 2011

Volunteer
Class volunteer, Adopt-A-Physicist, Online, 2021
Event volunteer, Berkeley Lab Director's Apprenticeship Program, June 2020
Event volunteer, Yale Physics Girls Science Investigations, 2016
Event volunteer, Yale Physics Olympics, October 2014/2016

Other
Guest contributor, Physics World, October 2020
Guest contributor, Physics Today, October 2020