Dr. Brigid D. Crowe

EDUCATION

Ph.D., Physics, University of New Hampshire, 2019
Concentration: Experimental Particle Physics
Dissertation Title: *"Heavy Photon Displaced Vertex Search at 2.3GeV with Prospects for True Muonium Discovery"*
Dissertation Advisor: Maurik Holtrop, Ph.D

M.S., Physics, The University of Memphis, 2013
Concentration: Mathematical Physics
Thesis Title: *"Path Integral Approach to Time-Fractional Quantum Mechanics"*
Thesis Advisor: Narahari B. Achar, Ph.D

B.S., Magna cum Laude, Physics and Mathematics,
Chemistry (minor), The University of Memphis, 2011
I also completed 39 credits of various Engineering and Computer Science classes

RESEARCH EXPERIENCE

Postdoctoral Research Associate, Kansas State University, 2023 – present
- Part of the Mu2e collaboration at Fermilab, searching for exotic muon decays
- Primarily working with the Cosmic Ray Veto (CRV) subsystem and EPICS database

Postdoctoral Research Associate, University of Memphis, 2022 - 2023
- Studying novel applications of phosphor thermometry combined with flexible ceramics
- Synthesizing and characterizing other exotic materials such as aerogels with extremely low heat conductivity or high flexibility, and marketability of devices made from them

Postdoctoral Research Associate, William & Mary, 2019 - 2022
- Built and commissioned the Gas Ring Imaging Cherenkov (GRINCH) detector for the SuperBigBite (SBS) collaboration, and developed software tools for its data visualization
- In charge of reconstructing the data for the BONuS experiment at Jefferson Lab, and developing software to calibrate its radial time projection chamber (RTPC)
- Calibrated the drift chamber alignment for the CLAS12 collaboration at Jefferson Lab
- Assisted with data taking for the A1n/D2n experiments, as well as PREX/CREX

Graduate Research Assistant, University of New Hampshire, 2015 - 2019
- Produced the Monte Carlo simulations for physics processes expected to be seen in the Heavy Photon Search (HPS) experiment at the Thomas Jefferson National Accelerator Facility
- Performed a displaced heavy photon vertex search on the 2016 data
- Simulated and calculated the prospects for a True Muonium search at higher beam energy

Graduate Research Assistant, The University of Memphis, 2011 - 2013
- Derived and solved the time-fractional Schrödinger equation using fractional calculus
- Explored its subdiffusive behavior for time derivatives of order <1

Undergraduate Research Assistant, The University of Memphis, 2009 - 2010
- Implemented IDL routines to prep solar coronal loop data from the X-ray telescope on the Hinode spacecraft, to explore the coronal heating problem

TEACHING EXPERIENCE

Graduate Teaching Assistant, 2013 - 2015
- University of New Hampshire
- Courses: Physics I & II (401 & 402)

Interim Physics Instructor, 2013
- The University of Memphis
- Courses: Introductory Physics (1010), Introductory Physics Lab (1001)

Graduate Teaching Assistant, 2011 - 2013
- The University of Memphis
- Courses: Physics II (2120), Intro to Physics (2121)

PUBLICATIONS

1. Searching for prompt and long-lived dark photons in electroproduced e+e− pairs with the heavy photon search experiment at JLab. Phys. Rev. D (2023)

2. Exclusive π− Electroproduction off the Neutron in Deuterium in the Resonance Region. Y. Tian *et al.*, Phys. Rev. C (2023)

3. Precision Determination of the Neutral Weak Form Factor of 48Ca. D. Adhikari *et al.*, Phys. Rev. Lett. (2022)

4. Beam-Recoil Transferred Polarization in K+Y Electroproduction in the Nucleon Resonance Region with CLAS12. D.S. Carman *et al.* Phys. Rev. C (2022)

5. Beam-spin asymmetry Σ for Σ− hyperon photoproduction off the neutron. N. Zachariou *et al.* Phys Lett. B (2022)

6. New Measurements of the Beam-Normal Single Spin Asymmetry in Elastic Electron Scattering over a Range of Spin-0 Nuclei. D. Adhikari *et al.* Phys. Rev. Lett. (2022)

7. Polarized structure function $\sigma_{LT'}$ from $\pi^0 p$ electroproduction data in the resonance region at $0.4\,GeV^2 < Q^2 < 1.0\,GeV^2$. E. L. Isupov *et al.* Phys. Rev. C (2022)

8. Multidimensional, High Precision Measurements of Beam Single Spin Asymmetries in Semi-inclusive π+ Electroproduction off Protons in the Valence Region. S. Diehl *et al.* Phys. Rev. Lett. (2022)

9. Measurement of charged-pion production in deep-inelastic scattering off nuclei with the CLAS detector. S. Morán *et al.* Phys. Rev. C (2022)

10. Improved Λp Elastic Scattering Cross Sections between 0.9 and 2.0 GeV/c as a Main Ingredient of the Neutron Star Equation of State. J. Rowley *et al.* Phys Rev. Lett. (2021)

11. First Measurement of Timelike Compton Scattering. P. Chatagnon *et al.* Phys. Rev. Lett. (2021)

12. Measurement of deeply virtual Compton scattering off Helium-4 with CLAS at Jefferson Lab. R. Dupré *et al.*, Phys. Rev. C (2021)

13. Double Polarisation Observable G for Single Pion Photoproduction from the Proton. N. Zachariou *et al.,* Physics Letters B (2021)

14. An Accurate Determination of the Neutron Skin Thickness of 208Pb through Parity Violation in Electron Scattering. D. Adhikari *et al.*, Phys. Rev. Lett. (2021)

15. Observation of Beam Spin Asymmetries in the Process ep → e'π+ π-X with CLAS12. T. Hayward *et al.,* Phys. Rev. Lett. (2021)

16. Measurement of the proton spin structure at long distances. X. Zheng *et al.,* Nature Physics (2021)

17. Photoproduction of the f2(1270) meson using the CLAS detector. K. Hicks *et al.*, Phys. Rev. Lett. (2021)

18. Differential cross sections for Lambda(1520) using photoproduction at CLAS. U. Shrestha *et al.*, Phys. Rev. C (2021)

19. Beam-Spin Asymmetry in semi-inclusive electro-production of a hadron pair. M. Mirazita *et al.*, Phys. Rev. Lett. (2021)

20. Search for a dark photon in electroproduced e+e− pairs with the Heavy Photon Search experiment at JLab, P. H. Adrian *et al.,* Phys. Rev. D 98 (2018)

21. Time Fractional Schrödinger Equation Revisited. B. N. Achar, B. D. Crowe, J. Hanneken, Advances in Mathematical Physics (2013)

PRESENTATIONS

Crowe, B. (2021). "Gas Ring Imaging Cherenkov (GRINCH) Detector for the SuperBigBite Experiments". APS Division of Nuclear Physics Fall Meeting, Boston, MA

Crowe, B. (2021). "RG-F Status". CLAS Collaboration Meeting, Remote

Crowe, B. (2021). "GRINCH GMn Readiness Review". SBS Collaboration Meeting, Remote

Crowe, B. (2020). "GRINCH Status". SBS Collaboration Meeting, Remote

Crowe, B. (2019). "Radiative Fraction and Selection Cuts for the 2016 Vertex Search." HPS Collaboration Meeting, Jefferson Lab

Crowe, B. (2018). "True Muonium Search at 6.6GeV." HPS Collaboration Meeting, SLAC

Crowe, B. (2017). "2016 Vertex Search Status". HPS Collaboration Meeting, SLAC

Crowe, B. (2016). "Monte Carlo Framework". HPS Collaboration Meeting, Jefferson Lab

Crowe, B. (2015). "Moller Event Selection". HPS Collaboration Meeting, Jefferson Lab

AWARDS AND HONORS

- URA Visiting Scholars Award Funding (2023)
- Chi Beta Phi Award for Excellence in Physics (The University of Memphis, 2011)
- Goldenkey International Honor Society (2011)
- Phi Kappa Phi, Academic Honor Society (2011)
- Society of Physics Students (2010)
- Sigma Alpha Lambda National Honors Organization (2009)
- Alpha Epsilon Delta National Honor Society (2008)
- Alpha Lambda Delta National Honor Society (2008)

TECHNICAL SKILLS

- Experience working in a biomaterials laboratory, measuring physical properties including UV-Vis transmission, light diffusion (haze meter), scanning electron microscope (SEM), X-ray photoelectron spectroscopy (XPS), imaging with various light microscopes and cameras, and original software

- Experience building and commissioning particle detectors (spectrometers, gas systems, PMTs), including their interface with readout electronics, data acquisition, and analysis software for high-energy nuclear physics experiments

- Familiarity with beam physics event simulation tools (MADGRAPH, GEANT4)

- Programming ability in C++, Java, Python, FORTRAN, IDL

- Working knowledge of ROOT analysis framework, online repositories (SVN, GitHub)

- Managed high-throughput workflows submitted to a high-performance computing cluster