Jason Bane
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August 28, 2019

Dear Professor Nilanga Liyanage and Dr. Kondo Gnanvo,

Completing my research at Jefferson Lab for the last 5 years has afforded me the opportunity to gain an immense amount of experience with electron scattering experiments. My work with the MARATHON, APEX, and Argon(e',p) experiments have honed my skills and knowledge in experimental physics. This experience will make me a prime candidate to join your group working with the GEM detectors for SBS at Jefferson Lab.

My work at Jefferson Lab has allowed me to work on many aspects of an experiment. I was able to work on the refurbishment and maintenance of the BigBite Spectrometer for the MARATHON experiment. Preparing this spectrometer gave me the opportunity to gain experience in the design and construction of the front end electronics including designing and testing of a logic trigger. I continued my work with BigBite by contributing to the refurbishing of individual detectors in the spectrometer and erecting the data acquisition system. During the Argon, MARATHON, and APEX experiments, I helped maintain the online analysis software and replay scripts. Using the analysis software and replayed data, I calibrated parts of the detectors, focusing on the beam position monitors and adc signals from the cherenkov and calorimeters. Working with these experiments and their collaborators allowed me to work with large numbers of students, postdocs and other scientists. Working with such a vast group of scientist developed my skills in communication and collaboration. Being a part of these large collaborations have advanced my abilities in discussion, presenting, and collaborating. As part of my Ph.D., I have been analyzing MARATHON data. Part of my analysis task has been to compare data results to simulated data. In order to simulate data, I have had to work closely with cross-section models and simulation packages. Completing this analysis has granted me the ability to learn different coding languages like C++, fortran, ROOT, and python.

The knowledge I have gained working at Jefferson Lab would make me a great fit for this postdoc at the University of Virginia. My previous work with the Hall A analysis software and hardware experience with the big bite spectrometer and the high-resolution spectrometers in hall A will allow me to be beneficial team member in your group.

As part of my application, I am attaching one document to fulfill the application request. This document contains this cover letter, my CV with references, and a statement of research interests .

Thank you for your time and attention,
Jason Bane

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Education

- **University of Tennessee** **Knoxville, TN**
  Ph.D. in Nuclear Physics *August 2012 – Planned December 2019*
  Thesis: The EMC Effect in A=3 Nuclei *Advisor: Nadia Fomin*
- **University of Tennessee** **Knoxville, TN**
  Secondary Education Certification in Math and Science *August 2009 – May 2010*
- **University of Tennessee** **Knoxville, TN**
  Bachelor of Science, Physics & Minor in Education *August 2004 – May 2009*

Experience

- **University of Tennessee, Department of Physics and Astronomy** **Knoxville, TN,**
  Graduate Research Assistant *May 2014 – Present*
  - Designed and constructed front end electronics for an electron spectrometer.
  - Created module layouts and cable maps for efficient reuse of products.
  - Tested high voltage cards and laid high voltage cable for an electron spectrometer.
  - Used Oscilloscopes to test signals, debug logic modules, and map out inconsistent signals.
  - Maintained and refurbished individual detector components of a spectrometer including checking the quality of Photo Multiplier Tubes and plastic scintillators.
  - Calibrated detectors and used online analysis tools in Java to control the quality of data during an experiment.
  - Performed analysis on a large set of data involving multiple nuclear targets using Python, C++ , ROOT, and fortran.
  - Instructed new researchers on the use of hardware and software used in the field

- **University of Tennessee, Department of Physics and Astronomy** **Knoxville, TN,**
  Graduate Teaching Assistant *August 2012 – May 2015*
  - Designed and implemented observational and planetarium based astronomy labs.
  - Educated students on the use of refracting telescopes and equatorial mounts.
  - Instructed students in laboratory exercises to help conceptualize physics topics.
  - Tutored students for homework assistance and test prep.

- **Clay County Tennessee Education Department** **Celina, TN**
  Secondary Educator & Football Coach *August 2010 – May 2012*
  - Created lesson plans that included interactive, creative thinking, and discussion driven curriculum for a diverse body of geometry students.
  - Constructed lessons that used hands-on lab activities, demonstrations, and interactive computer lessons to instruct high school Juniors and Seniors in algebra-based physics.
  - Used discussion-based problem-solving lessons to help remedial math students to improve their algebra, geometry and trigonometry skills for post-secondary education.
  - Provided an equitable and inclusive atmosphere for diverse students.
  - Math and reading focused tutoring.

Core Technical Skills

Hardware: Detector maintenance and wiring, front end electronics design and implementation, logical trigger design and testing
Languages: C, C++, LaTeX, Python, shell script, SQL
Monte Carlo Simulation Packages
Example scripts located at https://github.com/jbane11/examples
Software: Microsoft Office, Libre Office, Texstudio, vim, atom
Operating Systems: Linux(Red Hat), Windows, MacOS

Publications

- H. Dai, [et al. including **J. Bane**], "First Measurement of the Ar(e,e')X Cross Section at Jefferson Lab," Phys. Rev. C 99, 054608 May 2019
- R. Cruz-Torres, [et al. including **J. Bane**], "Comparing proton momentum distributions in A=3 nuclei via ^{3}He and ^3H(e,e'p) measurements," in preparation, (2019)
- S. N. Santiesteban, S. Alsalmi, D. Meekins, **J. Bane,** et al., "Density Changes in Low Pressure Gas Targets for Electron Scattering Experiments" NIM A 940, 2019
- H. Dai, [et al. including **J. Bane**], "First Measurement of the Ti(e,e')X Cross Section at Jefferson Lab," Phys. Rev. C 98, 014617 July 2018
- P V. Pandey, [et al. including **J. Bane**], "Probing electron-argon scattering for liquid-argon based neutrino-oscillation program," preprint arXiv:1711.01671

Honors

- Jefferson Science Associates graduate fellowship award (2018)
- Chancellor's honors for extraordinary professional promise (2016)
- DOE Office of Science Graduate Student Research program award (2015)
- Dean's List 2009 Academic Year (2010)

Conference Presentations

- "EMC in A=3 from MARATHON," 2nd Workshop on Quantitative Challenges in SRC and EMC Research, MIT, Cambridge MA, March 2019
- "Ratios in A=3 nuclei from MARATHON ," American Physical Society's Division of Nuclear Physics' yearly meeting, HA, October 2018
- "Measurement of the spectral function of Argon and Titanium through the(e,e'p) reaction," American Physical Society's Division of Nuclear Physics' yearly meeting, HA, October 2018
- "Status of the MARATHON experiment." American Physical Society's Division of Nuclear Physics' yearly meeting, Pittsburgh PA, October 2017
- "Searching for the Origin of the EMC effect." American Physical Society's Division of Nuclear Physics' yearly meeting, Sante Fe NM, October 2016

Poster Presentations

- "The impetus in the EMC effect, a EMC simulation." Gordon Research Conferences, Holderness, NH. August 2018
- "Searching for the Origin of the EMC effect." SURA Board of Trustees Meeting, Newport News, VA. April 2018

References

Nadia Fomin, Professor
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Cynthia Keppel, Hall A and C Leader
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(757) 584-7580, keppel@jlab.edu

Douglas Higinbotham, Staff Scientist
Jefferson Lab Accelerator Facility
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Interests

Football, coaching, programming, boating, traveling,

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Statement of Research Interest

My research at JLab focused on two areas, preparing the BigBite spectrometer(BBS) and analyzing HRS data. In order to prepare the BBS, I refurbished the Cerenkov by replacing broken PMTs, realigning internal mirrors, and repairing leaks. By performing maintenance on the VDCs with conditioning the field and signal wires and flushing and replacing the gas, I return the VDCs to working order. I prepared the electronics of the BBS by laying power and signal cables. As part of the preparation, I design logical and efficient cable layouts for building triggers and data storage. My analysis of the HRS data started with building and maintaining the replay script and repository for replay and detector database. I calibrate the ADCs and TDCs from the HRS detectors to provide useful information from the detector signals. Then, I calculated the detector efficiencies and measured the PID efficiency of the calorimeters and Cerenkov. A clean sample of DIS electrons was counted by removing the background events with corrections for pions, positron contamination, and end cap contamination. Then I extracting the cross-section via the Monte-Carlo ratio method. Using the cross-section of Helium, Tritium, and deuterium, I calculated the EMC effect for both Helium and Tritium.

My time at Jefferson Lab has taught many many aspects of the process of inclusive cross-section measurement from electron scattering. I want to take this knowledge and advance my understanding of not only inclusive electron scattering but also other scattering processes, like semi-inclusive or exclusive scattering process and parity-violating reactions. I want to use the tools that I have learned here to develop a more complete interpretation of the structure and interactions of the fundamental aspects of nature. I also want to use my skills with hardware to efficiently and logically develop new and improved tools to study the building blocks of nature.