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Overview

Visiting Graduate Research Assistant at Fermi National Accelerator Laboratory, collaborating on Experiments E906/SeaQuest and E1039/SpinQuest. SeaQuest and SpinQuest are proton-induced Drell-Yan experiments that explore the properties of sea quarks in the nucleon. In my Ph.D. dissertation work at the SeaQuest experiment, I am studying the measurement of angular distributions from dimuon events in the Drell-Yan process. I am responsible for data analysis and the maintenance of trigger detectors. I have previously served as an officer for the Fermilab Student & Postdoc Association, where I represented young physicists.

Research Experience

• ***Leading the trigger-detector effort for the SpinQuest Experiment at Fermilab*** (May 2018 - Present) Advisor: Dr. Stephan Pate, Dr. Vassili Papavassiliou, New Mexico State University, Las Cruces, NM

Summary: I have performed data analysis, hardware installation, and systems testing for the trigger hodoscopes used in the SpinQuest proton-induced Drell-Yan experiments at Fermilab. Additionally, I developed software to optimize high-voltage PMTs and set up triggers using NIM electronics.

• ***Analyzing SeaQuest Experimental Data*** (Feb 2022 - Present) Advisor: Dr. Stephen Pate, New Mexico State University, NM

Summary: This is the analysis work for my doctoral dissertation, in which I focused on extracting the angular distributions of proton-induced Drell-Yan dimuons produced at the SeaQuest/E906 Fermilab experiment, using a 120 GeV proton beam on an Fe target. To address bin migration and the acceptance effect in the reconstructed real data, I used the Bayesian Iterative Unfolding technique. I conducted extensive systematic studies to identify any potential biases in the measurement. These studies included numerous simulations using Geant4 and closure tests using simulated data. The 'Gradient Boosted Reweighter' technique was used to calibrate the Monte Carlo, ensuring that the track and dimuon distributions matched well with the real data.

Education

Ph.D. in Physics, New Mexico State University, Las Cruces, NM, USA — 2016 - Ongoing
Supervisor: Dr. Stephen Pate

M.Sc. in Physics, New Mexico State University, Las Cruces, NM, USA — May 2021
GPA: **3.64/4.0**, *Supervisor:* Dr. Stephen Pate

M.Sc. in Physics, Jagannath University, Dhaka, Bangladesh — 2012 - 2014
Grade: **3.74 out of 4.00**

B.Sc. in Physics, Jagannath University, Dhaka, Bangladesh — 2006 - 2012
Grade: **3.75 out of 4.00**

Collaborations

- ***SpinQuest***
- ***SeaQuest***

Professional Memberships

- ***American Physical Society (APS)***

Technical Skills

- ***Software and Programming Language***: bash, C++, Python, ROOT.
- ***Operating system***: Windows, Linux, Mac
- ***Version Control System***: GitHub, CVS
- ***Special Courses and certifications***: 1) U.S. Particle Accelerator School (USPAS) 2) DANCE/CoDaS computational and data science software training 3) The 2023 National Nuclear Physics Summer School (NNPSS)

Journal Publications

1) Stephen Pate et al. Estimation of Combinatoric Background in SeaQuest using an Event-Mixing Method. 2023, arXiv:2302.04152
2) Andrew Chen, et al. Probing nucleon's spin structures with polarized Drell-Yan in the Fermilab SpinQuest experiment. 2019, arXiv:1901.09994
Lists of SeaQuest and SpinQuest Collaboration Papers and Conference talks in my Google Scholar profile: `https://scholar.google.com/citations?user=KOygUhMAAAAJ&hl=en`.

Presentations

1) 2023 Fall Meeting of APS DNP and JPS : Angular Distribution of Dimuons from Drell-Yan Production in p+Fe Interactions at 120 GeV Beam Energy
2) New Perspectives, 26-27 June 27 2023, Fermi National Accelerator Laboratory, Illinois, Chicago, USA: Iterative Unfolding of the Angular Distribution of Drell–Yan Production in p+Fe Interactions at 120 GeV Beam Energy
3) Fall 2022 Meeting of the APS Division of Nuclear Physics, October 27-30 2022: Measurement of the Angular Distribution of Drell-Yan Production in p+Fe Interactions at 120 GeV Beam Energy
4) New Perspectives, 16-19 August 2021, Fermi National Accelerator Laboratory, Illinois, Chicago, USA: Measurement of the Angular Distribution of Drell-Yan Production in p+Fe Interactions at 120 GeV Beam Energy
5) New Perspective 2020(2.0), August 24-25, 2020: Systematic Study of Spectrometer-Induced Azimuthal Asymmetries for SpinQuest
6) 2020 Fall Meeting of the APS Division of Nuclear Physics, October 29-November 1, 2020: Systematic Study of Potential False Azimuthal Asymmetries in SpinQuest
7) Summer 2019 USPAS Session: 350 MHz Single Spoke Resonator design and optimization for β =0.45
8) 52nd Fermilab Users Organization Annual Meeting, Batavia, IL, USA: Commissioning Trigger for the SpinQuest/E1039 Experiment (**Poster**).

Job Experience

Graduate Research Assistant May 2018 - Present
New Mexico State University, Las Cruces, NM

- Conducted simulation tasks and developed the analysis framework for my thesis project.
- Served as an expert on the trigger detector system in the ***SpinQuest Experiment.***

Graduate Teaching Assistant Aug 2016 - May 2018
New Mexico State University, Las Cruces, NM

- Instructed introductory physics laboratory classes and provided tutoring as a Graduate Teaching Assistant.
- Played a role in networking and system administration.

Leadership Roles

- Judge at the Southwestern New Mexico Regional Science and Engineering Fair March 2017
- FSPA Officer at the Fermilab Student and Postdoc Association (FSPA) Oct 2021 - Oct 2022
- Managed the schedule for the Users' Executive Committee visits to Congress in Washington, D.C. March 2021

Honors and awards

2022-2023	$4000 Merit-based Enhancement Fellowships.
2021-2022	$1600 Scholarship for outstanding work as Ph.D. student.
2021-2022	$2962 IA HEERF PHYS LEADS 2025.
2020-2021	$1600 Scholarship for outstanding work as Ph.D. student.

Media Appearance

- NMSU continues research on particle physics with renewed DOE grant July 09, 2022
- NMSU physics department awarded $1.26 million DOE grant June 23, 2018

References

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