Lee Hagaman

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Education

University of Chicago — Chicago, IL
Physics PhD Student — *Aug. 2023 – present*
- Entered as a 5th year PhD student after transferring from Yale.

Yale University — New Haven, CT
Physics PhD Student — *Aug. 2019 – Aug. 2023*
- Master of Science in Physics
- Master of Philosophy in Physics

University of California, Berkeley — Berkeley, CA
Undergraduate Student — *Aug. 2015 – Jun. 2019*
- Bachelor of Arts in Physics

Research Experience

Research at University of Chicago — Jun. 2023 – present
Researcher — *Chicago, IL*
- Continued working with Bonnie Fleming as she transferred from Yale to the University of Chicago and Fermilab, focusing on my photon LEE search described below.

Research at Brookhaven National Laboratory — Jun. 2022 – Jun. 2023
Researcher — *Upton, NY*
- As part of my DOE Office of Science Graduate Research Fellowship, I worked with Xin Qian at Brookhaven National Laboratory to continue my thesis work. Specifically, I continued to work on my single photon analysis in MicroBooNE, and also started working on more MicroBooNE analyses such as a joint ν_e/ν_μCC cross section analysis, and an effective nucleon axial mass cross section analysis.

Research at Yale — Jun. 2022 – Jun. 2023
Researcher — *New Haven, CT*
- Contributed to the electron neutrino low energy excess search in MicroBooNE. Led my own neutral current delta radiative photon excess search. Built and tested ProtoDUNE-VD charge readout planes at CERN and at Yale. Tested a pixellated DUNE near detector prototype at the University of Bern.

Research at Lawrence Berkeley National Laboratory — Jun. 2022 – Jun. 2023
Researcher — *Berkeley, CA*
- Worked with Professor Daniel McKinsey in his research group focusing on direct detection of dark matter, in particular with the LUX and LZ experiments. I primarily worked on IBEX, an experiment which measured optical properties of PTFE immersed in liquid xenon as well as TPB (tetraphenyl butadiene) coatings immersed in liquid argon. These measurements are relevant to current and future dark matter experiments and neutrino experiments.

Awards

MicroBooNE Impact Award — 2023
- "To recognize the contributions of our collaborators which might not be recognized through the usual route of publications." For contributions to the validation of additional data samples.

Office of Science Graduate Student Research (SCGSR) Fellowship — 2022-2023
- Awarded by the Department of Energy to allow me to continue my thesis research at Brookhaven National Laboratory for a year.

Nathan Hale Associates Fellowship — 2019-2020
- "A special distinction that reflects the university's appreciation of your achievements as well as your potential."

Talks

TeV Particle Astrophysics (TeVPA 2024) 2024
- MicroBooNE's Beyond Standard Model Physics Program

2nd Short Baseline Experiment-Theory Workshop 2024
- MicroBooNE's Recent Cross Section Results

Lawrence Berkeley National Laboratory Research Progress Meeting 2023
- Investigating Short-Baseline Neutrino Anomalies Using MicroBooNE

The 24th International Workshop on Neutrinos From Accelerators (NuFACT 2023) 2023
- MicroBooNE's Searches for Anomalous Single-Photon Production

American Physical Society April Meeting (2023) 2023
- Sterile Neutrino Search At MicroBooNE Using Both The BNB And NuMI Beams

American Physical Society April Meeting (2022) 2022
- Single Photon Search in MicroBooNE Using Wire-Cell 3D Reconstruction Algorithms

Yale Wright Laboratory Nuclear Particle Astrophysics Seminar 2021
- First Test of the MiniBooNE Low Energy Excess Under a Single-Photon Hypothesis in the MicroBooNE Experiment

Brown University Student Machine Learning Initiative Seminar 2021
- Electron Neutrino Low Energy Excess Search in MicroBooNE Based on Wire-Cell 3D Reconstruction Algorithms

American Physical Society April Meeting (2021) 2021
- Charged Current Electron Neutrino Event Selection in MicroBooNE Based on Wire-Cell 3D Reconstruction Algorithms

Posters

The 25th International Workshop on Neutrinos From Accelerators (NuFACT 2024) 2024
- Updated NC Delta Radiative Single Photon LEE Analysis From MicroBooNE

The XXXI International Conference on Neutrino Physics and Astrophysics (Neutrino 2024) 2024
- Inclusive and Exclusive Pionless Cross Section Measurements with MicroBooNE (sole creator and presenter)
- Low Energy Excess and New Physics Searches with MicroBooNE (created and presented jointly with other collaborators)

The XXX International Conference on Neutrino Physics and Astrophysics (Neutrino 2022) 2022
- Progress Towards An Investigation Of The MiniBooNE Low Energy Excess Using Neutral-Current Delta-Like Single Photons In MicroBooNE With Wire-Cell 3D Reconstruction Algorithms

Teaching

UChicago SPS Python For Research Program Mentor Winter 2024
- Met with students for two hours per week for five weeks, helping them through an introductory research project using python and publicly available MicroBooNE LArTPC data and simulation files.

Qualifying Exam Preparation Tutor, Yale University Physics Department Fall 2022
- Hired to give lectures on classical mechanics and electromagnetism to prepare fellow physics graduate students for the qualifying exam.
- Held office hours for exam revisions and contributed to the exam solutions to be given to students.

Guest Lecturer, Yale University Spring 2022
- As a Teaching Fellow for Introductory Nuclear and Elementary Particle Physics, gave a 75 minute lecture on neutrino physics, with an emphasis on modern experiments.

Teaching Fellow, Yale University Fall 2019 - Spring 2022
- Taught and graded assignments for:
  - Graduate Level Classical Mechanics (Physics 500) - 1 semester
  - Introductory Physics Lab (Physics 165L/166L) - 2 semesters
  - Introductory Electromagnetism (Physics 181) - 2 semesters
  - Introductory Mechanics (Physics 180) - 1 semester
  - Introductory Nuclear and Elementary Particle Physics (Physics 442) - 1 semester

Undergraduate Group Tutor, UC Berkeley Physics Department Fall 2018
- Hired to hold weekly office hours for three introductory physics classes.

Outreach

Chicago South Side Science Festival 2023

- Volunteer, operated and explained hands-on demonstrations of electromagnetism, primarily to elementary school age children.

Brookhaven National Lab P5 Town Hall 2023

- Volunteer, distributed microphones and assisted each chair with the timing of talks.

Brookhaven National Lab Bridge Competition 2023

- Volunteer, helped check the specifications of bridges submitted by high school students from around Long Island.
- Operated the machine which applied force to test bridge efficiencies.

Brookhaven National Lab Maglev Competition 2023

- Volunteer, helped middle school students from around Long Island measure the speeds of their magnetically levitated vehicles.
- Graded students' written reports.

Brookhaven National Lab Science Bowl 2023

- Volunteer, served as Science Judge in a series of head-to-head matches between teams of middle school students and high school students.

Yale University Science Olympiad 2020

- Volunteer, helped run the "Detector Building" event, in which high school students built and tested temperature monitoring devices.

Yale Physics Olympics 2019

- Volunteer, helped run a competition in which high school students measured the index of refraction using a laser.

Selected Publications

All can be found at https://inspirehep.net/authors/1844138.

1. MicroBooNE Collaboration. "First Constraints on Light Sterile Neutrino Oscillations from Combined Appearance and Disappearance Searches with the MicroBooNE Detector." Phys. Rev. Lett. 130, 011801 (2023)., arXiv:2210.10216

2. MicroBooNE Collaboration. "Search for an Excess of Electron Neutrino Interactions in MicroBooNE Using Multiple Final-State Topologies." Phys. Rev. Lett. 128, 241801 (2022)., arXiv:2110.14054

3. MicroBooNE Collaboration. "Search for an anomalous excess of inclusive charged-current ν_e interactions in the MicroBooNE experiment using Wire-Cell reconstruction." Phys. Rev. D 105, 112005 (2022)., arXiv:2110.13978

4. MicroBooNE Collaboration. "First Measurement of Energy-Dependent Inclusive Muon Neutrino Charged-Current Cross Sections on Argon with the MicroBooNE Detector." *Phys. Rev. Lett.* 128, 151801 (2022)., arXiv:2110.14023

5. Kravitz, S., Smith, R.J., Hagaman, L. et al. "Measurements of angle-resolved reflectivity of PTFE in liquid xenon with IBEX." Eur. Phys. J. C 80, 262 (2020)., arXiv:1909.08730