

Brinden Carlson

(970)-433-3380 • bcarlson1@ufl.edu • GitHub: bear-is-asleep

EDUCATION

PhD Candidate, Physics
University of Florida, Gainesville, FL, expected 2025
GPA: 3.74/4.0

Bachelor of Science, Physics and Astrophysics
Illinois Institute of Technology, Chicago, IL, May 2020
GPA: 3.69/4.0 (7 × Dean's List)

HONORS/ AWARDS

DOE SCGSR award	Jan 2025 - July 2025
Tom Scott Memorial Award	Dec 2024
URA VSP award	Oct 2024 - Dec 2024
Best Talk of session at New Perspectives 2024	July 8, 2024
UF Honors Society	Spring 2021 - Present
UF IHEPA fellowship	Summer 2021
Member of ΣΠΣ Physics Honors Society	Spring 2019 - Spring 2020
Secretary of ACS at Illinois Institute of Technology	Fall 2019 - Spring 2020
Member of SPS at Illinois Institute of Technology	Fall 2018 - Spring 2020

GRADUATE RESEARCH

SBND, Fermi National Laboratory Fall 2020 - Present
University of Florida
Experimental Neutrino Physics, Dr. Heather Ray Advising

- Implemented flash matching into machine learning-based reconstruction of neutrino events to identify neutrino events with 99.9% purity and 99% efficiency.
- Compared final state muon kinematics from various nuclear models within GENIE with existing MicroBooNE data using NUISANCE.
- Utilized neutrino beam angular dependence (PRISM) to identify observable differences between different nuclear models in SBND.
- Designed reconstruction selection cuts to isolate a sample of Muon Neutrino Charged Current events.
- Ported machine learning code, generated training sample, optimized hyperparameters, and trained machine learning reconstruction algorithm of neutrino events in LArTPCs and achieved above 90% primary particle ID efficiency.
- Created PDS event display to verify mapping of each PDS component into its expected location in the hardware database by comparing the cumulative photons of each PD to its neighbors and the overlaid reconstructed track locations.
- Performed analysis of using neutrino electron scattering events to constrain neutrino flux at SBND.
- Modified GENIE neutrino event generator to account for orbital electron's motion on cross section and final state electron's kinematics.
- Installed PMTs, X-ARAPUCAs, and calibration fibers onto SBND frame and performed quality control checks throughout installation phase to complete detector installation of the PDS.

- Measured PMT waveforms in test stands and fixed malfunctioning PMTs by replacing fried resistors, missing capacitors, and resoldering cable to PMT base to ensure proper functionality.

UNDER-GRADUATE RESEARCH

NOvA Test Beam, Fermi National Laboratory

Fall 2017 - Spring 2020

Illinois Institute of Technology

Research Advisor: Dr. Daniel Kaplan & Dr. Yagmur Torun

- Employed a particle simulation using G4beamline to study how a low-energy proton beam creates a beam of tagged neutrons with known energy and position in order to calibrate a detector.
- Conducted tests on various sets of magnetic field data from the dipole spectrometer magnet employed in the NOvA Test Beam to benchmark its performance.
- Ran tests on time of flight (TOF) cable delay times with a group of graduate assistants by recording statistics on waveforms produced from a Pulser machine to calibrate timing delays in experiment.

Advanced Photon Source, Argonne National Laboratory

Fall 2018 - Fall 2019

Illinois Institute of Technology

Research Advisor: Dr. Ali Khounsary

- Simulated sundry optical configurations for a x-ray beam created via synchrotron radiation from a dipole bending magnet.
- Analyzed intensity and energy resolution for a sagittally bent monochromator's by varying the sagittal radius and selected beam energy.

POSITIONS/TEACHING

SBND Machine Learning Reconstruction Group Convener, Fermi National Laboratory

Fall 2024 - Present Fermi National Laboratory, Batavia, IL

- Communicate group results to SBND collaboration.
- Assist group members with SBND machine learning projects by providing technical support.
- Lead group meetings by reviewing group member results and providing feedback.

SBND Software Release Manager, Fermi National Laboratory

Summer 2024 - Present

Fermi National Laboratory, Batavia, IL

- Developed standardized contributing guidelines to ensure robust code integration and experiment-wide communication.
- Triggered continuous integration (CI) tests for each pull request and created tagged releases by triggering in Jenkins.
- Deployed tagged releases on a common build node to distribute software access to all collaborators.

Research Assistant, UF Neutrino Group

Summer 2023 - Present

Fermi National Laboratory, Batavia, IL

- Assisted undergraduate students in studies at SBND such as single kaon production, PMT cable delays, and PMT Neutral Current software triggering metrics.

PRESENTATIONS

- SPINE Workshop 2024, Boston MA, July 22-26, 2024
“LArCV File Making at SBN”
“Particle Identification”
- “Studying Neutrino-Nucleus Interactions at SBND” New Perspectives 2024, Batavia IL, July 8-9, 2024

- “SPINE SBND” NPML 2024, ETH Zurich, June 25-28, 2024
- ”SBND Machine Learning Reconstruction Chain” SBN Analysis Workshop, Batavia IL, July 24-29, 2023
- ”SBND Implementation” ICARUS ML Workshop, Fort Collins CO, July 10-14, 2023
- “Neutrino Electron Scattering for Flux Constraint on SBND” New Perspectives 2023, Batavia, IL, June 26, 2023
- “Neutrino Electron Scattering for Flux Constraint on SBND” APS, Minneapolis MN, April 17, 2023