Nicholas Kamp

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Education and Work

Harvard University, Cambridge, MA

Postdoctoral Fellow in Physics 08/2023–

Advisor: Prof. Carlos Argüelles-Delgado

Massachusetts Institute of Technology, Cambridge, MA

Ph.D. in Physics 09/2019–06/2023

Ph.D. thesis: "Experimental and Phenomenological Investigations of the MiniBooNE Excess" (arXiv: 2308.12015)

Advisor: Prof. Janet Conrad

University of Michigan, Ann Arbor, MI

B.S.E. Engineering Physics with Honors, Summa Cum Laude 09/2015–05/2019

Minors: Math, Music

Awards

Session 6 Best Talk at New Perspectives 2024	July 2024
NSF Graduate Research Fellow	2020–2023
MIT GSC Travel Grant Recepient	Winter 2022, Summer 2022
Thomas Frank First Year Graduate Fellowship	Fall 2019
Distinguished Academic Achievement Award	Spring 2019
College of Engineering Honors Program Graduate	Spring 2019
Los Alamos National Lab SPOT Award	Summer 2018
Los Alamos Awards Program Recipient	Summer 2017
James B. Angell Scholar	Winter 2018–2019

Press

KM3NET Detects the Highest Energy Neutrino Ever Observed. *Harvard Department of Physics.*	February 2025
3 Questions: Investigating a long-standing neutrino mystery. *MIT News.*	September 2021

Presentations

Invited

The SIREN Toolkit for Neutrino Physics Within and Beyond the Standard Model

– Talk given at the 2025 Neutrino–Nucleus Interactions in the Standard Model and Beyond (05/2025)

Lake- and Surface-Based Detectors for Forward Neutrino Physics

– Talk given at an LHCb Tuesday meeting (03/2025)

Observation of an Ultra-High-Energy Neutrino Event in KM3NeT

– Talk given at the 2025 Nevada Center for Astrophysics Symposium (02/2025)

Heavy Neutrinos in Ice, Water, Plastic, and Dirt

– Seminar given at the Instituto de Física Corpuscular (01/2025)
– Seminar given at the Université catholique de Louvain (01/2025)
– Seminar at Ghent University (02/2025)
– Seminar given at Northwestern University (04/2025)
– Talk to be given at LLP2025 (06/2025)

Atmospheric Neutrinos for Heavy Neutral Leptons: An Experimental Overview

– Talk given at Atmospheric Neutrinos: Experiments and Phenomenology (12/2024)

Demystifying the Neutrino Sector: New Strategies for Old Anomalies

– Seminar given at Boston University (11/2024)

MiniBooNE in Ten Minutes

– Talk given at New Perspectives 2024 (07/2024)
– Talk given at New Perspectives 2022 (06/2022)

Recent Results on the 3+1 Model from IceCube

– Talk given at the 2nd Short-Baseline Experiment-Theory Workshop (04/2024)

Recent Developments Regarding the MiniBooNE Anomaly

– Seminar given at Columbia University (09/2022)

MicroBooNE's First Results and the MiniBooNE Low Energy Excess
- Seminar given at Perimeter Institute (05/2022)

First results from the MicroBooNE search for a low energy excess
- Talk given at Lepton Photon 2021 (01/2022)

Search for an anomalous excess of charged-current quasi-elastic electron-neutrino interactions with the MicroBooNE experiment using Deep-Learning-based reconstruction
- Seminar given at MIT with Lauren Yates and Janet Conrad (10/2021)
- Seminar given at University of Rochester (12/2021)
- Talk given at IceCube working group meeting (10/2021)

Visualizing Interstellar's Wormhole
- Talk presented to high school students at the Michigan Math and Science Scholars summer course entitled "Relativity: A Journey Through Warped Space and Time" (06/2019)

Contributed

Neutrinos in Lake Geneva: Measuring the LHCb Forward Neutrino Flux with Large-Scale Detectors
- Talk given at TeVPA 2024
- Poster presented at Neutrino 2024

SIREN: An Open Source Neutrino Injection Toolkit
- Poster presented at Neutrino 2024

Simulating Heavy Neutral Leptons in Neutrino Telescopes
- Talk given at the 2024 ANTARES-KM3NeT collaboration meeting

Recent Developments Regarding the MiniBooNE Anomaly
- Talks given at NuFACT 2023 and TAUP 2023

Exploring Heavy Neutral Leptons with Transition Magnetic Moments at Neutrino Experiments
- Talk given at 2023 APS April meeting

Sterile Neutrino and Dipole Portal Explanations of the MiniBooNE Excess
- Posters presented at ICHEP 2022 and Neutrino 2022

BSM Neutrino-Nucleus Interactions and the MiniBooNE Anomaly
- Contribution to the BSM session of the 2021 Neutrino–Nucleus Interactions in the Standard Model and Beyond workshop

Explaining the MiniBooNE Excess Through a Mixed Model of Oscillation and Decay
- Talks given at PHENO 2021 and DPF 2021, poster presented at WIN 2021

Updated MiniBooNE Results with the Complete Dataset
- Talk given at 2021 APS April meeting

A Convolutional Neural Network for Shower Energy Reconstruction in MicroBooNE
- Talks given at 2020 NPML Workshop and 2020 New Perspectives 2.0 conference

JSNS^2: A Sterile Neutrino Search using Electron Neutrino Appearance at the J-PARC Spallation Neutron Source
- Talk given at APS April 2019 meeting

Measuring the Neutron Cross Section and Detector Response from Interactions in Liquid Argon
- Poster presented at APS DNP Fall 2017 meeting

Examination of Scintillation Light in a Liquefied Mixture of Noble Gas and other Dopants
- Poster presented at APS DNP Fall 2016 meeting

Selected Publications

The following are publications for which I had significant contributions or acted as a mentor for a junior collaborator. For a full list of publications, see my INSPIRE page.

[1] O. Adriani et al. "The ultra-high-energy event KM3-230213A within the global neutrino landscape". In: (Feb. 2025). **16 Citations**. arXiv: 2502.08173 [astro-ph.HE].

[2] Nicholas W. Kamp et al. "Lake- and Surface-Based Detectors for Forward Neutrino Physics". In: (Jan. 2025). **2 Citations**. arXiv: 2501.08278 [hep-ex].

[3] Ming-Shau Liu, Nicholas Kamp, and Carlos A. Argüelles. "Constraints and Sensitivities for Dipole-Portal Heavy Neutral Leptons from ND280 and its Upgrade". In: (Dec. 2024). **1 Citation**. arXiv: 2412.15051 [hep-ph].

[4] Felix J. Yu, Nicholas Kamp, and Carlos A. Argüelles. "Learning Efficient Representations of Neutrino Telescope Events". In: (Oct. 2024). **1 Citation**. arXiv: 2410.13148 [hep-ex].

[5] Felix J. Yu, Nicholas Kamp, and Carlos A. Argüelles. "Enhancing events in neutrino telescopes through deep-learning-driven super-resolution". In: *Phys. Rev. D* 111.4 (2025). **0 Citations**, p. L041301. DOI: 10.1103/PhysRevD.111.L041301. arXiv: 2408.08474 [hep-ex].

[6] Austin Schneider, Nicholas W. Kamp, and Alex Y. Wen. "SIREN: An Open Source Neutrino Injection Toolkit". In: (June 2024). **3 Citations**. arXiv: 2406.01745 [hep-ex].

[7] Nicholas W. Kamp et al. "Implications of MicroBooNE's low sensitivity to electron antineutrino interactions in the search for the MiniBooNE excess". In: *Phys. Rev. D* 107.9 (2023). **4 Citations**, p. 092002. DOI: 10.1103/PhysRevD.107.092002. arXiv: 2301.12573 [hep-ph].

[8] Nicholas W. Kamp et al. "Dipole-coupled heavy-neutral-lepton explanations of the MiniBooNE excess including constraints from MINERvA data". In: *Phys. Rev. D* 107.5 (2023). **25 Citations**, p. 055009. DOI: 10.1103/PhysRevD.107.055009. arXiv: 2206.07100 [hep-ph].

[9] J. M. Hardin et al. "New Clues about light sterile neutrinos: preference for models with damping effects in global fits". In: *JHEP* 09 (2023). **21 Citations**, p. 058. DOI: 10.1007/JHEP09(2023)058. arXiv: 2211.02610 [hep-ph].

[10] P. Abratenko et al. "Search for an Excess of Electron Neutrino Interactions in MicroBooNE Using Multiple Final-State Topologies". In: *Phys. Rev. Lett.* 128.24 (2022). **156 Citations**, p. 241801. DOI: 10.1103/PhysRevLett.128.241801. arXiv: 2110.14054 [hep-ex].

[11] P. Abratenko et al. "Search for an anomalous excess of charged-current quasielastic ν_e interactions with the MicroBooNE experiment using Deep-Learning-based reconstruction". In: *Phys. Rev. D* 105.11 (2022). **87 Citations**, p. 112003. DOI: 10.1103/PhysRevD.105.112003. arXiv: 2110.14080 [hep-ex].

[12] A. A. Aguilar-Arevalo et al. "MiniBooNE and MicroBooNE Combined Fit to a 3+1 Sterile Neutrino Scenario". In: *Phys. Rev. Lett.* 129.20 (2022). **40 Citations**, p. 201801. DOI: 10.1103/PhysRevLett.129.201801. arXiv: 2201.01724 [hep-ex].

[13] A. A. Aguilar-Arevalo et al. "First dark matter search results from Coherent CAPTAIN-Mills". In: *Phys. Rev. D* 106.1 (2022). **74 Citations**, p. 012001. DOI: 10.1103/PhysRevD.106.012001. arXiv: 2105.14020 [hep-ex].

[14] Kiara Carloni et al. "Convolutional neural networks for shower energy prediction in liquid argon time projection chambers". In: *JINST* 17.02 (2022). **11 Citations**, P02022. DOI: 10.1088/1748-0221/17/02/P02022. arXiv: 2110.10766 [hep-ex].

[15] Stefano Vergani et al. "Explaining the MiniBooNE excess through a mixed model of neutrino oscillation and decay". In: *Phys. Rev. D* 104.9 (2021). **55 Citations**, p. 095005. DOI: 10.1103/PhysRevD.104.095005. arXiv: 2105.06470 [hep-ph].

[16] P. Abratenko et al. "Electromagnetic shower reconstruction and energy validation with Michel electrons and π^0 samples for the deep-learning-based analyses in MicroBooNE". In: *JINST* 16.12 (2021). **14 Citations**, T12017. DOI: 10.1088/1748-0221/16/12/T12017. arXiv: 2110.11874 [hep-ex].

Outreach Activities

Harvard University

- Mentor for PhD students Julia Book-Motzkin, Andy Jin, Felix Yu, Oscar Barrera, and Alex Wen
- Mentor for visiting researchers Emily Hu, Steven Eulig, Dana Gajewski, Ming-shau Liu, and Pablo Castaño
- Mentor within the IceCube Mentorship Program
- Led students through a machine learning activity for the 2024 IceCube Masterclass at Harvard University
- LPPC Seminar Series organizer

Massachusetts Institute of Technology

- Mentor for undergraduate student Kiara Carloni
- MIT Physics Department Mentor Program
- PhysGAAP program mentor
- Laboratory for Nuclear Science Graduate Student Seminar organizer
- MicroBooNE Young coordinator

University of Michigan

- Society of Physics Students treasurer
- Honors GO trip leader: turtle conservation through Foundación Verdiazul in Junquillal, Costa Rica