Kelsey Lund, PhD

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APPOINTMENTS

N3AS Postdoctoral Fellow 2024 - Present
Network for Neutrinos, Nuclear Astrophysics, and Symmetries Seattle, WA
UC Berkeley / Institute for Nuclear Theory

Graduate Research Fellow 2020 - 2024
Center for Nonlinear Studies Los Alamos, NM
Los Alamos National Laboratory

Graduate Research Assistant 2020-2024
Department of Physics Raleigh, NC
North Carolina State University

EDUCATION

PhD Physics 2024
North Carolina State University Raleigh, NC
Dissertation Title:
How the Gentle Winds Beckon: r-Process Nucleosynthesis in Neutron Star Merger Winds

MS Physics 2020
North Carolina State University Raleigh, NC

BS Physics 2017
University of California San Diego La Jolla, CA

PUBLICATIONS

Gamma Rays as a Signature of r-Process Producing Supernovae: Remnants and Future Galactic Explosions 2025
Z. Liu, E. Grohs, **K.A. Lund**, G. C. McLaughlin, M. Reichert, I.U. Roederer, R. Surman, X. Wang
arXiv:2506.14991 *(Accepted to The Astrophysical Journal)*

Angle-Dependent in-situ Fast Flavor Transformations in Post-Neutron Star Merger Disks 2025
K.A. Lund, P. Mukhopadhyay, J.M. Miller, G.C. McLaughlin
Astrophysical Journal Letters, 985, L9

Kilonova Emissions from Neutron Star Merger Remnants: Implications for Nuclear Equation of State 2025
K.A. Lund, R. Somasundaram, G.C. McLaughlin, J.M. Miller, M.R. Mumpower, I. Tews
The Astrophysical Journal, 987, 56

Nuclear Uncertainties Associated with the Ejecta of a Neutron-Star Black-Hole Accretion Disk 2024
M.R. Mumpower, T.M. Sprouse, J.M Miller, **K.A. Lund**, J.C. Garcia, N. Vassh, G.C. McLaughlin, R. Surman
The Astrophysical Journal, 970, 173

Magnetic Field Strength Effects on Nucleosynthesis from Neutron Star Merger Outflows 2024
K.A. Lund, G.C McLaughlin, J.M. Miller, M.R. Mumpower
The Astrophysical Journal, 964, 111

Emergent Nucleosynthesis from a 1.2 Second Long Simulation of a Black-Hole Accretion Disk 2024
T.M Sprouse, **K.A. Lund**, J.M. Miller, G.C. McLaughlin, M.R. Mumpower
The Astrophysical Journal, 962, 79

Superheavy Elements in Kilonovae 2023
E.M. Holmbeck, J. Barnes, **K.A. Lund**, T.M. Sprouse, G.C McLaughlin, M.R. Mumpower
Astrophysical Journal Letters, 951, L13

The Influence of β Decay Rates on r-Process Observables 2023
K.A. Lund, J. Engel, G.C. McLaughlin, M.R. Mumpower, E.M Ney, R. Surman
The Astrophysical Journal, 944, 144

Kilonovae Across the Nuclear Physics Landscape: the Impact of Nuclear Physics Uncertainties on r-Process Powered Emission 2021
J. Barnes, Y.L. Zhu, **K.A. Lund**, T.M. Sprouse, N Vassh, G.C McLaughlin, M.R. Mumpower, R. Surman
The Astrophysical Journal, 918, 44

Modeling Kilonova Light Curves: Dependence on Nuclear Physics Inputs 2021
Y.L. Zhu, **K.A. Lund**, J. barnes, T.M. Sprouse, N. Vassh, G.C. McLaughlin, M.R. Mumpower, R. Surman
The Astrophysical Journal, 906, 94

INVITED TALKS

INVITED SEMINARS

Upcoming: NYU Astrophysics Seminar (New York, NY) — Apr 2026

GTSI Nuclear Science & SSI Seminar (Livermore, CA) — Jul 2025
"Colors of the Winds: Painting a Picture of Neutron Star Merger Disks"

University of Tennessee, Knoxville Physics & Astrophysics Seminar (virtual) — Apr 2025
"Post-Neutron Star Merger Accretion Disk Winds: A Flavor Sampler"

IReNA Online Seminar (virtual) — Feb 2025
"Nucleosynthesis in Neutron Star Merger Remnant Winds"

Notre Dame Astrophysics Seminar (South Bend, IN) — Oct 2024
"How the Gentle Winds Beckon: Nucleosynthesis in Neutron Star Merger Winds"

Los Alamos National Laboratory T-2 Distinguished Seminar Series (Los Alamos, NM) — Jul 2024
"How the Gentle Winds Beckon: r-Process Nucleosynthesis in Neutron Star Merger Winds"

Caltech Astronomy Tea Talk (Pasadena, CA) — Jan 2024
"Magnetic Field Effects on r-Process Nucleosynthesis in Post-Merger Disk Outflows"

University of Minnesota Nuclear Theory Seminar (virtual) — Oct 2023
"To The Actinides and Beyond: Nucleosynthesis in Neutron Star Merger Disks"

Virginia Tech Astronomy Seminar (Blacksburg, VA) — Apr 2023
"Uncertainties and Opportunities in r-Process Observables"

N3AS Seminar (virtual) — Aug 2022
"Effects of Nuclear Uncertainties on r-Process Observables"

Los Alamos National Laboratory T-2 Distinguished Seminar Series (Los Alamos, NM) — Jul 2022
"Probing Sources of Uncertainty in Kilonova Modeling"

INVITED CONFERENCES & WORKSHOPS

Upcoming: APS Global Physics Summit (Denver, CO) — Mar 2026

Upcoming: Physics and Astrophysics of Neutrino-Dense Environments Workshop (Aspen, CO) — Jan 2026

APS Division of Nuclear Physics Meeting (Chicago, IL) — Oct 2025
"Nuclear Uncertainties in r-Process Heavy Element Formation and Kilonova Modeling"

INT Program 25-2b: From Colliders to the Cosmos (Seattle, WA) — Sep 2025
"Interpreting Kilonova Signals to Constrain the Nuclear Equation of State"

FRIB-TA Topical Program: Future Directions in Nuclear Beta Decay at FRIB (East Lansing, MI) — Sep 2025
"β-Decay Rates and Their Influence on Astrophysical r-Process Observables"

SFB 1245 Annual Workshop (Leiman, Germany) — Nov 2024
"Nucleosynthesis and Neutron Star Mergers"

BRIDGCE-IReNA 2024 Annual Meeting (Guildford, UK) — Jul 2024
"Magnetic Field Strength Effects on Nucleosynthesis from Neutron Star Merger Outflows"

ECT* Workshop: MICRA (Microphysics in Computational Relativistic Astrophysics) (Trento, Italy) — Sep 2023
"Magnetic Field Effects on Nucleosynthesis in Post-Merger Disk Outflows"

INT Program 23-2: Astrophysical Neutrinos and the Origin of the Elements (Seattle, WA) — Aug 2023
"A "Beta" Look at Post-merger Nucleosynthesis"

Remnants of Neutron-Star Mergers: Connecting Hydrodynamics Models to Nuclear, Neutrino, and Kilonova Physics (Darmstadt, Germany) — Oct 2022
"Key Uncertainties in Astrophysical r-process Nucleosynthesis"

INT Prog. 21-3: Radionuclides: Nuclear Physics, Astrophysical Models, and Observations (virtual) — Oct 2021
"Nuclear Physics in Kilonova Modeling"

LECTURES

INTURN Lecture Series (Seattle, WA) — Nov 2025
"Using Design to Communicate Physics Results"

INTURN Lecture Series (Seattle, WA) — Apr 2025
"Introduction to Nucleosynthesis in the Universe"

North Carolina State University Nuclear Astrophysics Group (Raleigh, NC) — Jan 2022
"matplotlib Tutorial for Nuclear Astrophsics"

Universitat Politècnica de Barcelona (Barcelona, Spain) — Oct 2021
"Nucleosynthesis in the Universe"

OTHER TALKS

CONTRIBUTED TALKS

International Symposium on Nuclei in the Cosmos XVIII (Barcelona, Spain) Jun 2025
"Neutrino Oscillations in Post-Merger Disks"

APS Division of Nuclear Physics Meetings (Boston, MA) Oct 2024
"r-Process Nucleosynthesis from Neutron Star Merger Winds

Los Alamos T-Division Student Lightning Talks (Los Alamos, NM) Jul 2023
"Magnetic Field Strength Effects on Nucleosynthesis in Merger Driven Outflows

International School of Nuclear Physics, 43rd Course (Erice, Italy) Sep 2022
"Kilonova Modeling: Nuclear Physics, Magnetic Fields, Neutrinos

Los Alamos T-Division Student Lightning Talks (Los Alamos, NM) Aug 2022
"Magnetic Fields in Kilonova Modeling"
Awarded 1st Place prize

N3AS Summer School in Multi-Messenger Astrophysics (Santa Cruz, CA) Aug 2022
"Kilonova Modeling"

15th **International Conference on Nuclear Data for Science and Technology** (virtual) Jul 2022
"Probing Nuclear Uncertainties in Kilonova Modeling"

Center for Nonlinear Studies Student Series (Los Alamos, NM) Jul 2022
"Kilonova Modeling: Magnetic Fields, Neutrinos, Nuclear Physics"

ChETEC-INFRA Schools on Nuclear Astrophysics Questions (virtual) Jan 2022
"Actinide Dating Stars: Nuclear Uncertainties in Cosmic Age

ECT* Workshop: KRINA (Key Reactions in Nuclear Astrophysics) (virtual) Jun 2021
"Sensitivity of the Observed Kilonova Signal to Nuclear Physics"

Southeast Section APS (SESAPS) Meeting (virtual) Nov 2020
"Identification of Key Isotopes in Kilonova Heating"

APS Division of Nuclear Physics Meeting (virtual) Nov 2020
"Identification of Key Isotopes in Kilonova Heating"

FIRE Collaboration Annual Meeting (virtual) Jul 2020
"Identification of Key r-Process Isotopes in Kilonova Heating"

APS Divsion of Nuclear Physics Meetings (Crystal City, VA) Oct 2019
"Uncertainties in Kilonova Heating from Nuclear Physics Inputs"

FIRE Collaboration Annual Meeting (Upton, NY) Jun 2019
"Uncertainties in Kilonova Light Curves from Nuclear Physics: A Case Study"

NRAO Seminar Series (Socorro, NM) 2016
"Probing Magnetized Turbulence in the Fermi Bubbles"

APS Pacific Coast Gravity Meeting (Fullerton, CA) 2016
"On The Astrophysical Origin of the Elements"

POSTERS

RIKEN iTHEMS NOW&NEXT25 (Wakō, Japan) Jul 2025
"Neutrino Fast Flavor Oscillations in Neutron Star Merger Disks"

Neutrinos in Physics and Astrophysics (Berkeley, CA) Jan 2025
"r-Process Nucleosynthesis from Post-Merger Disks with Monte Carlo Neutrino Transport: Effects of Magnetic Field Strength"

International Symposium on Nuclei in the Cosmos XVII (Daejeon, Korea) Sep 2023
"Magnetic Field Effects on Nucleosynthesis from Merger Outflows"
Awarded prize for Outstanding Poster Presentation

JINA Frontiers in Nuclear Astrophysics Meeting (South Bend, IN) May 2022
"Actinide-Dating Stars: Nuclear Uncertainties in Cosmic Age"

North Carolina State University Graduate Student Research Symposium (Raleigh, NC) Apr 2022
"Actinide-Dating Stars: Nuclear Uncertainties in Cosmic Age"

AAS Winter Meeting (Grapevine, TX) Jan 2017
"Probing Magnetized Turbulence in the Fermi Bubbles"

NAC IV Workshop (Washington, DC) Oct 2016
"Probing Magnetized Turbulence in the Fermi Bubbles"

MENTORSHIP

University of Washington / Institute for Nuclear Theory:

Part of leadership team for INT Undergraduate Research Network (INTURN)
Current research mentor for **one undergraduate student** through INTURN

UC Berkeley:

Current research mentor for **one undergraduate student** through N3AS
Current career mentor for **two undergraduate students** through N3AS

Other:

Ongoing mentorship and research assistance provided to graduate students at NC State University and Notre Dame University

OTHER ACADEMIC ACTIVITIES

2025

Community Work:

- University of Washington Physics Postdoc Professional Development Committee Member *(ongoing)*
- Rising Researchers Seminar Series Core Committee member *(ongoing)*
- Organizer for N3AS Seminar Series *(ongoing)*
- Panelist at Time Domain and Multi-Messenger Astrophysics (TDAMM) IV Workshop *Oct 2025)*
- Organizing Committee CeNAM Frontiers 2026 *(upcoming in College Station, TX)*
- Local Organizing Committee for International Symposium on Nuclei in the Cosmos *(until Jun 2025)*

Workshops & Schools:

- Nuclei in the Cosmos School (Barcelona, Spain)
- CeNAM/INT Nucleosynthesis Uncertainties Workshop (Seattle,WA)

2024

- INT Workshop 24-89W: EOS Measurements with Next-Generation Gravitational-Wave Detectors (Seattle, WA)

2022

- N3AS Summer School in Multi-Messenger Astrophysics (Santa Cruz, CA)
- JINA-CEE Frontiers in Nuclear Astrophysics Meeting (South Bend, IN)

2021

- INT Workshop 21-79W: New Directions in Neutrino Flavor Evolution in Astrophysical Systems (virtual)
- International Neutrino Summer School (virtual)
- ECT* Workshop: Probing Nuclear Physics with Neutron Star Mergers (virtual)
- International Workshop on Weak Interactions and Neutrinos (virtual)

2020

- JINA-Horizons Workshop (virtual)

2019

- ECT* Workshop: Nuclear and Astrophysics Aspects for the Rapid Neutron Capture Process in the Era of Multi-Messenger Observations (Trento, Italy)
- FOE19 Fifty-one Erg Conference (Raleigh, NC)
- JINA First Frontiers Summer School (East Lansing, MI)

2018

- Neutron Physics Summer School (Raleigh, NC)

OUTREACH

Upcoming **Astronomy on Tap** public talk (Seattle, WA)	Nov 2025
Astronomy Days at North Carolina Museum of Natural Sciences (Raleigh, NC)	Jan 2023
Astronomy on Tap public Talk (Durham, NC)	Nov 2022
Astronomy Days at North Carolina Museum of Natural Sciences (Raleigh, NC)	Jan 2022
LEAP Workshop at North Carolina State University (Raleigh, NC)	Aug 2018
Designed plan for **Galaxy Garden** at VLA visitor center (Magdalena, NM)	Jul 2017
Restored 2-dish interferometer at Frank T. Etscorn Observatory (Socorro, NM)	Jul 2017
Public Tours of Very Large Array (VLA) facilities (Magdalena, NM)	Jul 2016

LANGUAGES

Native Proficiency: English, Catalan, Spanish
Working Proficiency: Italian
Elementary Proficiency: French, German
Computational: Python, HPC and large-scale simulations, Mathematica, Data Visualization, Data analysis

SELECTED REFERENCES

Gail McLaughlin
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Dept. of Physics
North Carolina State University
Raleigh, NC
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Staff Scientist
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