

# LAUREN KOHLER

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## RESEARCH INTERESTS & AREAS OF EXPERTISE

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- Scientific machine learning applications to nuclear reactor systems
- Calibration, validation, and uncertainty quantification
- Predictive modeling based on sparse measurement data for advanced reactors
- Multimodal Sensing and transfer learning to nuclear thermal-hydraulics

## EDUCATION

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**B.S. in Nuclear Engineering, Minor in Mathematics** expected May 2024  
North Carolina State University, Raleigh NC  
Overall GPA: 3.84/4.0

### Relevant Course Work

MA540: Uncertainty Quantification	NE400: Nuclear Reactor Energy Conversion
NE795: Scientific Machine Learning	NE401: Nuclear Reactor Analysis and Design
MA401: Partial Differential Equations	NE402: Nuclear Reactor Engineering

## RESEARCH AND WORK EXPERIENCE

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**Research Aide** January 2023 - present  
*Argonne National Laboratory* *Remote*

**Mentor:** Dr. Alexander Heifetz (aheifetz@anl.gov)

- Designed LSTM Autoencoder model to validate fiber optic temperature readings from sparse measurements.
- Investigated the affect of alternative temperature sensors in liquid sodium to advance development of sodium fast reactors (SFRs), reducing operational and maintenance costs.

**Undergraduate Research Experience in Nuclear Engineering** August 2021 - present  
*North Carolina State University* *Raleigh, NC*

**Mentor:** Dr. Xu Wu (xwu27@ncsu.edu)

- Constructed a convolutional neural network to predict spectra distributions from plasma imaging.
- Analyzed crud build-up in Duke Energy pressurized water reactor (PWRs) using machine learning methods.

**Nuclear Engineering Intern** May 2022 - August 2022  
*GE Hitachi - Probabilistic Risk Analysis* *Wilmington, NC*

- Developed an autonomous analysis tool to compare the frequency and consequences of core damage sequences on the BWRX-300, a small modular reactor.

**Undergraduate Researcher Experience in Mathematics** May 2021 - December 2021  
*University of North Carolina - Charlotte* *Charlotte, NC*

**Mentored by:** Dr. Kevin McGoff

- Reviewed past research about shotgun reconstruction and jigsaw puzzles. Using current findings, formulated and posed a research problem.

- Discovered positive and negative result regarding uniqueness in clear jigsaw puzzles.

### Teaching Assistant

North Carolina State University

August 2022 - December 2022

Raleigh, NC

- MAE206: Engineering Statics

## LEADERSHIP INVOLVEMENT

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### Recording Secretary of Executive Board

*Alpha Omega Epsilon — Gamma Chapter*

January 2023 - December 2023

Raleigh, NC

- Managed attendance and voting records for all meetings and functions, ensuring a quorum was present for voting and accurately disseminating meeting minutes within set deadlines.
- Collaborated with volunteer chair to track and validate service hours for over 40 Active Members, while overseeing compliance with attendance policies and collecting semester-end committee reports.

### Secretary of Executive Board

*Women In Nuclear — North Carolina State University Chapter*

August 2023 - May 2024

Raleigh, NC

- Work closely with the executive board to orchestrate events and maintain up-to-date meeting documents and files, enhancing the organization's focus on nuclear science.
- Oversee social media initiatives for community engagement and represented the organization at outreach events to attract interest in the field of nuclear science.

## PUBLICATIONS

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1. **L. Kohler**, X. Wu, A. Heifetz, "Bayesian Inference and Inverse Uncertainty Quantification of Fiber Optic Distributed Temperature Sensing in a Thermal Mixing Tee" submitted for Proceedings of the ANS Best Estimate Plus Uncertainty International Conference (BEPU-2024). Lucca, Tuscany Italy, May 19 – 24, 2024.
2. **L. Kohler**, J. Clifford, E. Kautz, X. Wu. "ML-Spec: Benchmark Results of Machine Learning-Based Spectra Predictions of Time-Dependent Lithium Emission Spectroscopy Imaging." Submitted for Proceedings of ANS, Pennsylvania, USA, April 4 – 6, 2024.
3. **L. Kohler**, N. Etter, N. Ritchie, M. Diaconeasa. "Enhancing Probabilistic Risk Assessment for the PULSTAR Research Reactor with Advanced Fault Tree and Initiating Event Analysis Techniques." (In preparation to be submitted to Transactions of American Nuclear Society. University Park, Pennsylvania, USA, April 4 – 6, 2024).
4. **L. Kohler**, J. Clifford, E. Kautz, X. Wu. "ML-Spec: Machine Learning-Based Spectra Predictions of Time-Dependent Lithium Emission Spectroscopy Imaging," (In preparation to be submitted to Transactions of ANS. University Park, Pennsylvania, USA. April 4 – 6, 2024).
5. **L. Kohler**, M. Weathered, A. Heifetz, "Compression Multimodal Learning for Reconstruction of Temperature Field from Sparse Measurements in a Liquid Metal Cooled Reactor," (in preparation, to be submitted to Scientific Reports).
6. **L. Kohler**, A. Heifetz, M. Weathered, and A. Cilliers, "LSTM Autoencoder Prediction of Distributed Temperature in Liquid Sodium using Measurements with Co-located Fiber Optic Sensor and Sparse Multi-Point Thermocouple Array," in Transactions of American Nuclear Society. Washington, D.C., USA, November 12-15, 2023.
7. A. Furlong, F. Alsafadi, **L. Kohler**, X. Wu, S. Palmtag, A. Godfrey, and S. Hayes. "Machine Learning-Based Prediction of Crud Buildup Locations in Pressurized Water Reactors," in Transactions of American Nuclear Society. Washington, D.C., USA, November 12-15, 2023.

## HONORS AND AWARDS

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- Roy G. Post Scholar 2023
- US DOE - University Nuclear Leadership Program (UNLP) Scholarship 2022, 2023
- Duke Power Nuclear Engineering Grant 2023
- North Carolina State University “Engineer Your Experience” Grant 2023
- American Nuclear Society Scholarship 2022
- Dean’s List Fall 2020 - Spring 2023

## TECHNICAL SKILLS

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- **Programming languages:** Python, MATLAB, R, L<sup>A</sup>T<sub>E</sub>X, Mathematica, Maple
- **Machine Learning libraries:** TensorFlow, Keras, scikit-learn, PyTorch
- **Languages:** English, American Sign Language