

Lucas H. Ehinger

LucasEhinger@gmail.com | EhingerL@MIT.edu

EDUCATION

Massachusetts Institute of Technology

GPA: 4.9/5.0

- PhD in experimental nuclear and particle physics.

Cambridge, MA

August 2022-Present

Seattle University

GPA: 4.0/4.0

- BS in Physics; BS in Electrical Engineering with Computer Specialization; BS in Mathematics
- Minor in Computer Science

Seattle, WA

Sept. 2018 – June 2022

HONORS AND AWARDS

President's Award: Top Graduating 4-year student at Seattle University. June 2022

Sullivan Leadership Award: Full-ride merit scholarship at Seattle University Sept. 2018 – June 2022

RESEARCH AND LAB EXPERIENCE

Measuring in-medium nucleon modification through spectator tagged DIS with the LAD experiment

MIT

June 2023-Present

- Preparing to run first ever tagged-DIS measurement in Jefferson Lab's Hall C, to test SRC-EMC hypothesis.
- Only graduate student on experiment. Significant work on detector construction, data acquisition setup, reconstruction software development, and simulation.

First Measurement of nuclear sub-threshold J/ψ photo-production

MIT

October 2022-October 2024

- Analysed data from Jefferson Lab's Hall D, with the SRC-CT group. Extracted first ever measurement of sub-threshold J/ψ photo-production.

NIST Research Intern: Portable Cold-Atom Vacuum Standard Development

NIST

September 2021-November 2021

- Performed both hardware (apparatus design, construction, operation, and interfacing) and software (data analysis with python) duties.

CERN Summer Student Program: Search for BSM Physics in di-Higgs Decays

CERN

June 2021-August 2021

- Member of the University of Michigan IREU at the CERN Summer Student Program. Work was virtual due to pandemic.
- Worked with Prof. Haichen Wang of UC Berkeley to develop GNN machine learning to search for pair production of Higgs via $HH \rightarrow \gamma\gamma + X \neq b\bar{b}$ decay.
- Significant work with C++, Root, Linux, and statistical analysis techniques. Some experience with training GNN machine learning algorithms.

An investigation of the $\bar{u} - \bar{d}$ asymmetry in the proton sea through a combined Statistical and Meson Cloud Model

Seattle University

June 2020-June 2022

- Working with Dr. Mary Alberg to theoretically investigate the \bar{u} / \bar{d} relationship in the proton.
- Extensive work with MATLAB and Mathematica, and some work with Fortran.

Experimental investigation of electric force microscopy by quasi-static and dynamic force measurements

Seattle University

Jan. 2019-April 2020

- Worked with Dr. Woo-Joong (Andy) Kim to measure short range electric force through dynamic and quasistatic force microscopy.
- Gained lab experience with extensive coding in MATLAB, theoretical and experimental work with cantilevers, and precise angle measurements using an autocollimator laser setup.

Low Temperature Investigation of Ammonium Sulfate

Seattle University, University of Washington

Oct. 2018-March 2020

- Assisted Dr. Amal al-Wahish with publishing of previously collected data from Oak Ridge National Lab.
- Performed material analysis through work with FTIR Spectroscopy, Neutron Scattering, and Specific Heat Capacity data.

Isabellenhütte Research and Development Internship

Isabellenhütte GmbH. | Dillenburg, Germany

June 2018 - August 2018

- 10-week internship in Germany with a small thermoelectric research and development lab.
- Assisted in the development of thermoelectric Seebeck generators. Performed both experimental work in labs (including hot and cold soldering and metal saw operation) and created calculators in Excel to predict theoretical properties of the motors.

JOURNAL PUBLICATIONS

1. J.R. Pybus, **L. Ehinger**, SRC-CT Group, *First Measurement of Near- and Sub-Threshold J/ψ Photoproduction off Nuclei*, Submitted to Physical Review Letters, October 2024. ↗
2. F. Hauenstein, C. Ayerbe Gayoso, S. Ratliff, H. Szumila-Vance, A. Schmidt, **L. Ehinger**, O. Hen, D. Higinbotham, I. Korover, *Tagged deep inelastic scattering measurement on deuterium with the LAD experiment*, European Physics Journal A. ↗
3. M. Alberg, **L. Ehinger**, and J. Miller, *Pions in Proton Structure and Everywhere Else*, Letter in Physical Review D (June 2022). ↗
4. **Lucas Ehinger**, Daniel Barker, James Fedchak, Julia Scherschligt, Stephen Eckel, *Direct comparison of two multiplexed portable cold atom vacuum standards*, AVS Quantum Science (April 2022). ↗
5. N. Pelle, **L. Ehinger**, C. R. Zaug, and W. J. Kim, *An autocollimator with sub-microradian sensitivity*, American Journal of Physics 88:7, 586-591, (2020). ↗

OTHER REPORTS

1. A. Accardi et. al, *Strong Interaction Physics at the Luminosity Frontier with 22 GeV Electrons at Jefferson Lab*, arxiv (Jun 2023). ↗
2. **L. Ehinger** et. al, *Search for New Physics in di-Higgs Decays with $H \rightarrow \gamma\gamma$ and without B-jet Pairs* (2021), CERN Summer Student Program Final Report. ↗

RESEARCH PRESENTATIONS AND CONFERENCES

1. **Lucas Ehinger**, *Measuring in-medium nucleon modification through spectator tagged Deep Inelastic Scattering with the LAD experiment*, American Physical Society Division of Nuclear Physics Fall 2024, Boston, MA. ↗
2. **Lucas Ehinger**, *An investigation of the $\bar{u} - \bar{d}$ asymmetry in the proton sea through an updated Pion Cloud Model.*, American Physical Society Division of Nuclear Physics Fall 2021, Boston, MA (Online), October, 2021. (Poster). ↗
3. **Lucas Ehinger**, *An investigation of the $\bar{u} - \bar{d}$ asymmetry in the proton sea through a combined Statistical and Meson Cloud Model.*, Murdock College Science Research Conference, Vancouver, WA (Online), November, 2020 (Poster). ↗
 - Best overall poster prize. \$500 personal + \$500 department award. ↗
4. **Lucas Ehinger**, *An investigation of the $\bar{u} - \bar{d}$ asymmetry in the proton sea through a combined Statistical and Meson Cloud Model.*, American Physical Society Division of Nuclear Physics Fall 2020, New Orleans, LA (Online), October, 2020. (Poster). ↗
5. **Lucas Ehinger**, *An investigation of the $\bar{u} - \bar{d}$ asymmetry in the proton sea through a combined Statistical and Meson Cloud Model.*, Seattle University Undergraduate Research Fair, Seattle, WA (Online), October, 2020 (Poster).
6. **Lucas Ehinger**, *Dynamic force microscopy using a high-precision autocollimator.*, American Physical Society April Meeting, Washington DC, DC (Online), April, 2020. (Lecture). ↗

7. **Lucas Ehinger**, Krishna Kharel, Ö. Günaydin-Şen, Amal al-Wahish, *Spectroscopic Investigation of Ammonium Sulfate.*, American Physical Society March Meeting, Denver, CO (Online), March, 2020. (Poster). ↗
8. **Lucas Ehinger**, W.J. Kim, *Experimental Investigation of Electric Force Microscopy by Quasi-Static & Dynamic Force Measurements.*, Murdock College Science Research Conference, Vancouver, WA, November, 2019 (Lecture).
9. **Lucas Ehinger**, W.J. Kim, *Experimental Investigation of Electric Force Microscopy by Quasi-Static & Dynamic Force Measurements.*, Seattle University Undergraduate Research Fair, Seattle, WA, October, 2019 (Poster).

NON-RESEARCH EMPLOYMENT

Library IT Assistant	15hrs/week	<i>May 2019–January 2021 (excluding summers)</i>
Physics grader and lab TA	5hrs/week	<i>September 2018–June 2020 (excluding summers)</i>
Volunteer Physics Tutor	2hrs/week	<i>September 2019–June 2022 (excluding summers)</i>

ORGANIZATION AFFILIATIONS

- Treasurer & Executive Board Member, MIT Outing Club
- Student Ambassador, American Physical Society
- Member, Society of Physics Students (SPS)
- Member, Alpha Sigma Nu
- Member, IEEE-Etta Kappa Nu
- Chapter President(2021-2022), Tau Beta Pi (The Engineering Honor Society)