JACOB HELWIG

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Education

Texas A&M University, College Station, TX — **August 2021-May 2025**
- Ph.D. candidate, Computer Science — **GPA**: 3.71 (*21 hours*)
- Advised by Dr. Shuiwang Ji

The University of Texas at Austin, Austin, TX — **August 2016-May 2021**
- Bachelor of Science, Mathematics — **GPA**: 3.39 (*138 hours*), **Upper Division GPA**: 3.74 (*73 Hours*)
- Certificate in Elements of Computing — **GPA**: 3.67 (*18 Hours*)
- Certificate in Scientific Computing — **GPA**: 3.83 (*18 Hours*)
- Certificate in Applied Statistical Modeling — **GPA**: 3.95 (*18 Hours*)

Research

*=Equal Contribution

Artificial Intelligence for Science in Quantum, Atomistic, and Continuum Systems *Xuan Zhang*, Limei Wang*, **Jacob Helwig***, Youzhi Luo*, Cong Fu*, Yaochen Xie*, . . . , Alán Aspuru-Guzik, Erik Bekkers, Michael Bronstein, Marinka Zitnik, Anima Anandkumar, Stefano Ermon, Pietro Liò, Rose Yu, Stephan Günnemann, Jure Leskovec, Heng Ji, Jimeng Sun, Regina Barzilay, Tommi Jaakkola, Connor W. Coley, Xiaoning Qian, Xiaofeng Qian, Tess Smidt, Shuiwang Ji* (paper)
- AI for Science survey paper, to be submitted for peer review
- Led section 9 on Partial Differential Equations (PDEs)

Learning Temporal Dynamics in Time-Dependent Partial Differential Equations *Xuan Zhang*, **Jacob Helwig***, Yuchao Lin, Yaochen Xie, Cong Fu, Stephan Wojtowytsch, Shuiwang Ji*
- Under review (ICLR 2024)

High-fidelity Fluid Flow Reconstruction *Cong Fu, **Jacob Helwig**, Shuiwang Ji*
- Accepted as a poster to LoG 2023

Group Equivariant Fourier Neural Operators for Partial Differential Equations ***Jacob Helwig***, *Xuan Zhang*, Cong Fu, Jerry Kurtin, Stephan Wojtowytsch, Shuiwang Ji* (paper/talk, code)
- Developed a global convolution operator that encodes symmetries for solving PDEs by extending group equivariant convolutions to a frequency domain parameterization
- Accepted as poster to the 2023 International Conference on Machine Learning

Covariate Dependent Graphical Models (CRAN, paper, blog)
- Completed a software implementation (R and C++) of an algorithm that models the conditional dependence structure of a dataset as continuous function of an extraneous covariate
- Package is available on Comprehensive R Archive Network
- Co-authored simulation study for a methods paper describing the algorithm (under review)

Work Experience

Los Alamos National Laboratory, Los Alamos, NM | Applied Machine Learning Fellow — **June 2023 - August 2023**
- Project: Solving the Elastic Wave Equation Using Deep Learning
- Mentors: Dr. Hanchen Wang, Dr. Youzuo Lin

Work Experience (cont.)

DIVE Lab, College Station, TX | Research Assistant **June 2022 -**
- Research on developing deep neural surrogates for solving PDEs and dynamics modeling
- Advisor: Dr. Shuiwang Ji

Texas A&M University, College Station, TX | Graduate Teaching Assistant **August 2021 - May 2022**
- STAT 404: Statistical Computing (*Fall 2021*)
- STAT 651: Statistics in Research (*Spring 2022*)

John Deere, HX Factory Automation | Data Science and Analytics Intern **May 2021-August 2021**
- Paint optimization: created a high-fidelity model (Python) of the paint system for identifying improved logic in high-traffic intersections
- Forklift safety: developed automated human detection software (Python) using computer vision (YOLO) and proximity estimation logic

The University of Texas at Austin, Austin, TX | Teaching Assistant **August 2020-May 2021**
- M 348: Scientific Computation in Numerical Analysis (*Fall 2020*)
- M 368K: Numerical Methods for Applications (*Spring 2021*)

TIDES, Austin, TX | Evaluation Fellow **January 2020-January 2021**
- Texas Institute of Discovery Education in Science
- Statistical analysis of student achievement under an alternative teaching method in comparison with a traditional lecture

Honors

Ruth J. & Howard F. Newton Memorial Graduate Student Teaching Award In Statistics, 2022 Recipient
- "Jacob was selected to receive the Newton Teaching Award based on his outstanding evaluations by the instructors he was Teaching Assistant for during the Fall 2021 and Spring 2022 semesters." (award details)

UT Austin University Honors, Fall 2019, Spring 2020, Fall 2020, & Spring 2021
- "To be included, a student must earn at least 45 grade points [and] a grade point average of at least 3.50"

Skills

Coding Languages
- Advanced: Python, R
- Basic: Bash, Slurm, C++, SQL

Software
- PyTorch, Excel, Git, LaTeX

Appointed Positions

Statistics Graduate Student Association **September 2021 - May 2022**
- Departmental delegate to GPSG (Graduate and Professional Student Government)