

# JACOB HELWIG

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## Education

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**Texas A&M University**, College Station, TX

**August 2021-May 2026**

- Ph.D. candidate, Computer Science
- Advised by Dr. Shuiwang Ji

**GPA: 3.75 (24 hours)**

**The University of Texas at Austin**, Austin, TX

**August 2016-May 2021**

- Bachelor of Science, Mathematics
- Certificate in Elements of Computing
- Certificate in Scientific Computing
- Certificate in Applied Statistical Modeling

**GPA: 3.39 (138 hours), Upper Division GPA: 3.74 (73 Hours)**

**GPA: 3.67 (18 Hours)**

**GPA: 3.83 (18 Hours)**

**GPA: 3.95 (18 Hours)**

## Research

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\*=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, under review
- Led section 9 on Partial Differential Equations (PDEs)

**SineNet: Learning Temporal Dynamics in Time-Dependent Partial Differential Equations**, *Xuan Zhang\**, **Jacob Helwig\***, *Yuchao Lin*, *Yaochen Xie*, *Cong Fu*, *Stephan Wojtowytsch*, *Shuiwang Ji* ([paper](#))

- Accepted as a poster to the 2024 International Conference on Learning Representations

**High-fidelity Fluid Flow Reconstruction**, *Cong Fu*, **Jacob Helwig**, *Shuiwang Ji* ([paper](#), [code](#))

- Accepted as a poster to the 2023 Learning on Graphs Conference

**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

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**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.)

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**DIVE Lab**, College Station, TX | Research Assistant

**June 2022 -**

- Research topic: accelerating the numerical solution of PDEs with deep learning
- 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

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**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

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### Coding Languages

- Advanced: [Python](#), [R](#)
- Basic: Bash, Slurm, [C++](#), [SQL](#)

### Software

- PyTorch, Excel, Git,  $\LaTeX$

## Appointed Positions

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**Statistics Graduate Student Association**

**September 2021 - May 2022**

- Departmental delegate to GPSG (Graduate and Professional Student Government)