

Tianxiang Dai

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SUMMARY

PhD candidate in Electronic Engineering at Stanford University developing representation models for physical systems, grounded in training across physics and computer science.

Research spans nanophotonics, scientific machine learning, optical instrumentation, and autonomous design, with a focus on representations that make complex physical systems easier to model, optimize, interpret, and build.

EDUCATION

STANFORD UNIVERSITY

Sep. 2023 – Jul. 2028 (Expected)

PhD in Electronic Engineering

Relevant coursework: Deep Generative Models, Reinforcement Learning, Computational Imaging, Nanophotonics, Electromagnetic Waves

PEKING UNIVERSITY

Sep. 2019 – Jul. 2023

Bachelor of Science in Physics and Computer Sciences (dual degree)

GPA: 3.8/4.0

SKILLS

- Programming Languages: Python (Advanced), Mathematica (Advanced), C/C++ (Intermediate)
- Frameworks/Libraries: PyTorch, JAX
- Simulation Tools: Meep, Tidy3D
- Machine Learning: Deep Neural Networks, Natural Language Processing, Multi-modal Models, Agentic Systems
- Optical Engineering: Metasurface Design, Nanophotonics, Optical Neural Networks

SELECTED PUBLICATIONS

1. **Tianxiang Dai** and Jonathan A. Fan. *Characterizing and Optimizing the Spatial Kernel of Multi Resolution Hash Encodings*. arXiv:2602.10495 (2026). ICLR 2026 Poster.
2. **Dai, T.**, Shao, Y., Mao, C. *et al.* *Shaping freeform nanophotonic devices with geometric neural parameterization*. *npj Comput Mater* **11**, 259 (2025). DOI:10.1038/s41524-025-01752-w
3. Jiang, Z., **Tianxiang Dai**, S. Guo, S. H. Sohag, Y. Shao, C. Mao, A. Alu, J. A. Fan, and Y. Zhou. *Freeform Mode-Engineered Metasurfaces*. *Nano Letters* (2026). DOI:10.1021/acs.nanolett.5c06075
4. Shao, Y., Z. Wang, **Tianxiang Dai**, R. Lupoiu, Y. Kim, T. D. Milster, and J. A. Fan. *Conformal Aberration-Correcting Spaceplates*. *Laser & Photonics Reviews* (2026). DOI:10.1002/lpor.202502414
5. R. Lupoiu, Y. Shao, **T. Dai**, C. Mao, K. Edee, and J. A. Fan. *A multi-agentic framework for real-time, autonomous freeform metasurface design*. *Sci. Adv.* **11**, eadx8006 (2025). DOI:10.1126/sciadv.adx8006

SELECTED CONFERENCES

1. **T. Dai**, Y. Shao, C. Mao, Y. Zhou, and J. A. Fan, "Neural Level Set Representation for High-Q Nonlocal Metasurface Design," in *Optica Design and Fabrication Congress 2025 (FlatOptics, Freeform, OFT)*, Technical Digest Series (Optica Publishing Group, 2025), paper FTh1A.3.
2. Chenkai Mao*, Robet Lupoiu*, **Tianxiang Dai***, Mingkun Chen and Jonathan Fan (2024). *Towards General Neural Surrogate Solvers with Specialized Neural Accelerators*. ICML 2024 Poster.
<https://arxiv.org/abs/2405.02351> * These authors contributed equally.

OPEN-SOURCE CONTRIBUTIONS

- Tidy3D (Fast electromagnetic solver (FDTD) at scale) - <https://github.com/flexcompute/tidy3d>
- FDTDx (Electromagnetic FDTD Simulations in JAX) - <https://github.com/ymahlau/fdtdx>

HONORS & AWARDS

- Weiming Bachelor of PKU (2023) - *Awarded to top 1.3% of graduating class (50 out of 3,826 students)*
- Leo KoGuan Scholarship (2021) - *Awarded to top 3.4% in Department of Physics (7 out of 207 students)*
- Merited Student of PKU (2021,2020)
- Second Class Scholarship of PKU (2020)
- Silver Medal in the 35th China Physics (2018) Olympics final