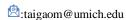
Taigao Ma

:+1 (734) 272-2050



EDUCATION

University of Michigan, Ann Arbor, MI, USA

08/2019-04/2024 (Expected)

Ph.D. in Physics

- GPA: 4.00/4.00
- **Data Science Certificate Program** (ongoing)
- Advisor: Prof. L. Jay Guo, @:guo@umich.edu
- Interest: Generative AI, Foundation Models, Reinforcement learning, AI for Science, Optics and Photonics Simulation and Inverse Design, Data Analysis, Data Mining and Data Visualization, Quantitative Analysis.

University of Science and Technology of China (USTC), Hefei, China

08/2015-06/2019

B.S. in Physics

Outstanding Graduates.

GPA: 3.81/4.30

WORK EXPERIENCE

PhD Intern at Visa Research, Austin

Foundation Models for transaction modelling in payment industry

05/2023-Now

- Built up the working pipeline from table-to-text generator and data preprocessing, to model architecture and training.
- Demonstrated a proof of concept foundation model for understanding the transaction data and predicting future transaction states.

RESEARCH EXPERIENCE

Graduate Student Research Assistant at University of Michigan, Ann Arbor

Foundation Models for simulation and design of photonic structures

05/2022-Now

- Proposed and developed OL-Transformer as a fast surrogate model for photonic simulation with 3800x time improvement.
- Proposed and developed OptoGPT as a foundation model for fast, efficient, flexible inverse design in multilayer thin film structures.
- 2 papers submitted, 1 paper in preparation, 1 patent submitted.

Reinforcement learning for sequential design of sustainable photonic structures

06/2021-Now

- Developed a deep reinforcement learning algorithm to design optical multilayer thin film in PyTorch.
- Build up a customized environment integrated with physical simulations for thin film design.
- Designed and fabricated multilayer thin film for sustainable applications, including environmentally friendly Cr color coatings, solar cells with pleasing colors for building-integration (with 30% energy efficiency improvement), etc.
- 2 paper published, 2 patent submitted.

Benchmark multiple deep learning models for nano-photonic inverse design

01/2020-06/2021

- Built up a benchmark platform to compare deep learning models (tandem networks, GANs, VAEs) for nanostructure inverse design.
- Designed evaluation metrics, developed data analysis system and data visualization methods for evaluating their performance.

- Taigao Ma, Haozhu Wang, L. Jay Guo, "Elucidating the General Design Principle for Multilayer Thin Film Structures through Explainable Sequential Learning". (in preparation)
- Taigao Ma, Haozhu Wang, and L. Jay Guo. "OptoGPT: A Foundation Model for Inverse Design in Optical Multilayer Thin Film Structures." arXiv:2304.10294 (2023).
- Taigao Ma, Haozhu Wang, and L. Jay Guo. "OL-Transformer: A Fast and Universal Surrogate Simulator for Optical Multilayer Thin Film Structures." arXiv:2305.11984 (2023). (Accepted by ICML 2023 SynS & ML Workshop)
- Anwesha Saha*, Taigao Ma*, Haozhu Wang, L. Jay Guo, " Environmentally Sustainable and Multifunctional Chrome-like Coatings Having No Chromium Designed with Reinforcement Learning". ACS Applied Materials & Interfaces (2023). (*co-first)
- Youngbum Park, Sangeon Lee, Mustafa Tobah, Taigao Ma, and L. Jay Guo, "Optimize optical/electrical/mechanical properties of ultrathin metal films for flexible transparent conductor applications". Optical Materials Express 13, no. 2 (2023): 304-347.
- Taigao Ma, Mustafa Tobah, Haozhu Wang, and L. Jay Guo. "Benchmarking deep learning-based models on nanophotonic inverse design problems." Opto-Electronic Science 1, no. 1 (2022): 210012.
- Day Matthew, Mark Dong, Bradley Smith, Rachel Owen, Grace Kerber, Taigao Ma, Herbert Winful, and Steven Cundiff. "Simple single-section diode frequency combs." APL Photonics 5, no. 12 (2020): 121303.
- Niu Rui, Shuai Wan, Shuman Sun, Taigao Ma, Haojing Chen, Weiqiang Wang, Zhizhou Lu et al. "Repetition rate tuning of soliton in microrod resonators." arXiv preprint arXiv:1809.06490 (2018).

TALKS

Physics Graduate Student Symposium

University of Michigan, Ann Arbor

Learn to design: From optimization to deep learning and reinforcement learning.

2022

Metasurface: Manipulating light at the nano scale.

2021

HONORS&AWARDS

Rackham Graduate Research Grant (\$3000)

2022

Cyrus Tang Scholarship (10%) 2015, 2016, 2017, 2018

ADDITIONAL INFORMATION

- **Reviewer:** AIP Advances
- Graduate Student Instructor: Physics Lab 241 (Winter 2020, Winter 2021), Physics Lab 141 (Fall 2020)