Tianning Zhang Email : zhangtianning110@gmail.com
https://veya2ztn.github.io

Education

- **Singapore University of Technology and Design** Singapore
  Ph.D. in Science, Math, and Technology *Jan. 2018 - July 2022*
- **Chu Kochen Honors College, Zhejiang University** Hangzhou
  B.S. in Physics (Honour) *Supt. 2013 - July 2017*

Working

- **Shanghai AI Lab** Shanghai
  Researcher *July 2022 - Present*
  - **AI for Science**: By introducing AI into scientific research, we can open up new intersections between AI and science, utilize large AI models to address challenges in large-scale simulations and analyses in natural sciences, use AI language models to boost academic productivity and accelerate knowledge acquisition, sharing, and structuring, employ AI data tools for analyzing big data issues in scientific fields, and leverage physics knowledge to analyze AI models and technologies, thereby constructing interpretable and analyzable AI tools.

- **Chinese University of Hong Kong** Hong Kong
  Postdoctoral Fellow *Sept 2023 - Present*

Highlight Projects

- **Scientific Knowledge LLM**: Utilize the logical reasoning abilities of large language models (LLMs) to analyze and construct a knowledge graph of scientific knowledge from ancient times to the present. Keep real-time track of and archive the latest scientific developments and technologies, discern and extrapolate frontier knowledge. Enhance the system of human knowledge inheritance and improve the productivity of scientific research in natural sciences.
- **Large Weather Model: FengWu** : The 'Fengwu' large model, constructed based on multimodal and multitask deep learning methods, has for the first time achieved effective forecasts of core atmospheric variables over a period of more than 10 days at high resolution, and outperforms peers in 80% of evaluation metrics. 'Fengwu' only needs 30 seconds to generate highly accurate global forecasts for the next 10 days, significantly outperforming traditional models in efficiency.
- **Metasurface DL**: Using deep learning, we design metasurfaces and handle their unit interactions, vastly improving computation speed and enabling an end-to-end inverse design process, which demonstrates how to analyze, construct, optimize, and control complex systems with existing computational tools. *https://github.com/veya2ztn/MetaSurface
- **TensorNetwork ML**: TensorNetwork, an open-source project I developed, leverages the tensor network framework for superlinear model construction, expanding matrix multiplication into higher-dimensional tensor entanglement systems, a technique derived from quantum physics. Our work covers theory, model design, and optimization strategies for practical applications. *https://github.com/veya2ztn/TNproject

Acadamic

- C. Kang, T. Han, J. Gong, **T. Zhang**, Lei Bai, Wanli Ouyang et al. "*FengWu: Pushing the Skillful Global Medium-range Weather Forecast beyond 10 Days Lead.*" arXiv preprint arXiv:2304.02948 (2023).
- **T. Zhang**, T. Q. Chen, "*Stack operation of tensor networks*", Frontiers in Physics, 2022: 363.
- **T. Zhang**, L. K. Ang, "*Symmetry Enhanced Network Architecture Search for Complex Metasurface Design*", IEEE Access, 2022, 10: 73533-73547.
- **T. Zhang**, L. K. Ang, "*SUTD-PRCM dataset and neural architecture search approach for complex metasurface design*",arXiv:2203.00002, (2022)
- **T. Zhang**, L. K. Ang , "*Deep learning-based design of broadband GHz complex and random metasurfaces*", APL Photonics 6, 106101 (2021)
- **T. Zhang**, L. K. Ang "*Optical Kerr effect and third harmonic generation in topological Dirac/Weyl semimetal*" Opt. Express 27, 38270-38280 (2019)

Programming Skills

- **Languages**: Python, Javascript, C/C++, Rust **Technologies**: Pytorch/Tensorflow, Mathematica, Matlab