

Yuan, Wenxuan

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Seeking PhD opportunities in trustworthy machine learning, with a particular interest in embedding interpretable structures that enable prediction, explanation, and intervention. Passionate about developing effective and transparent learning algorithms to address key scientific and engineering challenges.



🎓 Education Experience

Imperial College London

Sep 2024 - Nov 2025

MSc | Applied Computational Science and Engineering | Department of Earth Sciences and Engineering

- **Degree:** Distinction
- **Key Courses:** Computational Mathematics (A*), Machine Learning (A*), Fluid Dynamics (A*), Deep Learning (A), Inversion & Optimisation (A) etc.

Taiyuan University of Technology

Sep 2020 - Jun 2024

BSc | Mathematics and Applied Mathematics | School of Mathematics

- **GPA:** 92/100
- **Key Courses:** mathematical analysis (97), advanced algebra (98), probability theory and mathematical statistics (93), mathematical physics equations (97), numerical analysis (94), abstract algebra (100) etc.
- **Honorary Awards:** Outstanding Academic Award (2020-2024), Outstanding Research Award (2022-2024), etc.

🕒 Research Experience

Information Shapes Koopman Representation

Jun 2025 - Sep 2025

Equal Contribution

Outputs: ICLR 2026, Arxiv, Github

- Analyzed the trade-off between **structural simplicity** and **expressive** in **Koopman** representations from an **information-theoretic** perspective.
- **Main contributions:** Implemented algorithms and conducted extensive experiments on physical simulation tasks; Produced illustrative figures of the proposed models; Polished and revised the manuscript.

Deep Learning-Based Simulation of Dispersion Shock Waves in Nonlinear PDE Systems

Dec 2023 - Dec 2024

First Author, Research Project Leader

Outputs: Physical Review E, Github

- Led the **full-cycle development** of a research project, encompassing data preprocessing, model design, numerical experiments, and thesis writing.
- Developed the **DPINN** and **DRKT** modules based on the PINN framework and traditional Runge-Kutta methods, innovatively addressing dispersion shock wave phenomena in the **Generalized Gardner equation**.
- Integrated the modules into the **PgMSNN model** using the multi-stage training strategy.

The 32nd International Joint Conference on Artificial Intelligence (IJCAI)

Aug 2023

First Author, Research Team Leader

Outputs: IJCAI conference, Github

- Attend the **IJCAI** conference and **oral presentation** at MiGA workshop.
- Presented the technical report of the **MSTCN-VAE model**, an unsupervised model based on skeletal data to effectively solve the micro-gesture classification problem.

Solving Nonlinear Partial Differential Equations Based on PINN Method

Jul 2022 - Apr 2023

First Author

Outputs: Optik, Github

- Using the **PINN** method to simulate the wave solutions (solitons, breathers) of **Modified Schrodinger equation**.
- Reproduce the PINN method in the **Tensorflow** and **Pytorch**.
- Developed structure-preserving neural networks, highlighting the integration of **physical priors** into **ML frameworks** for reliability and interpretability.

🌟 Publications

Apr 2026

Xiaoyuan Cheng* **Wenxuan Yuan***, Yiming Yang, Yuanzhao Zhang, Sibao Cheng, Yi He, and Zhuo Sun, "*Information Shapes Koopman Representation*", The Fourteenth International Conference on Learning, April 2026.

Nov 2024

Wenxuan Yuan and Rui Guo, "*Physics-guided multistage neural network: A physically guided network for step initial values and dispersive shock wave phenomena*", Physical Review E, Volume 110, Issue 6, Page 065307.

Aug 2023

Wenxuan Yuan, Shanchuan He, and Jianwen Dou, "*MSTCN-VAE: An unsupervised learning method for micro gesture recognition based on skeleton modality*", International Joint Conference on Artificial Intelligence, August 2023.

May 2023

Wenxuan Yuan, Rui Guo, and Yining Gao, "*Physics-informed Neural Network method for the Modified Nonlinear Schrödinger equation*", Optik, Volume 279, Page 170739.

Preprints & Submissions

- Xiaoyuan Cheng*, **Wenxuan Yuan***, Boyang Li, Yuanchao Xu, Yiming Yang, Hao Liang, Bei Peng, Robert Loftin, Zhuo Sun, Yukun Hu, "*How Does the Lagrangian Guide Safe Reinforcement Learning through Diffusion Models?*", Submitted to ICML 2026.
- Yiming Yang, Xiaoyuan Cheng, Yi He, Kaiyu Li, **Wenxuan Yuan**, Zhuo Sun, "*On Stability and Robustness of Diffusion Posterior Sampling for Bayesian Inverse Problems*", Submitted to ICML 2026.

🌟 Competitions

FEMA Predicting the Unpredictable Challenge — Rank 1

Feb 2025

(Team Leader) Developed machine learning models for real-time lightning storm evolution prediction and location forecasting to support emergency response and infrastructure protection.

MiGA-IJCAI Challenge (Track1 Microgesture Classification) — Rank 12

Apr 2023 - Jun 2023

(Team Captain) Led the team to develop and optimize an unsupervised model for micro-gesture classification.

China Undergraduate Mathematical Contest in Modeling — National Second Prize

Sep 2023

(Team Leader) Develop a mathematical model of a specified solar field and calculate energy efficiency.

ASC Student Supercomputer Challenge — Global Second Class

Nov 2021 - Mar 2022

(Team member) Deploy the Yuan1.0 model in the HPC cluster for training and hyperparameter tuning.