

Panpan Cui

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Experiences

Protein Language Model–Based Design of High-Efficiency RuBisCO Dec 2025 – Now

- Goal: Predict hard-to-measure Rubisco kinetic parameters and identify high-efficiency RuBisCO variants via LLM.
- Method: Build predictive models via small sample fine-tuning strategies based on pre-trained PLMs (e.g, ESM). Integrate cross-species kinetic data and evaluate robustness and interpretability.

Mathematical Modeling and Optimization of Photosynthesis in *Brassica napus* Dec 2023 – Jan 2026

- Goal: Build interpretable math models to explain photosynthetic mechanisms and guide crop-level optimization.
- Method: Build ODE-based photosynthesis models in *Arabidopsis thaliana* and extend them to *Brassica napus* by integrating experimental data.
- Results: Establish a mechanistic photosynthesis model for *Brassica napus*, facilitating mechanistic understanding and yield-oriented optimization. Contributed to a key project of CAS.

Modeling Light-Harvesting Antenna Size Effects on Photosynthesis Sep 2024 – Nov 2024

- Goal: Evaluate the impact of light-harvesting antenna size on photosynthetic efficiency at leaf and canopy scales.
- Method: Conducted mathematical simulations and built an MLP-based model to predict photosynthetic efficiency in single and multi layer leaves.
- Results: Shows that smaller antenna size reduces efficiency in single-layer leaf but improves efficiency in multi-layer leaves, increasing photosynthetic efficiency by 25% under high-light conditions.

Publications

An Overview of the Structure and Function of Plant Photosystem II Light-Harvesting Proteins with Engineering Perspective

Submitted to *Journal of Integrative Plant Biology (SCI-Q1)*

Ting Zhou, **Panpan Cui**, Lijin Tian, Wenda Wang, Meng Li

Education

University of Chinese Academy of Sciences (UCAS) Mar 2025 – Now

PhD Student in Computer Science

- GPA: 3.86/4.0 Ranking: 3% (Estimated)

Institute of Botany, Chinese Academy of Sciences (IBCAS) Sep 2023 – Mar 2025

Master Student in Developmental Biology

- GPA: 3.80/4.0 Ranking: 5% (Estimated)
- Advisor: [Prof. Rongcheng Lin](#) and [Prof. Meng Li](#)

Huazhong Agricultural University (HZAU) Sep 2019 – June 2023

BS in Landscape Architecture

- GPA: 3.79/4.0 Ranking: 0.05% (Obtain the guaranteed admission)
- Advisor: [Prof. Fan Zhang](#) and [Assoc. Prof. Yanhong He](#)

Technologies

Languages: Python, C/C++, LaTeX

Tools: PyTorch, Linux, Git, SnapGene, MEGA, Matplotlib, Pandas

Awards

2020, 2021, 2022 National Encouragement Scholarship (Top 10%)

2023 Outstanding Graduates of HZAU (Top 3%)

2023, 2024, 2025 Postgraduate Scholarships of UCAS