Wen Cao（曹雯）

22230038@zju.edu.cn | https://1wenniecao1.github.io/

EDUCATION

Zhejiang University 2022.09 - 2025.03
Master of Engineering, Optical Engineering (Recommended Direct Admission)
Zhejiang University 2018.09 - 2022.06
Bachelor of Engineering, Opto-Electronics Information Science and Engineering (GPA: 3.94/4.0)

PUBLICATION

- **Cao, W.**, Bai, L., Xu, Y., Kuang, C., Liu, X. (2024). Fast autofocusing strategy for phase retrieval based on statistical gradient optimization. **Optics and Lasers in Engineering**. (Accepted)
- **Cao, W.**, Bai, L., Tao, S., Tian, Z., Xu, Y., Kuang, C., Liu, X. (2024). Optimal phase mask design for coherent modulation imaging by deep learning. **Optics and Laser Technology**, 176, 110951. DOI: https://doi.org/10.1016/j.optlastec.2024.110951
- Bai, L., **Cao, W.**, Tao, S., Tian, Z., Xu, Y., Kuang, C., Liu, X. (2024). Single-shot multi-wavelength coherent diffractive imaging based on sparse representation and modulation optimization. **Applied Physics Letters**, 124(18). DOI: https://doi.org/10.1063/5.0194876
- Xu, Y., Sun, Y., Wu, H., **Cao, W.**, Bai, L., Tao, S., ... Liu, X. (2023). Regularized deconvolution for structured illumination microscopy via accelerated linearized ADMM. **Optics and Laser Technology**, 169, 110119. DOI: https://doi.org/10.1016/j.optlastec.2023.110119
- **Cao, W.**, Bai, L., Tao, S., Tian, Z., Xu, Y., Kuang, C., Liu, X. (2024). Tilt-corrected reflective ptychography based on automatic differentiation. (Under Review)
- Bai, L., **Cao, W.**, Xu, Y., Kuang, C., Liu, X. (2024). Extrapolative alternating projection phase retrieval algorithm initialized by compressive global optimization. (Under Review)

AWARD/HONOR

National Scholarship (2024); Award of Honor for Graduate (2024, 2023); Graduate with Merit A Performance (2024, 2023); Lbtek Optics Scholarship (2023); Outstanding Graduates (2022); First Prize in Zhejiang University Dance Competition (2022); Second Prize in the 9th Eastern Optoelectronic Design Competition (2022); Guoguang Second Class Scholarship (2020); Zhejiang University Third Class Scholarship (2019-2021); Second Prize in Yongdian Cup Innovation Competition (2019).

PATENT

- Kuang, C., **Cao, W.**, Xu, Y., Liu, X., ... Tian, Z. (2023). A Defect Detection System and Method for Extreme Ultraviolet Lithography Mask Based on Photon Sieve. **(No.202311333714X, Granted)**
- **Cao, W.**, Xu, Y., Kuang, C., Bai, L., ... Liu, X. (2022). An Extreme Ultraviolet Ptychography Method Based on Random Phase Modulation. **(No.2022116235603)**
- Xu, Y., Kuang, C., **Cao, W.**, Tao, S., ... Liu, X. (2022). A Non-Line-of-Sight Imaging System and Method Based on Spectral and Spatio-Temporal Dual Encoding. **(No.202211624120X)**
- Xu, Y., Kuang, C., **Cao, W.**, Tao, S., ... Liu, X. (2022). A Non-Line-of-Sight Imaging System Based on Multi-channel Parallel Detection. **(No.2022116180456)**
- Bao, Y., Huang. L., **Cao, W.**, Wang, K. (2021). An Intelligent Smartphone-Compatible Lossless Sugar Content Detection Device and Its Detection Method. **(No.2021107320231, Granted)**

RESEARCH EXPERIENCE

Physics-informed self-supervised phase retrieval in low light 2024.06 - Present

- Investigated papers on noise analysis in low light and deep learning techniques in phase retrieval.
- Developed self-supervised learning by integrating CNN with propagation models.
- Assessed the performance of the proposed approach in comparison to supervised learning.

Fast autofocusing for phase retrieval using statistical optimization 2024.03 - 2024.06

- Researched literature on autofocusing methodologies in phase retrieval and non-reference image quality assessment (NR-IQA).
- Derived gradient ascent formulas based on NR-IQA and propagation rules to achieve fast correction.
- Validated by comparing performance against established methods numerically and experimentally.
- Summarized our work in a manuscript and submitted it to the journal, which has been accepted.

Tilted diffraction correction using automatic differentiation 2023.10 - 2024.03

- Investigated on tilted diffraction models, correction approaches, and automatic differentiation (AD).
- Formulated a framework to compute transformation matrix via AD for higher reconstruction quality.
- Validated our method in simulations and experiments across reflection angles and noise levels.
- Wrote a paper based on our method and submitted it to the journal.

Optimal modulation design in CMI based on deep learning 2022.09 - 2023.10

- Researched papers, studied basic knowledge on phase retrieval and modulation.
- Constructed a U-Net model to reconstruct object first, subsequently designed optimal mask through gradient update derivations, and finally implemented joint optimization between these two modules.
- Evaluated the effectiveness through simulation and experiments.
- Summarized our work in a manuscript and submitted it to the journal, which has been published.

Non-line-of-sight imaging using ADMM and deep learning 2021.09 - 2022.06

- Reviewed literature on NLOS, deconvolution, inverse problems in optics and deep learning.
- Reconstructed the hidden 3d object from Time-of-Flight data using U-Net model and ADMM.
- Corrected distorted reflection scanning grid using geometric principles, LabVIEW and NI hardware.
- Mitigated pile-up effect and enhance performance using multi-channel parallel detection.
- Summarized the work into the undergraduate thesis.

SKILLS

Software	Python, MATLAB, PyTorch, TensorFlow, LabVIEW
Language	Mandarin (Native), English (TOEFL: 109)

EXTRACURRICULAR ACTIVITIES

Sports/Art	Dance Competition at Zhejiang University; Choral Competition at Zhejiang University.
Volunteer Work	Astronomy Club Teaching Activities at Qiu Shi Primary School; Summer Music Festival at Zhejiang University; Anniversary Celebration of the College of Optical Science and Engineering at Zhejiang University; Guide of Xiaoying Lane; Reading Activity: 'Embrace Youth'; 'Traditional Culture Construction Week'; 'Create Youth' Entrepreneurship Competition; Yunfeng Freshman Sports Meeting.
Organization/Club	Media Center of the Student Union of the College; News and Information Department in Qiushi Chao; Advocacy group in Zhejiang University Esports Association.