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Address: Room 328, Student Hall 15, Beijing Normal University, Beijing, China

EDUCATION

Beijing Normal University, Beijing, China 2021.09-Now
Undergraduate of Science in Theoretical Physics, Liyun Elite Program (expected in 2026.07)
Undergraduate of Business in Economics (expected in 2026.07) Ranking : 2 (out of 23)
GPA (overall): 3.7/4.0;
Core courses: Optics (93)/ Quantum Mechanics I&II (89)/ Introduction to Computational Physics (95)/ Seminar on Optics (95)/ Mechanics (95) / Electromagnetism (97) / Electrodynamics(91) / Solid-state Physics(82)

Scholarships: Outstanding Freshman Scholarship 2021.09
First-class Scholarship of Beijing Normal University 2024.10 & 2022.10
Beijing Normal University First-class Incentive Scholarship 2024.10 & 2023.10 & 2022.10

Language: IELTS:7.5 (Reading:8.0 Listening:8.5 Speaking:6.5 Writing:6.0)
TOEFL:101 (Reading:30 Listening:28 Speaking:20 Writing:22)

SKILLS

Computer:
- Python (with PyTorch, SciPy ...)
- MatLab
- C++

Lab Skills: Using Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM) for materials characterization and analysis.

RESEARCH EXPERIENCES

Single-layer Diffractive Neural Network (D2NN) 2024.12-Now

- **Project Description:** Participated in the design and implementation of a Single-layer Diffractive Neural Network (D2NN). D2NN aimed to transfer neural network inference to the optical domain, utilizing light diffraction for high-speed parallel computation to accelerate processing speed. Addressing the issue of significant output layer intensity loss in traditional multi-layer mask-based D2NNs, I initiated this project to explore the possibility of achieving similar performance using a single phase mask within a 4f optical system.
- **Key Responsibilities & Contributions:**
  - Designed the optical weights by utilizing a Spatial Light Modulator (SLM) placed in the Fourier plane of a 4f system, constructing the core of the optical neural network.
  - Formulated the optical neural network transfer function based on diffraction principles.
  - Trained the D2NN using optical simulation methods with the PyTorch framework and the MNIST handwritten digit dataset.
- **Achievements:** Successfully designed and trained a single-layer phase-mask-based optical neural network. Achieved high-speed inference on the MNIST dataset through optical simulation, demonstrating the potential of single-layer D2NNs for optical computing.

Self-calibrating Beam Shaping Based on Reflective Spatial Light Modulator | Course Project

- **Project Description:** This project focused on developing a self-calibrating optical system for real-time beam shaping and wavefront correction. The primary goal was to compensate wavefront distortions and higher-order modes commonly present in laser beams by utilizing a reflective spatial light modulator (SLM) in a feedback control loop.
- **Key Responsibilities & Contributions:**
  - Designed and constructed the core optical system, integrating a reflective spatial light modulator (SLM) as the key element for wavefront phase modulation.
  - Incorporated a CCD camera equipped with a microlens array to serve as a wavefront sensor, enabling real-time measurement of the beam's wavefront shape.
  - Developed a Python program for the control system to process the wavefront data acquired from the CCD sensor.
  - Implemented optimization algorithms, such as stochastic gradient descent or simulated annealing, within the Python program to minimize the square error between the measured and desired wavefronts.
- **Achievements:** Successfully designed, simulated, and programmed a self-calibrating optical system capable of real-time wavefront correction and dynamic beam shaping. Demonstrated the ability to generate and maintain beams with specific wavefront shapes, including Gaussian and Laguerre-Gaussian profiles, by actively controlling the reflective SLM based on wavefront sensor feedback.

Micro and Nano Optics | Undergraduate Research Assistant 2022.4-2024.6

Advisor: Jinwei Shi (Professor of Physics Department, Beijing Normal University)
Funding: Awarded funding from the Beijing Undergraduate Research Training Program.

- **Optical Surface Structure Characterization:** Utilized Scanning Electron Microscopy (SEM) to determine the size and morphology of nanoparticles. Performed optical spectroscopy measurements to analyze their plasmon resonance properties.
- **FDTD Optical Properties Simulation:** Conducted simulations using the Finite-Difference Time-Domain (FDTD) method to study the electromagnetic modes of gold nanorods excited by visible light. Investigated the influence of nanorod length, width, and length uniformity on the position and width of absorption peaks induced by the second-order excitation mode in 2D materials.

Atomic Co-Magnetometry | Undergraduate Research Assistant 2023.06-2023.08
Advisor: Dong Sheng (Professor of Department of Precision Machinery and Instrumentation, University of Science and Technology of China)

- Developed a working knowledge of the principles and operation of atomic magnetometers and co-magnetometers, focusing on their application in precision measurements.
- Conducted thermal simulations using COMSOL to optimize the design and ensure the thermal stability of critical components within the atomic co-magnetometer setup.
- Participated in the construction and alignment of optical paths for laser-based interrogation of atomic states and implemented electronic measurement circuits for signal acquisition and noise reduction in atomic magnetometry experiments.

WORK EXPERIENCES

BNUPA(Beijing Normal University Photographer Association) | Chairman 2023.09-2024.09(expected)

- Hosted and organized multiple lectures and interviews with external experts. This included 3 lectures and 2 interviews, engaging approximately 200 student attendees.
- Delivered several lecture series, including "Optical Concepts in Photography" and "Imaging System Quality from the Perspective of Photographic Equipment".

Homoludens Archive | Undergraduate Researcher & Archives Administrator 2022.09-2023.07