



# Yu-Chao Huang

✉ [morrisatntu@gmail.com](mailto:morrisatntu@gmail.com) |  [physics-morris.github.io](https://github.com/physics-morris) |  [Physics-Morris](#) |

## EDUCATION

---

### National Taiwan University

*M.Sc., Physics, GPA 3.4/4.3, TOEFL 100*

Sept. 2022 – Aug. 2024

*Taipei, Taiwan*

### National Central University

*B.Sc., Physics, GPA 4.0/4.3*

Sept. 2018 – Jun. 2022

*Taoyuan, Taiwan*

## RESEARCH INTEREST

---

I am passionate about interdisciplinary research at the intersection of quantum computing and machine learning. My work focuses on applying machine learning techniques to quantum computers with theoretical guarantees, aiming to develop novel algorithms to enhance quantum computation efficiency and effectiveness.

## PUBLICATIONS (\*) DENOTES EQUAL CONTRIBUTION

---

- [1] Chenwei Xu\*, **Yu-Chao Huang\***, ..., Han Liu. “BiSHop: Bi-Directional Cellular Learning for Tabular Data with Generalized Sparse Modern Hopfield Model”. *International Conference on Machine Learning*, 2024. [\[pdf\]](#)

## SUBMISSIONS

---

- [2] **YC Huang**, Hsi-Sheng Goan. “L2O- $g^\dagger$ : Learning to Optimize Parametrized Quantum Circuits with Fubini–Study Metric Tensor”. Under review. [\[pdf\]](#)
- [3] Yu-Min Tseng\*, **YC Huang\***, ..., Yun-Nung Chen. “Two Tales of Persona in LLMs: A Survey of Role-Playing and Personalization”. Under review. [\[pdf\]](#)

## EXPERIENCE

---

### Research Internship

*Northwestern University*

July 2023 – Feb. 2024

*Advisor: Professor Han Liu*

- Proposed the Bi-Directional Sparse Modern Hopfield Model (BiSHop), a novel framework utilizing the generalized sparse Hopfield model and bi-directional learning modules, aiming to address the current challenges in deep learning models for tabular data learning. Empirically demonstrated that BiSHop outperforms current SOTA methods on real-world datasets [\[1\]](#).

### Graduate Research

*National Taiwan University*

June 2022 – July 2024

*Advisor: Professor Hsi-Sheng Goan*

- Introduced the L2O- $g^\dagger$  framework, a novel approach that integrates a meta-optimizer with the Fubini–Study metric to address the variational quantum algorithms problem. Theoretical motivated update equation, while experimental results demonstrate faster convergence and superior performance compared to SOTA methods [\[2\]](#).
- Investigated the phase transition and magnetization susceptibility properties of the transverse Ising model in a longitudinal magnetic field by employing the variational quantum circuit implemented with Qiskit [\[link\]](#).
- Surveyed the role-playing and personalization capabilities in large language models (LLMs) [\[3\]](#).

### Undergraduate Research

*National Central University*

June 2020 – July 2022

*Advisor: Professor Shih-Hung Chen*

- Developed a highly parallelized Fortran program with MPI and OpenMP for numerically simulating the mesoscopic scale of strongly coupled plasma-laser interaction [\[c\]](#).
- Incorporated molecular dynamics simulation with particle-in-cell simulation to understand and improve the conversion efficiency of EUV light generation through laser-produced plasmas process. [\[link\]](#).
- Explored the behavior of electromagnetic waves in various dielectric mediums using the finite-difference time-domain (FDTD) method with Fortran. Analyzed and visualized various three-dimensional physical quantities in Python [\[link\]](#).
- Built a Beowulf cluster from scratch using eight old PCs to act as a testing platform before being employed in a larger cluster [\[link\]](#).

## PRESENTATIONS

---

- [a] **YC Huang**, Hsi-Sheng Goan. “L2O- $g^\dagger$ : Learning to Optimize Parametrized Quantum Circuits with Fubini–Study Metric Tensor”. Joint Symposium on Quantum Computing (JSQC) 2024. [\[pdf\]](#)
- [b] **YC Huang**. “BiSHop: Bi-Directional Cellular Learning for Tabular Data with Generalized Sparse Modern Hopfield Model”. AI x Natural Science Journal Club, Oct. 2023. (Invited oral presentation)
- [c] **YC Huang**, Mao-Syun Wang, Shih-Hung Chen. “Modeling mesoscopic light-matter interaction using MicPIC method”. Annual Meeting of the Physical Society of Taiwan, 2022. [\[pdf\]](#)
- [d] **YC Huang**, Shih-Hung Chen, Peilong Chen. “Coupled Oscillations in Plant Shoots”. Annual Meeting of the Physical Society of Taiwan, 2021. [\[pdf\]](#)

## AWARDS

---

- |  |             |
|--|-------------|
| <b>Academic Excellence Award (Top 5%)</b>  | 2018 – 2019 |
| <ul style="list-style-type: none"><li>• Awarded in the Fall 2018, Spring 2019, and Fall 2019 semesters.</li></ul>  |             |
| <b>DeChen Culture and Arts Foundation Scholarship</b>  | 2021        |
| <ul style="list-style-type: none"><li>• Selected as one of four candidates annually by the DeChen Culture and Arts Foundation; awarded 80,000 TWD (approximately 2,500 USD).</li></ul> |             |
| <b>Hui-Jung Welfare and Charity Foundation Elite Student Award</b>   | 2020        |
| <ul style="list-style-type: none"><li>• Selected as an outstanding student by the Hui-Jung Welfare and Charity Foundation; awarded 100,000 TWD (approximately 3,000 USD).</li></ul>    |             |

## TEACHING EXPERIENCE

---

- TA of PHYS1008-01: **General Physics**; PHYS1006-10: **General Physics**; PHYS1007-19: **General Physics**; PHYS9049: **Introduction to Quantum Computation and Information** at National Taiwan University.
- Head of TA of undergraduate course **Introduction to Python Programming and its Application**. TA of **General Physics Laboratory**; **General Physics** at National Central University.

## PERFESSIONAL ASSOCIATIONS

---

- |   |                        |
|---|------------------------|
| <b>Taiwan Physics Students Association</b>  | Sept. 2023 – Jun. 2024 |
| <i>Executive Committee &amp; Treasurer</i>  | <i>Taipei, Taiwan</i>  |
| <ul style="list-style-type: none"><li>• Promoted physics to the general public and successfully made TPSA a member of the International Association of Physics Students (IAPS).</li><li>• Organized student night events during the Annual Meeting of the Physical Society of Taiwan, uniting physics majors from various universities across Taiwan.</li></ul> |                        |
| <b>American Physical Society (APS)</b>  | 2023 – 2024            |
| <i>Graduate Student Member</i>  |                        |