

# BO-YU CHEN

✉ [b12202023@ntu.edu.tw](mailto:b12202023@ntu.edu.tw)  <https://phys-mattchen.github.io/>

## EDUCATION

---

- National Taiwan University (NTU)** Taipei, Taiwan  
**Bachelor of Science in Physics** | GPA: 4.15/4.30 (Overall/Scale) Sep 2023 - present
- NTU Fu Bell Scholarship (Highest distinction, Top 1 % across university, \$ 6500 per year)
  - 1st place in the undergraduate special talent admission
- University of Chicago (UChicago)** Chicago, IL  
**Visiting Student | Research Intern in Pritzker School of Molecular Engineering** Jun 2024 - Sep 2024 (expected)
- UChicago-Taiwan Student Exchange Fellowship, Department of Physics, UChicago (Youngest Awardee)
  - Advisor: **Prof. Hannes Bernien**
- Affiliated Senior High School of National Taiwan Normal University** Taipei, Taiwan  
**Computer Science Honor Program** | GPA: 100/98/100 (Math/Physics/Scale) Aug 2020 - Jun 2023
- Taipei City Mayor Award (Highest distinction, Top 1% graduates)
  - 1st place in the entrance exam

## RESEARCH INTERESTS

---

Quantum information, cold atoms, statistical machine learning, 2D materials.

## PUBLICATIONS

---

\*Equal contribution. **Citations Summary:** h-index=3, Total citations=23 ([Google Scholar](#))

- [6] Nonparametric Modern Hopfield Models,  
Jerry Yao-Chieh Hu\*, **Bo-Yu Chen\***, Dennis Wu, Feng Ruan, Han Liu,  
[arXiv:2404.03900](#) (2024)
- [5] STanHop: Sparse Tandem Hopfield Model for Memory-Enhanced Time Series Prediction,  
Dennis Wu\*, Jerry Yao-Chieh Hu\*, Weijian Li\*, **Bo-Yu Chen**, Han Liu,  
In *12th International Conference on Learning Representations (ICLR'24)*, 2024. [arXiv:2312.17346](#)
- [4] Magnetoresistance Properties in Nickel-catalyzed, Air-stable, Uniform, and Transfer-free Graphene,  
**Bo-Yu Chen**, Bo-Wei Chen, Wu-Yih Uen, Chi Chen, Chiashain Chuang, Dung-Sheng Tsai,  
*Nanotechnology* **35**, 205706, 2024. DOI: [10.1088/1361-6528/ad2381](https://doi.org/10.1088/1361-6528/ad2381)
- [3] On Sparse Modern Hopfield Model,  
Jerry Yao-Chieh Hu, Donglin Yang, Dennis Wu, Chenwei Xu, **Bo-Yu Chen**, Han Liu,  
In *37th Conference on Neural Information Processing Systems (NeurIPS'23)*, 2023. [arXiv:2309.12673](#)  
This work was highlighted in *Northwestern CS department news*.
- [2] Modulations for Quantum Electronic Material Transports by Vacuum Annealing Methods,  
Ji-Wei Ci, **Bo-Yu Chen**, Yuan-Chih Hung, Huan-Chien Wang, Dung-Sheng Tsai, Wu-Yih Uen, Yuan-Liang Zhong,  
Jhy-Shyang Wang, Chi-Te Liang, Chiashain Chuang,  
*Spin* **13**, 2340023, 2023. DOI: [10.1142/S2010324723400234](https://doi.org/10.1142/S2010324723400234)
- [1] First-Principles Study on Possible Half-Metallic Ferrimagnetism in Double Perovskites  $Pb_2XX'O_6$  ( $X = Ti, Zr, Hf, V, Nb$  and  $Ta$ ,  $X' = Tc, Ru, Os$  and  $Rh$ ),  
**Bo-Yu Chen**, Po-Han Lee, Yin-Kuo Wang,  
*Materials* **15**, 3311, 2022. DOI: [10.3390/ma15093311](https://doi.org/10.3390/ma15093311)

## AWARDS & SCHOLARSHIPS

---

- **UChicago-Taiwan Student Exchange (UCTS) Fellowship**, Department of Physics, UChicago, USA 2024
- **Fu Bell Scholarship** (Highest distinction, Top 1% across university, \$ 6500 per year), NTU, Taiwan 2023, 2024

- **Taipei City Mayor Award** (Top 1% high school graduates), Taipei City, Taiwan 2023
- **Sakura Science Exchange Program** (official invitation), Japan Science and Technology Agency, Japan 2023

## RESEARCH EXPERIENCES

---

**Pritzker School of Molecular Engineering, University of Chicago** Chicago, IL (Hybrid)  
**Dual-Species Atom Arrays Quantum Architecture** Feb 2024 - present  
 plan to visit in 2024 summer

- Undergraduate research, with **Prof. Hannes Bernien**
- Supported by UCTS Fellowship.
- Implement the atom rearrangement protocols by using a combination of acousto-optic deflectors and spatial light modulators.

**Department of Computer Science, Northwestern University** Evanston, IL (Remote)  
**Computational and Statistical Theory of Ising Model in Machine Learning** Jan 2023 - present

- Undergraduate research, with **Prof. Han Liu**
- Investigated a nonparametric framework for modern Hopfield model, and showcased the versatility of this framework by constructing a family of efficient modern Hopfield models as extensions. [6]
- Introduced STanHop-Net, a time series prediction model, combines a Hopfield-based block with external memory modules, enhancing learning, rapid response to rare events, and superior empirical performance. [5]
- Introduced a sparse modern Hopfield model with memory-retrieval dynamics connecting to the sparse-structured attention, enabling robust representation learning, fast convergence, and exponential memory capacity. [3]

**Department of Electronics Engineering, Chung Yuan Christian University** Taoyuan, Taiwan  
**Two-Dimensional Materials and Nanoscale Electronic Devices** Aug 2021 - Jun 2023

- Independent research, with **Prof. Chiashain Chuang** and **Prof. Dung-Sheng Tsai**
- Synthesized transfer-free graphene by atmospheric-pressure chemical vapour deposition (APCVD) and investigated its magnetoresistance mechanism for potential applications in nanoscale magnetic sensor. [4]
- Investigated the quantum electronic material transports by vacuum annealing methods. [2]

**National Taiwan Normal University** Taipei, Taiwan  
**Density Functional Theory and First Principle Calculation** Oct 2021 - May 2022

- Independent research, with **Prof. Po-Han Lee** and **Prof. Yin-Kuo Wang**
- Investigated the half-metallic and ferrimagnetic properties of Pb-based double perovskite by Vienna Ab initio Simulation Package (VASP). [1]

## CONFERENCES PRESENTATIONS

---

- [3] Temperature-Dependent Magnetoresistance of Transfer-Free Graphene Grown by APCVD,  
**Bo-Yu Chen**, Bo-Wei Chen, Ji-Wei Ci, Wu-Yih Uen, Po-Han Lee, Chi Chen, Chiashain Chuang, Dung-Sheng Tsai,  
 13th Recent Progress in Graphene and Two-dimensional Materials Research Conference, Taipei, Taiwan, November 2022
- [2] Ab initio study on the growth mechanism of graphene on metal,  
**Bo-Yu Chen**, Po-Han Lee, Yin-Kuo Wang,  
 2022 Annual Meeting of the Physical Society of Taiwan, Taipei, Taiwan, January 2022
- [1] Layer-dependent properties of SnSe<sub>2</sub> two dimensional materials,  
**Bo-Yu Chen**, Po-Han Lee, Yin-Kuo Wang,  
 2022 Annual Meeting of the Physical Society of Taiwan, Taipei, Taiwan, January 2022