

Hao-Yang Yen

Interdisciplinary Program of Science, National Tsing Hua University

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Personal Statement

As a challenge-driven physics enthusiast, I am captivated by the interdisciplinary intersections of statistical mechanics and quantum dynamics. Statistical mechanics offers a theoretical framework that permeates diverse domains including plasma physics, biological physics, and nonlinear systems. While classical dynamics is well-established, quantum dynamics presents ongoing challenges. My interest lies in extending intriguing phenomena observed in classical systems to the quantum realm, where exploration and development are still underway.

Education

BSc Interdisciplinary Program of Science [National Tsing Hua University](#) **Hsinchu, Taiwan** *2021-present*

I am not a student in department of physics, but I have took many physics-relevant courses.

Relevant Courses: Statistical Mechanics I(A), Statistical Mechanics II (A), Electrodynamics I (A), Nonlinear Dynamics and Chaos (A), Quantum Physics (A+), Numerical Methods and Application (A+)

Research Experience

Department of Physics, NTHU

Undergraduate Student, PI: Prof. Yi-Ping Huang

- **Pattern Formation and Dynamics in Quantum System** *07/2023-present*

I explore pattern formation in quantum systems by bridging quantum dynamics with non-linear phenomena. Using the quantum trajectories method and phase representation, I investigate pattern formation in various quantum systems. This study deepens our understanding of the interplay between non-linear dynamics, pattern formation, and statistical mechanics in quantum systems. [More details](#)

Department of Physics, NTHU

Courses Projects

- **Nonlinear Dynamics and Chaos** *2023 spring*

We model virus spread with basic differential equations with generalized *SIR* model. However, considering more variables make the differential equations more complex. To avoid solving complex systems, our project employs the Monte Carlo method to simulate generalized *SIR* models. [More details](#)

- **Statistical Mechanics** *2023 fall*

In phase transition theory, phenomena arise when the correlation length diverges at critical points. This parallels occurrences in natural complex systems, where statistical models, like neural networks, categorize data akin to renormalization group theory, despite lacking a precise mathematical framework. [More details](#)

Working Experience

Management Assistant, [Executive Master of Business Administration, NTHU](#) *09/2023 - 01/2024*

Teaching Assistant, [MS in Regulatory Affairs for Drugs and Medical Devices, NTHU](#) *09/2023 - present*

Teaching Assistant for Statistical Mechanics, [Department of physics, NTHU](#) *02/2024 - present*

References

- **Asst Prof. Yi-Ping Huang:** NTHU
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