

Chin-Ching Fan (Castaly Fan)

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EDUCATION

- 2022 – Present **University of Florida**
- *Ph.D.* Student, Department of Physics (cfan1@ufl.edu)
 - Cumulative GPA: 3.83
- 2018 – 2022 **Rutgers University**
- B.S. in Physics*
- Major: *Physics* | Minor: *Astronomy*
- 2015 – 2018 **Taipei Wego Private Senior High School**

AWARDS & HONORS

- Apr 2024 *URA Visiting Scholar Program (VSP) Award*
- **Institute:** Universities Research Program (URA)
 - Granted \$8,000 in funding to support research conducted at Fermilab.
- Mar 2024 *IHEPA Fellowship*
- **Institute:** Institute of High Energy Physics and Astrophysics, University of Florida.
 - Received support \$15,000+ to facilitate research tasks at Fermilab.
- Sep 2021 *Departmental Honors in Physics (Rutgers University)*
- Apr 2017 *Honorable Mention / Research Spirit Award*
- **Institute:** 50th Taipei Scientific Exposition
 - **Project:** *Quantum eraser experiment*
- Jul 2016 *Scholarship / Macronix Science Award for Scientific Essay*
- **Institute:** Macronix Education Foundation
 - **Essay:** *Do We Live in the Multiverse? – The Exploration of Future Universe and Human Intelligence*

RESEARCH EXPERIENCES

- Sep 2023 – Present **SBND (Short-Baseline Near Detector) Experiment**
- **Mentor:** *Dr. Heather Ray*, University of Florida

- Analyzing SBND electron neutrino selection, Bethe-Bloch simulation, and energy reconstruction using SPINE framework (an ML reconstruction chain developed by SLAC).
- Establishing the LED calibration setup for SBND's PMT calibration.
- Managing the PDS (photon detection system) hardware database.

Mar 2023 – Aug 2023 **Research for the Magnetoelectric Effects**

- **Mentor:** *Dr. Neil Sullivan*, University of Florida
- Detected the magnetoelectric effects within single-molecule magnets.
- Designed a TDO detector (immersed in superfluid helium) and achieved an ultra-high frequency (~216 MHz) with optimal stability around the standard deviation of ~300 Hz.

Sep 2020 – Sep 2021 **Quantum Mechanics with Matrices**

- **Mentor:** *Dr. Larry Zamick*, Rutgers University
- Invented a quantum number for the symmetric patterns and the odd-even staggering regularities among the wavefunctions evaluated by an 11×11 pentadiagonal matrix under a strong coupling regime.
- Calculated the transition rates using *Mathematica*.

Jun 2020 – Aug 2020 **Institute of Physics, Academia Sinica**

Research Internship

- **Mentor:** *Dr. Shih-Chang Lee*, High Energy Theory Group at IoP
- Collected the references of the latest research related to black hole physics, cosmology, and condensed matter theory.
- Researched and reported the topics about the beryllium-8 (^8Be) anomaly, including the experimental setup and theoretical evidence.

WORK EXPERIENCES

Aug 2022 - Present **Department of Physics, University of Florida**

Instructor (Teaching Assistant)

- Construct laboratory lectures for an introductory physics course.
- Motivate students to be engaged in classical mechanics and assign the grades for their lab reports.

Jan 2020 – May 2022 **Theoretical Condensed Matter Group at Rutgers University**

Research Administrator

- Assisted Prof. Gabriel Kotliar in compiling lecture notes of quantum

field theory (QFT) by LaTeX and research proposals.

- Supervised reports to the Department of Energy with specific grants.
- Managed citation database of both CVs and publications efficiently.

PUBLICATIONS

Journal Articles

- M. Lewkowicz, J. Adams, **C. Fan**, S. G. Vasudevan, N. S. Sullivan, and A. S. Arvij. (2023). A High Sensitivity Tunnel Diode Oscillator for the Detection of Weak Magnetoelectric Effects. *Review of Scientific Instruments* [peer reviewing].
- D. S. Fosso, L. Zamick, **C. Fan**. (2023). Comparisons of matrices with different elements but identical eigenvalues. *International Journal of Modern Physics E*, 2350019.
- **C. Fan**, L. Zamick. (2021). Matrix Model: Emergence of a Quantum Number in the Strong Coupling Regime. *International Journal of Modern Physics E*, 30(07), 2150059.
- S. Robinson, **C. Fan**, M. Harper, L. Zamick. (2021). On the Vibrational Model of ^{92}Pd and Comparison with ^{48}Cr . *International Journal of Modern Physics E*, 30(06).

BOOKS / SELECTED ARTICLES

- L. Zamick and **C. Fan**, *Magnetic Moments with Akito Arima*. Dec 2021. Yu-Min Zhao, Da Hsuan Feng, and Richard F. Casten. *Akito Arima: Scientist, Educator, and Poet*. Shanghai Jiao Tong University Press, 98-102 (2021). ISBN: 978-7-313-25597-6.
- C. Fan, *Physics, Technology, and Future of Humans*. Sep 2019. VOISS Journal.

SELECTED TALKS AND PRESENTATIONS

- *SBND Analysis using ML Reconstruction Chain*. **New Perspectives 2024**, Fermilab, IL, U.S.A. Jul 8th, 2024. FERMILAB-SLIDES-24-0146
- *Quantum Mechanics with Matrices*. 17th **Aresty Annual Symposium**, Rutgers University, Piscataway, NJ, U.S.A. Apr 30th, 2021. MMS ID: 991031620145904646
- *Experiment of Anomalous Internal Pair Creation in 8Be* . Institute of Physics, Academia Sinica, Taipei, Taiwan. Aug 17th, 2020. DOI: 10.13140/RG.2.2.29921.94569

RELEVANT ASSOCIATIONS

<i>Visitor</i>	Fermilab	2024 – Present
	• SBND Experiment (Official email: castalyf@fnal.gov)	
<i>Columnist</i>	PanSci	2023 – Present
	• Scriptwriter/columnist focusing on quantum computing topics.	
<i>Columnist</i>	The News Lens (TNL)	2023 – Present
	• Contracted writer for scientific (physics-related) articles.	
<i>Founder</i>	The Ultimate Physics	2016 – Present
	• An online group to popularize knowledge of cutting-edge modern physics and astrophysics' theories.	
	• More than 10,000 members from all over the world currently.	
<i>Project Participant</i>	Wikipedia (Wikimedia Foundation)	2016 – Present
	• Created and edited several pages regarding high energy physics, mathematical physics, and astrophysics	

EXPERTISES

- **Data analysis (programming languages):** Python, C++ (for ROOT)
- **Technology:** Machine learning (Deep learning), Quantum computing
- **Analytical/computational framework:** Mathematica, MATLAB, Originlab, Digitizer
- **Document compiling:** LaTeX, Microsoft Office
- **Languages:** English (fluent), Chinese (native), French (elementary)