

Yen-Hsun Lin

Résumé

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Research Summary

I am an astroparticle physicist with expertise in multimessenger astronomy and dark matter (DM) detection. My research focuses on *three key areas*: (1) supernova-neutrino-boosted DM, (2) anomaly heating from DM in compact stars, and (3) probing DM self-interactions and DM-nucleon interactions in stars and planets. The first area is particularly vital as it opens the *new possibility* for direct DM mass measurements using *time-of-flight techniques*. I also collaborate with DUNE/COHERENT members and work on reducing systematic uncertainties in DUNE-like detectors. Additionally, I contributed to the JUNO collaboration, assessing its data analysis to solar-captured DM. My background in astroparticle physics and extensive research experience have provided me with a deep understanding of DM and its broader implications to our Universe.

Topic of Interest

Astroparticle physics, dark matter physics, supernova and compact star physics, high performance computation, Bayesian inference, and Monte Carlo simulation.

Programming

Python, Cython, C++, Mathematica and Matlab.

Education

National Chiao Tung University

PhD of the Institute of Physics

Thesis: Indirect detection of dark matter through neutrinos

Advisor: Prof. Guey-Lin Lin

Hsinchu, Taiwan
Aug. 2011 – Jul. 2016

National Chiao Tung University

Master of the Institute of Physics (direct to PhD program)

Advisor: Prof. Guey-Lin Lin

Hsinchu, Taiwan
Aug. 2010 – Jul. 2011

National Chiao Tung University

Bachelor of the Department of Electrophysics

Hsinchu, Taiwan
Aug. 2006 – Jul. 2010

Experience

Postdoctoral Scholar

Institute of Physics, Academia Sinica

Host: Dr. Meng-Ru Wu

Taipei, Taiwan
Aug. 2023 – Present

Visiting Scholar

School of Physics, Melbourne University

Host: Prof. Nicole F. Bell

Melbourne, Australia
Oct. 2023 – Nov. 2023

Postdoctoral Scholar

Physics Division, National Center for Theoretical Sciences

Taipei, Taiwan
Dec. 2021 – Jul. 2023

Distinguished Postdoctoral Scholar

Institute of Physics, Academia Sinica

Host: Dr. Meng-Ru Wu

Taipei, Taiwan
Aug. 2019 – Dec. 2021

Postdoctoral Researcher

Department of Physics, National Cheng Kung University

Host: Prof. Chuan-Hung Chen

Tainan, Taiwan
Oct. 2017 – Jul. 2019

Honors & Awards

1. **NCTS Postdoc Paper Award** Taiwan, 2024
Awarded by the Physics Division, National Center for Theoretical Sciences (NCTS).
2. **Best Research Paper Award for Junior Research Investigator**
Awarded by the Institute of Physics, Academia Sinica. Taiwan, 2024
3. **Selected Participant of the 13th HOPE Meeting with Nobel Laureates**
Representative of Taiwan. Japan, 2022
4. **Distinguished Postdoctoral Scholar** Taiwan, 2019
Independent position with grant, selected by the Academia Sinica.
5. **Annual Best PhD Thesis in Physical Science** Taiwan, 2017
Best PhD Thesis of the year, awarded by the Taiwan Physical Society.
6. **Selected Honorary Member of the Phi Tau Phi Scholastic Society**
Issued to the student graduated with top score. Taiwan, 2016

Github Repository

- **snorer: Spervnova-Neutrino-boosted dark matter**
Description: Evaluating the time-of-flight signatures of boosted dark matter due to supernova neutrinos from Milky Way, SN1987a and arbitrary distant galaxy.
Role: Main developer and maintainer
Project Page: <https://github.com/yehsunlin/snorer>

- **dukes: *DiffUse*-boosted *darK* *matteR* by *Supernova* *neutrinos***
Description: Evaluating the signatures of diffuse boosted dark matter by supernova neutrinos in the early Universe.
Role: Main developer and maintainer
Project Page: <https://github.com/yenhhsunlin/dukes>
- **dynesor: *DY*namical *NE*sted *S*ampling *integratOR***
Description: MCMC integrator for evaluating multidimensional integration based on dynamical nested sampling.
Role: Main developer and maintainer
Project Page: Non-disclose.

Scientific Activities & Services

Collaboration membership

1. With Members of DUNE/COHERENT Collaborations USA
 - ◇ Collaborating with Dr. Gianluca Petrillo and Dr. Yun-Tse Tsai 2020 – Present
 - ◇ Analysis the impact due to ν_e -Ar cross section uncertainty
 - ◇ Improving pinched parameter sensitivity via Machine Learning
2. Jiangmen Underground Neutrino Observatory (JUNO) Jiangmen, China
 - ◇ Co-author of the JUNO Yellow Book (R&D tech notes) 2015 – 2016
 - ◇ Sensitivity projection for the solar-captured DM in JUNO

Workshop organization

- Organizer of the Mini-workshop on Novel Experimental and Astrophysical Probes for Dark Matter, Taipei, Taiwan, 2021

Journal referee

1. Physical Letter B
2. Annals of Physics