

# Yen-Hsun Lin

## *Résumé*

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## Summary of Research

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 13<sup>th</sup> 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 U.S.A.
  - ◇ Collaborating with Dr. Gianluca Petrillo and Dr. Yun-Tse Tsai 2020 – Present
  - ◇ Analysis the impact due to  $\nu_e$ -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