

Yen-Hsun Lin, PhD | Curriculum Vitæ

Institute of Physics – Academia Sinica, Taiwan

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SUMMARY

I am an astroparticle phenomenologist specializing in multimessenger astronomy and dark matter detection. My research focuses on topics such as supernova neutrino-boosted dark matter and the effects of self-interacting dark matter on compact stars, the Sun, and Earth. I work with members of DUNE/COHERENT to reduce systematic uncertainties in DUNE-like detectors. I was also in the JUNO collaboration, with the role of estimating its sensitivity to Solar captured dark matter. With a background in astroparticle physics and extensive research experience, I have developed a deep understanding of dark matter studies and their applications.

RESEARCH TOPIC

Astroparticle physics, dark matter physics in compact stars and supernovæ, nuclear astrophysics, scientific computations (parallel and GPU computing), Bayesian inference and Monte Carlo simulations

EDUCATION

National Chiao Tung University <i>PhD of the Institute of Physics</i> Advisor: Prof. Lin, Guey-Lin Thesis: <i>Indirect detection of dark matter through neutrinos</i>	Hsinchu, Taiwan <i>Aug. 2011 - Jul. 2016</i>
National Chiao Tung University <i>MS of the Institute of Physics (Direct to PhD program)</i> Advisor: Prof. Lin, Guey-Lin	Hsinchu, Taiwan <i>Aug. 2010 - Jul. 2011</i>
National Chiao Tung University <i>BS of the Department of Electrophysics</i>	Hsinchu, Taiwan <i>Aug. 2006 - Jul. 2010</i>

WORKING EXPERIENCE

Institute of Physics, Academia Sinica <i>Postdoctoral Scholar</i> Host: Dr. Wu, Meng-Ru	Taipei, Taiwan <i>Aug. 2023 - present</i>
School of Physics, Melbourne University <i>Visiting Scholar</i> Host: Prof. Bell, Nicole	Melbourne, Australia <i>Oct. 2023 - Nov. 2023</i>
Physics Division, National Center for Theoretical Sciences <i>Postdoctoral Scholar</i> Independent position with travel funding	Taipei, Taiwan <i>Dec. 2021 - Jul. 2023</i>

Institute of Physics, Academia Sinica
Distinguished Postdoctoral Scholar
Independent position with grant
Host: Dr. Wu, Meng-Ru

Taipei, Taiwan
Aug. 2019 - Dec. 2021

Department of Physics, National Cheng Kung University
Postdoctoral Scholar
Host: Prof. Chen, Chuan-Hung

Tainan, Taiwan
Oct. 2017 - Jul. 2019

HONORS AND AWARDS

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|--|---------------------|
| NCTS Postdoc Paper Award | <i>Taiwan, 2024</i> |
| ○ Awarded by the Physics Division, National Center for Theoretical Sciences | |
| Best Research Paper Award for Junior Research Investigator | <i>Taiwan, 2024</i> |
| ○ Awarded by the Institute of Physics, Academia Sinica | |
| Selected Participant of the 13th HOPE Meeting with Nobel Laureates | <i>Japan, 2022</i> |
| ○ Representative of Taiwan | |
| Distinguished Postdoctoral Scholar | <i>Taiwan, 2019</i> |
| ○ Independent position with grant, selected by the Academia Sinica | |
| Annual Best PhD Thesis in Physical Science | <i>Taiwan, 2017</i> |
| ○ Best PhD Thesis of the year, awarded by the Taiwan Physical Society | |
| Selected Honorary Member of the Phi Tau Phi Scholastic Society | <i>Taiwan, 2016</i> |
| ○ Issued to the student graduated with top score | |

INVITED TALKS AT CONFERENCES AND WORKSHOPS

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|---|-----------------------|
| The 3rd International Joint Workshop on the Standard Model and Beyond and the 11th KIAS Workshop on Particle Physics and Cosmology | <i>Jeju, 2023</i> |
| ○ Title: Detection of $\text{SN}\nu$ BDM in current and future large underground detectors | |
| ○ Host: Korea Institute for Advanced Study (KIAS) | |
| Interplay of Nuclear, Neutrino and BSM Physics at Low-Energies | <i>Seattle, 2023</i> |
| ○ Title: Searching for afterglow: Light dark matter boosted by supernova neutrinos | |
| ○ Host: Institute for Nuclear Theory (INT 23–85w) | |
| Supernova Early Warning System (SNEWS) Online Seminar | <i>US, 2023</i> |
| ○ Title: Searching for afterglow: Light dark matter boosted by supernova neutrinos | |
| ○ Host: SNEWS Institutions (invited by Alec Habig) | |
| Theory Meeting Experiment: Particle Physics and Cosmology | <i>Quy Nhơn, 2023</i> |
| ○ Title: Light DM constraints from neutron stars and supernova neutrinos | |
| ○ Host: International Centre for Interdisciplinary Science and Education (19 th Recontres du Vietnam) | |
| NCTS Annual Theory Meeting | <i>Taipei, 2022</i> |
| ○ Title: Light DM constraints from neutron stars and supernova neutrinos | |
| ○ Host: National Center for Theoretical Sciences | |
| Dark Matter in Compact Objects, Stars, and in Low Energy Experiments | <i>Seattle, 2022</i> |
| ○ Title: Light dark matter boosted by supernova neutrinos | |
| ○ Host: Institute for Nuclear Theory (INT 22–2b) | |

Particle Physics Phenomenology Workshop (PPP 14)

Taipei, 2022

- **Title:** Searching the afterglow from supernova neutrino boosted dark matter
- **Host:** National Center for Theoretical Sciences

Sydney Consortium for Particle Physics and Cosmology Seminar

Sydney, 2021

- **Title:** Searching light to heavy dark matter by supernova neutrinos and neutron star temperature
- **Host:** University of New South Wales Sydney and University of Sydney (Sydney-CPPC)

Mini-workshop on Novel Experimental and Astrophysical Probes for Dark Matter

Taipei, 2021

- **Title:** Exploring dark matter with compact stars
- **Host:** Academia Sinica

NCTS Annual Theory Meeting

Taipei, 2019

- **Title:** Probing the isospin violation of self-interacting dark matter through old neutron stars
- **Host:** National Tsing Hua University

Particle Physics Phenomenology Workshop (PPP 13)

Taipei, 2019

- **Title:** Probing self-interacting dark matter through neutron stars
- **Host:** National Taiwan Normal University

COLLABORATION MEMBERSHIP

With Members of DUNE/COHERENT Collaborations

US, 2020-present

- Collaborating with Dr. Gianluca Petrillo and Dr. Yun-Tse Tsai from SLAC
- Study the impact on the thermal pinched parameter analysis due to the uncertainty of ν_e -Ar cross section
- Data analysis (python)

Jiangmen Underground Neutrino Observatory (JUNO)

China, 2015-2016

- Co-author of the JUNO Yellow Book (R&D tech notes)
- Sensitivity projection for the solar-captured DM in JUNO

WORKSHOP ORGANIZATION

Mini-workshop on Novel Experimental and Astrophysical Probes for Dark Matter

Taipei, 2021

- Main organizer of the workshop with Dr. Wu, Meng-Ru

SUPERVISING EXPERIENCE

Co-supervisor of Academia Sinica Summer Student Program

AS, 2020-2022

- Co-supervising with Dr. Wu, Meng-Ru
- Tsung-Han Tsai (now an undergraduate at NTHU), work published on *Phys. Rev. D* **108**, 083013 (2023)
- Yong Sheng Yap (now a PhD student at Cambridge U), work on compact star equation of states in terms of neutrons and dark matter
- Wen-Hua Wu (now a PhD student at Rice U), work published on *Phys. Rev. Lett.* **130**, 111002 (2023)

Co-supervisor of SLAC Summer Student

UTSA/SLAC, 2020-2021

- Co-supervising with Prof. Tanaka, Hirohisa (SLAC) and Dr. Tsai, Yun-Tse (SLAC)
- Adeela Malik (an undergraduate at Texas at San Antonio U), work on beyond Standard Model physics in supernovæ

Co-supervisor of NYCU Students

NYCU, 2020-2022

- Co-supervising PhD/MS students from NYCU with Prof. Lin, Guey-Lin
- Aiming for beyond Standard Model physics in supernovæ/colliders and numerical support (Python/Mathematica)

GITHUB REPOSITORY

snorer: Supernova-Neutrino-bOosted daRk mattER

- **About:** 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
- <https://github.com/yenhhsunlin/snorer>

dukes: DiffUse-boosted darK mattEr by Supernova neutrinos

- **About:** Evaluating the signatures of diffuse boosted dark matter by supernova neutrinos in the early Universe.
- **Role:** Main developer and maintainer
- <https://github.com/yenhhsunlin/dukes>

dynesor: DYnamical NEsted Sampling integratOR

- **About:** MCMC integrator for evaluating multidimensional integration based on dynamical nested sampling.
- **Role:** Main developer and maintainer
- Non-disclose

PROGRAMMING

Python/Cython/C++/Mathematica/Matlab

LIST OF PUBLICATION

Yen-Hsun Lin

Institute of Physics, Academia Sinica, Taipei

1 Refereed Articles

Dagger (\dagger) and asterisk (*) indicate that I am the *first author* and the *corresponding author*, respectively. Otherwise, the author list is arranged alphabetically.

1. **Y.-H. Lin** $\dagger,^*$ and M.-R. Wu, *Supernova-neutrino-boosted dark matter from all galaxies*, [*Phys. Rev. Lett.* **133**, 111004 \(2024\)](#)
2. **Y.-H. Lin** $\dagger,^*$, T.-H. Tsai, G.-L. Lin, H. T.-K. Wong and M.-R. Wu, *Signatures of afterglows from light dark matter boosted by supernova neutrinos in current and future large underground detectors*, [*Phys. Rev. D* **108**, 083013 \(2023\)](#)
3. **Y.-H. Lin** $\dagger,^*$, W.-H. Wu, M.-R. Wu and H. T.-K. Wong, *Searching for afterglow: Light dark matter boosted by supernova neutrinos*, [*Phys. Rev. Lett* **130**, 111002 \(2023\)](#)
4. A. Bauswein, G. Guo, J.-H. Lien, **Y.-H. Lin** and M.-R. Wu, *Compact dark objects in neutron star mergers*, [*Phys. Rev. D* **107**, 083002 \(2023\)](#)
5. G.-L. Lin and **Y.-H. Lin** * , *Exploring dark sector parameters in light of neutron star temperatures*, [*Phys. Rev. D* **104**, 063021 \(2021\)](#)
6. G.-L. Lin and **Y.-H. Lin** * , *Analysis on the black hole formations inside old neutron stars by isospin-violating dark matter with self-interaction*, [*JCAP* **08**, 022 \(2020\)](#)
7. C.-S. Chen and **Y.-H. Lin** * , *Reheating neutron stars with the annihilation of self-interacting dark matter*, [*JHEP* **08**, 069 \(2018\)](#)
8. C.-S. Chen and **Y.-H. Lin** * , *On the evolution process of two-component dark matter in the Sun*, [*JHEP* **04**, 074 \(2018\)](#)
9. C.-H. Chen and **Y.-H. Lin**, *Study of $B_c^\pm \rightarrow (D^0 K^\pm, D^0 \pi^\pm)$ decays*, [arXiv:1710.05531](#)
10. C.-S. Chen, G.-L. Lin, **Y.-H. Lin** and F. Xu, *The 17 MeV anomaly in beryllium decays and U(1) portal to dark matter*, [*Int. J. Mod. Phys. A* **32**, 1750178 \(2017\)](#)
11. C.-S. Chen, G.-L. Lin and **Y.-H. Lin**, *Thermal transport of the solar captured dark matter and its impact on the indirect dark matter search*, [*Phys. Dark Univ.* **14**, 35 \(2016\)](#)
12. F. An *et al.* [JUNO Collaboration], *Neutrino Physics with JUNO*, [*J. Phys. G* **43**, 1 \(2016\)](#)
13. C.-S. Chen, G.-L. Lin and **Y.-H. Lin**, *Complementary test of the dark matter self-interaction by direct and indirect detections*, [*JCAP* **01**, 013 \(2016\)](#)
14. Z. Djurcic *et al.* [JUNO Collaboration], *JUNO conceptual design report*, [arXiv:1508.07166](#)

15. G.-L. Lin, **Y.-H. Lin** and F.-F. Lee, *Probing the coupling of heavy dark matter to nucleons by detecting neutrino signature from the Earth core*, *Phys. Rev. D* **91**, 033002 (2015)
16. C.-S. Chen, F.-F. Lee, G.-L. Lin and **Y.-H. Lin**, *Probing dark matter self-interaction in the Sun with IceCube-PINGU*, *JCAP* **10**, 049 (2014)

2 Conference Proceedings

1. International Conference on Topics in Astroparticle and Underground Physics, Vienna, Austria 2023
Title: *Searching light dark matter boosted by supernova neutrinos in Super-K, Hyper-K and DUNE*
2. International Conference on High Energy Physics, Bologna, Italy 2022
Title: *Exploring dark sector parameters in light of neutron star temperatures*
3. International Conference on High Energy Physics, Prague, Czech 2020 (Webinar)
Title: *Analysis on the black hole formations inside old neutron stars by isospin-violating dark matter with self-interaction*
4. PyCon TW, Taipei, Taiwan 2019 (Computer vision related)
Title: *The art of inference: Practicing Bayesian reasoning in computer vision problems*
5. European Physical Society Conference on High Energy Physics, Ghent, Belgium 2019
Title: *Probing self-interacting dark matter through neutron stars*
6. International Conference on Neutrino Physics and Astrophysics, Heidelberg, Germany, 2018
Title: *On the evolution process of two-component dark matter in the Sun*
7. International Symposium on Nuclei in the Cosmos, Niigata, Japan 2016
Title: *Thermal transport of the solar captured dark matter and its implication*
8. European Physical Society Conference on High Energy Physics, Vienna, Austria 2015
Title: *Thermal transport of the solar captured dark matter and its implication*
9. International Conference on High Energy Physics, València, Spain 2014
Title: *The dark matter self-interaction and its impact on the critical mass for dark matter evaporations inside the Sun*
10. International Symposium on Particles, Strings and Cosmology, Taipei, Taiwan 2013
Title: *Probing the coupling of heavy dark matter to nucleons by detecting neutrino signature from the Earth core*
11. International Symposium on Cosmology and Particle Astrophysics, Honolulu, Hawaii 2013
Title: *Probing the coupling of heavy dark matter to nucleons by detecting neutrino signature from the Earth core*

3 Domestic Seminars and Colloquia

TPS = Taiwan Physical Society.

1. *Colloquium*, Tunghai University, Taichung 2024
2. *Seminar*, National Tsing Hua University, Hsinchu 2024
3. *Seminar*, National Tsing Hua University, Hsinchu 2023
4. *Seminar*, Chung Yuan Christian University, Taoyuan 2023
5. *Seminar*, National Taiwan Normal University, Taipei 2022
6. *Seminar*, National Taiwan University, Taipei 2022
7. *Seminar*, National Taiwan University, Taipei 2021
8. *Seminar*, Chung Yuan Christian University, Taoyuan 2020
9. *Seminar*, National Taiwan Normal University, Taipei 2020
10. *Webinar*, National Tsing Hua University, Hsinchu 2020
11. *Seminar*, National Central University, Taoyuan 2020
12. *Seminar*, National Chiao Tung University, Hsinchu 2020
13. *Annual Meeting TPS*, National Chiao Tung University Hsinchu, 2019
14. *Colloquium*, Tamkang University, New Taipei 2018
15. *Seminar*, National Taiwan Normal University, Taipei 2018
16. *Seminar*, Academia Sinica, Taipei 2018
17. *Seminar*, National Chiao Tung University, Hsinchu 2018
18. *Seminar*, Chung Yuan Christian University, Taoyuan 2017
19. *Annual Meeting TPS*, National Sun Yat-Sen University, Kaohsiung 2016
20. *Annual Meeting TPS*, National Tsing Hua University, Hsinchu 2015