Last modified December 19, 2022

Minjie Lei

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Research Interests

Multi-phase interstellar medium; Galactic magnetism; dust polarization; CMB Foreground

Education

Ph.D., Physics, Stanford University — Sept 2021 – Present
Topic: Physics of the multi-phase interstellar medium with a special focus on the structure of the 3D Galactic magnetic field

B.Sc., Physics & Math, University of Michigan — Sept 2016 – June 2020
Undergraduate thesis: "*Probing non-standard neutrino interactions with supernova neutrinos at Hyper-K,*" supervised by James D. Wells

Research Experience

HI Emission Morphology with Scattering Transform, Stanford University — 2021 – Present

- "*Probing the cold neutral medium through HI emission morphology with the scattering transform*" supervised by Susan Clark

Machine Learning for Neutrino Reconstruction, SLAC — 2021 – 2022

- "*Implicit Neural Representation as a Differentiable Surrogate for Photon Propagation in a Monolithic Neutrino Detector*" supervised by Kazu Terao and Hiro Tanaka
- Developed a scalable, data-driven photon library model using neural scene representation networks

Energy Reconstruction for the SNO+ Experiment, University of Pennsylvania — 2020 – 2021

- A Fast GPU-Enabled Simulation-Based Energy Fitter for SNO+ supervised by Josh Klein
- Developed a GPU-accelerated photon tracking algorithm for neutrino energy reconstruction

Neutrino Phenomenology, University of Michigan — 2018 – 2020

- "*Probing non-standard neutrino interactions with supernova neutrinos at Hyper-K*" supervised by James Wells
- Developed simulation algorithm to look for non-standard neutrino self-interaction signatures in galactic supernova neutrino data

Publications

4. **Minjie Lei**, S. E. Clark, "*Probing the cold neutral medium through HI emission morphology with the scattering transform,*" 2022, arXiv e-prints, arXiv:2212.06182
3. **Minjie Lei**, K. V. Tsang, et al., "*Implicit Neural Representation as a Differentiable Surrogate for Photon Propagation in a Monolithic Neutrino Detector,*" 2022, arXiv e-prints, arXiv:2211.01505
2. **Minjie Lei**, Noah Steinberg, & James D. Wells, "*Probing non-standard neutrino interactions with supernova neutrinos at Hyper-K,*" 2020, JHEP, 01, 179
1. **Minjie Lei**, James D. Wells, "*Minimally modified A_4 Altarelli-Feruglio model for neutrino masses and mixings and its experimental consequences,*" 2020, Phys. Rev. D, 102 (1), 016023

Scientific Presentations

Contributed Talks

Dec. 2022 **Galactic Science and CMB Foregrounds**; Core to Core CMB Workshop series
Apr. 2021 **APS April Meeting 2021**; American Physical Society

Teaching and Mentorship

Teaching Assistantships

Winter 2023 **Stars and Planets in a Habitable Universe** (Physics 15)
Fall 2019 **Honors Physics I - Mechanics** (Physics 160)
Fall 2018 **Physics for the Life Sciences I** (Physics 135)
Fall 2017 **Honors Physics I - Mechanics** (Physics 160)

Student Mentorship

2022-2023 **Amritpal Nijjar**, undergraduate at UCLA, Stanford PIE Program
2020-2021 **Jackie Zhao**, High school student, Minds Matter Philadelphia