

# SAMUEL YOUNG

Stanford, CA, USA  
youngsm.com

youngsam@stanford.edu  
+1 (714) 325-0817  
ORCID: 0000-0002-2488-1899

## EDUCATION

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### Stanford University

2023 – Present

Ph.D. in Physics

Research interests: neutrino physics, multi-modal scientific foundation models, 2D/3D computer vision.

Advisor: Kazuhiro Terao

### University of Pennsylvania

2021 – 2023

M.S. in Physics

Thesis: Large-scale Hybrid Neutrino Detection with Spectral Sorting

Advisor: Josh Klein

### University of Pennsylvania

2019 – 2023

B.A. in Physics (with Honors)

summa cum laude

## PUBLICATIONS

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1. **Young, S.**, Terao, K., *Panda: Self-distillation of Reusable Sensor-level Representations for High Energy Physics* 2025. arXiv: 2512.01324.
2. Alterkait, O., **Young, S.**, Tsang, K. V., Xia, J., Smith, C. H., Wongjirad, T., Terao, K., *10 Million Particle Events: Enabling Foundation Models for Sparse 3D Inverse Problems in NeurIPS AI for Science Workshop* (2025). **Poster Spotlight.**
3. **Young, S.**, Jwa, Y.-j., Terao, K., Particle trajectory representation learning with masked point modeling. *Machine Learning: Science and Technology* (2026).
4. Dainotti, M. G., **Young, S.**, Li, L., Levine, D., Kalinowski, K. K., Kann, D. A., Tran, B., Zambrano-Tapia, L., Zambrano-Tapia, A., Cenko, S. B., Fuentes, M., Sánchez-Vázquez, E. G., Oates, S. R., Fraija, N., Becerra, R. L., Watson, A. M., Butler, N. R., Gonzalez, J. J., Kutyrev, A. S., Lee, W. H., Prochaska, J. X., Ramirez-Ruiz, E., Richer, M. G., Zola, S., The Optical Two- and Three-dimensional Fundamental Plane Correlations for Nearly 180 Gamma-Ray Burst Afterglows with Swift/UVOT, RATIR, and the Subaru Telescope. *The Astrophysical Journal Supplement Series* **261**, 25. doi:10.3847/1538-4365/ac7c64 (July 2022).

## RESEARCH EXPERIENCE

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### Graduate research assistant

06/2024 – Present

Stanford University

- Foundation models for the Deep Underground Neutrino Experiment and its predecessors.
- Differentiable neural surrogates and GPU-accelerated Monte Carlo simulations for photon transport and photo-detector electronics simulation.

### Graduate research assistant (rotation)

03/2024 – 06/2024

Stanford University

- Hardware RD for the nEXO neutrinoless double beta decay experiment. (PI: Giorgio Gratta)

### Graduate research assistant (rotation)

01/2024 – 03/2024

SLAC National Laboratory, CERN

- Anomaly detection for the detection of long-lived particles at the LHC (PI: Julia Gonski).

### Graduate research assistant (rotation)

09/2023 – 12/2023

SLAC National Laboratory, Stanford University

- Developed data-driven surrogate model of light propagation in a liquid argon time projection chamber using implicit neural representations. (PI: Kazu Terao)

### Undergraduate research assistant

05/2020 – 05/2023

University of Pennsylvania

- Studied the efficacy of spectral photon sorting in THEIA, a future hybrid neutrino detector, and developed a novel neutrino vertex reconstruction algorithm. (PI: Josh Klein)

### DOE Science Undergraduate Laboratory Internship

05/2021 – 08/2021

SLAC National Laboratory)

- Scraped NASA Astrophysics Data System to catalog and analyze the largest dataset of optical data of Gamma-ray burst light curve afterglows and discovered a three-dimensional luminosity-time correlation.

## INVITED AND CONTRIBUTED TALKS

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<b>Neutrino Physics and Machine Learning (NPML)</b> <i>Toward a general-purpose foundation model for neutrino physics</i>	Virtual   Contributed, 2025
<b>Machine Learning for Fundamental Physics Summer School</b> <i>Toward a general-purpose foundation model for neutrino physics</i>	Berkeley, CA   Invited, 2025
<b>APS Global Physics Summit</b> <i>A foundation model for LArTPC events</i>	Anaheim, CA   Contributed, 2025
<b>APS April Annual Meeting</b> <i>Differentiable surrogate for modeling the physics of optical propagation in a LArTPC</i>	Sacramento, CA   Contributed, 2024
<b>Sixteenth Marcel Grossmann Meeting</b> <i>The Optical Two- and Three-Dimensional Fundamental Plane Correlations for More than 130 Gamma-Ray Burst Afterglows</i>	Virtual   Invited, 2021
<b>APS April Annual Meeting</b> <i>Reconstruction Results of Spectral Photon Sorting in Large-Scale Neutrino Detectors</i>	Virtual   Contributed, 2021
<b>APS Mid-Atlantic Section Annual Meeting</b> <i>Impact of Spectral Photon Sorting in Large-Scale Neutrino Detectors</i>	Virtual   Contributed, 2020
<b>Dipping Into Data Science</b>   <i>Center for Undergraduate Resources and Fellowships</i> <i>Using Large-Scale Neutrino Detector Data to Identify and Reconstruct Subatomic Particles</i>	Virtual   Contributed, 2020

## GRADUATE COURSEWORK

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**Physics:** Statistical Mechanics (PHYS 212), Classical Electrodynamics (PHYS 220), Quantum Field Theory I (PHYS 330)  
**Computer Science:** Machine Learning (CS 229), Machine Learning and the Physical Sciences (CME 215), 3D and 4D Foundation Models (CS 468), Computational Imaging (CS 448I), AI for Science (CS 524), Data for AI (CS 525)

## AWARDS AND HONORS

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<b>Stanford HAI Graduate Fellowship</b>	2024
<b>Stanford CS 229 Best Project Award</b> (pileup synthesis and transformer-based anomaly detection at ATLAS)	2024
<b>UC Berkeley Chancellor's Fellowship</b> (declined)	2023
<b>Phi Beta Kappa</b>	2023
<b>Roy and Diana Vagelos Challenge Award</b> (two years full tuition and fees)	2021 – 2023
<b>Marshall Scholarship Finalist</b>	2022
<b>NASA Pennsylvania Space Grant Undergraduate Scholarship</b>	2021