

Ming-Shau Liu

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Education

- 2022 – 2023 **MSci in Physics, University of Cambridge**
Thesis: "Non-Decoupling Dark Matter"
- 2019 – 2022 **BA in Mathematics with Physics, University of Cambridge**
Thesis: "Cosmological Outlook on Einstein-Cartan Theory"

Research Experience

- 2025 – **MIT – NSF IAIFI and AstroAI**
Dark Matter Detection via Scale-Aware Neural Networks and Transformer Architecture
- 2024 – 2025 **Harvard University – Argüelles Group**
Heavy-neutral lepton sensitivity analysis of the ND280 upgrade detector in T2K experiment
Reducing SiPM signal diffusion using prime-gon geometry in IceCube experiment
- 2023 – 2024 **Los Alamos National Laboratory – T - NPPAC**
Generalising the Universal Texture Zero's scalar potentials and their minima
- 2022 **CERN – Theory Division**
Non-decoupling dark matter: a study using geometric effective field theory
- 2021 – 2022 **University of Cambridge – Institute of Theoretical Geophysics**
Shallow current of viscous fluid flowing between diverging or converging walls
- 2020 – 2021 **University of Cambridge – Surface, Microstructure, Fracture Group**
Educational Package for Helium Atom Scattering Studies in Spin-Echo Machines

Publications

- 2024 Constraints and Sensitivities for Dipole-Portal Heavy Neutral Leptons from ND280 and Upgrade.
Liu, M.-S., Kamp, N.W., Argüelles, C.A. [ARXIV:2412.15051] Submitted to PHYSICAL REVIEW D
- 2024 Effective Scalar Potentials and Non-Abelian Flavour Models.
de Medeiros Varzielas, I., **Liu, M.-S.**, Sengupta, A., Talbert, J. In preparation for JHEP
- 2023 Shallow Current of Viscous Fluid Flowing between Diverging or Converging Walls.
Liu, M.-S., Huppert, H.E. JOURNAL OF FLUID MECHANICS 2023; 977:A23
- 2020 Educational Package for Helium Atom Scattering Studies.
Arnold, E.L., **Liu, M.-S.**, Prabhu, R., Richards, C.S., Ward, D., Avidor, N. ARXIV:2009.11614

Presentations

- 2024 **Hackathon Team Prize, NSF IAIFI Summer School**
VAE-based anomaly detection of extracted LSST features, Foundry Credit USD 2,000.-
- 2024 **Presentation, APS-DPF Pheno, University of Pittsburgh**
Generalizing flavored (flavon-based) scalar potentials and their minima
- 2023 **Poster, EPS-HEP, Universität Hamburg** – Non-decoupling dark matter
- 2023 **Presentation, DAMPT, University of Cambridge** – Non-decoupling dark matter

Teaching Experience

- 2023 – 2024 **Mathematical Tripos, University of Cambridge**
IA Vectors and Matrices, IA Dynamics and Relativity, IB Quantum Mechanics, IB Electromagnetism
- 2023 – 2024 **Natural Science Tripos, University of Cambridge** – II Relativity

Awards

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| 2024 | Swiss Excellence Scholarship (declined) | Cambridge Philosophical Society Travel Grant |
| 2022 | NMS Summer Student, CERN | Victoria-Brahm-Schild Award, Cambridge |
| 2021 | David Thompson Prize, Cambridge | Victoria-Brahm-Schild Award, Cambridge |