

Hoh Siew Yan 何守仁 Ph.D.

Associate Professor of Physics

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Research Profile

Experimental particle physicist working on precision muon measurements, collider physics, and scientific computing. Building XMUM's muEDM research group and CMS Open Data analysis capability, with complementary work in laser-plasma simulations and applied muography. Experience spans research funding, international collaboration leadership, university teaching, and student mentoring.

Research Funding

Amounts below are funding allocated to my institution, expressed in USD.

Period	Role	Programme	USD
2026–2028	PI	Shanghai Sci-tech Co-research Programme	56,000
2026–2029	PI	XMUM Research Seed Grant	15,000
2024–2026	Co-I	Foreign Talent Programme	28,000
2022–2024	PI	Young Researchers Encouragement Grant	10,000
2022–2024	Co-I	Young Researchers Encouragement Grant	10,000
2018–2022	Co-I	Newton Grant	50,000

Academic Appointments

Feb 2026–present	Associate Professor , Xiamen University Malaysia.
Dec 2023–Dec 2025	Postdoctoral Researcher , Tsung-Dao Lee Institute, Shanghai Jiao Tong University.
Oct 2021–Sep 2023	Senior Lecturer , Nuclear Science Division, Universiti Kebangsaan Malaysia.
Oct 2017–Jul 2021	Doctoral Researcher , INFN Padova / Università degli Studi di Padova.
Mar–Sep 2017	Visiting Research Scientist , LHC Physics Center, Fermilab.
Feb 2016–Jan 2017	Visiting Research Scientist , CMS Experiment, CERN.
Mar 2014–Feb 2016	Research Assistant , National Centre for Particle Physics, Universiti Malaya.

Education

2017–2021	Ph.D. in Physics , Università degli Studi di Padova. Thesis: Associated Higgs production with a leptonically decaying W or Z boson at 13 TeV.
2014–2017	M.Sc. in Physics , Universiti Malaya.
2010–2013	B.Sc. in Nuclear Science , Universiti Kebangsaan Malaysia.

Selected Research Contributions

Building an independent research programme

2026–present

Xiamen University Malaysia

- Establishing the local muEDM experiment group and leading development of its analysis framework; building CMS Open Data capability for toponium-like signal studies.
- Developing muon-radiography simulations for the East Coast Rail Link in collaboration with China Communications Construction Company, alongside student projects on tunnel monitoring.
- Contributing to Bayesian optimisation of ultrashort laser–target interactions with ELI-NP and Lancaster collaborators; developing local detector teaching capability through cloud-chamber and Geiger–Müller muon-counter construction.

Precision muon physics and beam optimisation

2023–2025

Tsung-Dao Lee Institute, Shanghai Jiao Tong University

- Developed the vertical-pitch correction analysis and systematic-uncertainty evaluation for the Fermilab Muon $g - 2$ experiment; contributed calorimeter-acceptance studies supporting the anomalous-precession analysis.
- Led crystal-level positron-energy spectrum studies to validate gm2ringsim simulations, preparing analysis documentation for internal and collaboration review.
- Led Bayesian optimisation of muon injection and storage parameters for PSI muEDM; maintained muSrSim beam–material simulations and characterised detector systems for muography.

Higgs and dark-matter analyses at CMS

2014–2021

INFN Padova, CERN, Fermilab, and Universiti Malaya

- Developed and validated the same-sign dilepton final state for associated Higgs production, contributing to inclusive and simplified-template cross-section measurements and their statistical combination.
- Built [NanoTnP](#) for electron-efficiency scale factors and [NanoFlipper](#) to correct electron charge misidentification; both supported the [CMS associated-Higgs analysis](#).
- Conducted dark-matter sensitivity and signal-characterisation studies using bottom-quark and missing-energy final states, spanning Run-I, early Run-II, and mono-Higgs analyses.

Open data, detector simulation, and plasma physics

2022–2023

Universiti Malaya / Universiti Kebangsaan Malaysia; visiting research at Sheffield

- Developed a fully leptonic $t\bar{t}$ analysis strategy using a 4.64 fb^{-1} scouting dataset, and tools to convert and validate legacy CMS AOD and MiniAOD data. Configured [JupyterHub](#) and [Docker](#) infrastructure for research and teaching.
- Built GEANT4 data-analysis and machine-learning prototypes for DUNE proton-decay studies during a visit to the University of Sheffield, May 2022–January 2023.
- Led particle-in-cell studies of intense laser interactions with nanostructured targets; mentored master's research using EPOCH and high-performance computing.

Additional collaborative experience includes LEMMA drift-chamber construction and test beams, CMS silicon-tracker test-beam studies, and Apache Spark prototypes for large-scale collision-data analysis.

Selected Publications

Co-author of over **418 peer-reviewed CMS Collaboration publications**; full [CMS record on INSPIRE](#).
Selected publications and preprints follow, with notes on related research contributions.

Journal articles

- [1] A. Adelmann, A. R. Bainbridge, I. Bailey, et al. “A compact frozen-spin trap for the search for the electric dipole moment of the muon”. In: *The European Physical Journal C* 85 (2025), p. 622. [DOI](#).
- [2] D. P. Aguillard et al. “Measurement of the Positive Muon Anomalous Magnetic Moment to 127 ppb”. In: *Phys. Rev. Lett.* 135 (10 2025), p. 101802. [DOI](#).
Related contribution: vertical-pitch correction and systematic studies, calorimeter acceptance, and positron-spectrum validation for Muon $g - 2$.
- [3] K. S. Khaw et al. “Towards non-invasive sediment monitoring using muography: A pilot run at the Shanghai Outer Ring Tunnel”. In: *Journal of Applied Physics* 138.11 (2025), p. 114902. [DOI](#).
- [4] A. Alias, I. Yusuff, and S. Y. Hoh. “Bulk-induced gravitational waves on braneworld wormhole”. In: *Modern Physics Letters A* 39.27n28 (2024), p. 2450130. [DOI](#).
- [5] F. T. T. Houn, S. Y. Hoh, and J. F. Ong. “Ionisation in nanowire by ultra-short relativistic laser pulse”. In: *Fundamental Plasma Physics* 10 (2024), p. 100045. [DOI](#).
Related contribution: led laser–nanostructure simulation studies and mentored the first author’s EPOCH-based master’s research.
- [6] F. T. T. Houn et al. “Gamma-ray back emission from nanowire array irradiated by ultra-intense relativistic laser pulse”. In: *AIP Advances* 14.11 (2024), p. 115106. [DOI](#).
- [7] CMS Collaboration. “Measurements of the Higgs boson production cross section and couplings in the W boson pair decay channel in proton-proton collisions at $\sqrt{s} = 13$ TeV”. In: *Eur. Phys. J. C* 83 (2023), p. 667. [DOI](#).
Related contribution: same-sign dilepton analysis, electron-efficiency and charge-misidentification frameworks, and statistical combination for associated Higgs production.
- [8] CMS Collaboration. “A Portrait of the Higgs Boson by the CMS Experiment Ten Years After the Discovery”. In: *Nature* 607 (2022), pp. 60–68. [DOI](#).
- [9] CMS Collaboration. “Measurement of the Higgs boson width and evidence of its off-shell contributions to ZZ production”. In: *Nature Physics* 18 (2022), pp. 1329–1334. [DOI](#).
- [10] D. Abercrombie et al. “Dark Matter Benchmark Models for Early LHC Run-2 Searches: Report of the ATLAS/CMS Dark Matter Forum”. In: *Phys. Dark Univ.* 27 (2020), p. 100371. [DOI](#).
- [11] N. Amapane et al. “Study of muon pair production from positron annihilation at threshold energy”. In: *JINST* 15.01 (2020), P01036. [DOI](#).
- [12] W. Adam et al. “Beam test performance of prototype silicon detectors for the Outer Tracker for the Phase-2 Upgrade of CMS”. In: *Journal of Instrumentation* 15.03 (2020), P03014. [DOI](#).
- [13] CMS Collaboration. “Search for dark matter produced in association with a Higgs boson decaying to a pair of bottom quarks in proton-proton collisions at $\sqrt{s} = 13$ TeV”. In: *Eur. Phys. J. C* 79.3 (2019), p. 280. [DOI](#).
- [14] J. Abdallah et al. “Simplified Models for Dark Matter Searches at the LHC”. In: *Phys. Dark Univ.* 9-10 (2015), pp. 8–23. [DOI](#).

Conference proceedings

- [15] M. Cremonesi et al. “Using Big Data Technologies for HEP Analysis”. In: *European Physical Journal Web of Conferences* (2019). DOI.
Related contribution: prototyped Apache Spark-based collision-data analysis in a containerised computing environment.
- [16] S. Y. Hoh, J. Komaragiri, and W. A. T. B. Abdullah. “Dark Matter Searches at the Large Hadron Collider”. In: *AIP Conf. Proc.* Vol. 1704. 1. 2016, p. 020005. DOI.

Preprints

- [17] D. P. Aguillard et al. “An improved direct limit on the muon electric dipole moment”. 2026. arXiv: 2608.11124 [hep-ex].
- [18] D. P. Aguillard et al. “Final Report on the Measurement of the Positive Muon Anomalous Magnetic Moment at Fermilab to 127 ppb”. 2026. arXiv: 2606.17323 [hep-ex].
- [19] G. M. Wong et al. “Construction and characterization of a muon trigger detector for the PSI muEDM experiment”. 2026. arXiv: 2603.27483 [physics.ins-det].
- [20] S. Y. Hoh et al. “Bayesian optimization of beam injection and storage in the PSI muEDM Experiment”. 2025. arXiv: 2503.01607 [physics.acc-ph].
Contribution: led Bayesian optimisation studies of muon beam injection and storage for PSI muEDM.
- [21] T. Hu et al. “Development of Fast Front-End Electronics for the Muon Trigger Detector in the PSI muEDM Experiment”. 2025. arXiv: 2502.11186 [physics.ins-det].

Technical Expertise

Scientific computing	C++, Python, Bash; ROOT/RDataFrame, NumPy, Pandas, Uproot; statistical analysis and Bayesian optimisation.
Simulation	GEANT4, muSrSim, MadGraph5, Sherpa; EPOCH and PConGPU; CRY and EcoMug.
Research infrastructure	Apache Spark, Docker, Kubernetes, JupyterHub, Ansible; high-performance computing workflows.
Instrumentation	CAEN DT5720, CAEN A5202, DRS4; detector simulation, characterisation, and test-beam experience.
Languages	English, Bahasa Malaysia, Mandarin Chinese, Cantonese.

Teaching and Curriculum Development

Associate Professor

2026–present

Xiamen University Malaysia

Design and deliver undergraduate physics and general-education courses, including assessment and examination development. Current teaching:

- **Physics and mathematics:** Ordinary Differential Equations; Physics Laboratory II; Physics Laboratory IV.
- **Computing and interdisciplinary study:** Data Intensive Science; From Physics to Finance: Quantitative Finance.

Senior Lecturer

2021–2023

Universiti Kebangsaan Malaysia

Principal coordinator for physics subjects in the Nuclear Science programme; taught undergraduate and master's classes of approximately 6–40 students. Developed teaching materials, C++ and Python examples, assessments, and laboratory manuals.

Area / level	Selected courses and responsibilities
Undergraduate physics	High Energy Physics; Nuclear and Atomic Physics; Nuclear Instrumentation and Reactor Technology. Principal coordination.
Master's radiation science	Quantities and Measurements; Interaction of Radiation with Matter; Internal Exposure Assessment. Co-coordination.
Laboratory teaching	Radiation Processing; Nuclear Security, Safety and Safeguards; Radiation and Nuclear Safety. Coordination, manual development, and demonstrations.

Research Student Mentoring

Institution	Students / status	Research themes
XMUM 2026–present	1 Ph.D., 3 undergraduates, 1 intern; ongoing	Toponium-like searches and muEDM analysis; muon radiography; physics-informed financial models; ROOT RDataFrame analysis.
TDLI / SJTU 2023–2025	3 master's graduates; 2 high-school projects completed	Muon $g - 2$ calorimeter acceptance, muEDM injection and storage, muon detectors, and cosmic-muon applications.
UKM 2021–2023	7 bachelor's graduates; 1 master's graduate	Dark-matter/Higgs studies, machine learning, CMS Open Data efficiency studies, and EPOCH plasma simulation.
Earlier mentoring 2016–2019	Master's projects at Padova and UM; 2 Fermilab summer students	Dark-matter analysis and Monte Carlo simulation; outputs include a conference poster and CERN-THESIS-2017-026 .

Selected student outcome. Master's mentee Felicia HOUNG TEEN TEEN presented research at iNuSTEC 2023 and PERFIK 2023 (best presentation award), and subsequently participated in international research schools and the CERN Summer Student Programme.

Academic Leadership and Service

- **CMS Generator Integration Coordinator, 2019–2022.** Coordinated experimental, computing, and technical teams; authored or reviewed 575 CMSSW pull requests and 39 external-maintenance pull requests. Benchmarked Sherpa performance, supported generator-configuration versioning, and facilitated a Sherpa workshop.
- **NuFact 2026 session convener.** Convened plenary, parallel, and poster sessions at the 27th International Workshop on Neutrinos from Accelerators, Shanghai.
- **Muon-physics group activities, TDLI, 2023–2025.** Organised weekly research meetings and chaired the journal club.
- **Physics outreach.** Delivered AI and particle-physics talks at Kuen Cheng and Pin Hwa high schools (2026), alongside earlier high-energy-physics outreach and knowledge-transfer activities.

Honours and Fellowships

- 2026 **Collaboration honour:** Breakthrough Prize in Fundamental Physics, as a member of the Fermilab Muon $g - 2$ experiment.
- 2025 **Collaboration honour:** Breakthrough Prize in Fundamental Physics, as a member of the CMS Collaboration.
- 2024 **Best Poster Award,** Simon Eidelman School on Muon Dipole Moments and Hadronic Effects.
- 2017 **Cariparo Ph.D. Fellowship,** Fondazione Cariparo; **Research Fellowship,** Fermilab LPC Visitor and Guest Programme.
- 2015 **Fundamental Physics Scholarship,** CERN.

Selected Invited and Plenary Talks

Year	Role	Event
2025	Plenary	Vietnam Flavour Physics Conference, Quy Nhon, Vietnam.
2025	Plenary	Muon Physics at the Intensity and Precision Frontiers, Changsha, China.
2025	Invited	Postdoctoral Mini-Symposium, Shanghai, China.
2024	Plenary	Muon Physics at the Intensity and Precision Frontiers, Beijing, China.
2024	Invited	National Physics Conference (PERFIK), Melaka, Malaysia.
2022	Keynote	Knowledge Transfer Workshop on High Energy Physics, Johor Bahru, Malaysia.

Referees

Prof. Khaw Kim Siang

Associate Professor

Tsung-Dao Lee Institute and School of Physics and Astronomy, Shanghai Jiao Tong University

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Prof. Shahidan Bin Radiman

Professor Emeritus

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