

Shin-Shan YU

Contact Information

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Employment

- [2024/08–today] Research Associate Professor, the Catholic University of America, U.S.A.
- [2022/08–2024/08] Research Assistant Professor, the Catholic University of America, U.S.A.
- [2023/02–today] Adjunct Professor, Department of Physics, National Central University, Taiwan
- [2018/08–2023/01] Professor, Department of Physics, National Central University, Taiwan
- [2019/01–2021/12] Distinguished Professor, Department of Physics, National Central University, Taiwan
- [2013/08–2018/07] Associate Professor, Department of Physics, National Central University, Taiwan
- [2009/08–2013/07] Assistant Professor, Department of Physics, National Central University, Taiwan
- [2005/10–2009/07] Research Associate, Fermi National Accelerator Laboratory, USA

Positions Held

- [2024/09–] Level-3 Co-convener, CMS Searches for new physics in final states with Unbalanced pT and Standard objects (SUS) Hadronic/Photon Group
- [2022/09–2024/08] Level-2 Co-convener, CMS Physics Performance and Dataset (PPD) Data Quality Monitoring and Data Certification (DQM-DC) Group
- [2021/09–] Editor, Journal of the Association of Asia Pacific Physical Societies (AAPPS)

- [2021/09–2022/05] Committee Member, LHCP 2022 Program Committee and Local Organizing Committee
- [2017/09–2018/08] Committee Member, CMS B2G/Exotica Publication Committee
- [2017/08–2018/07] Associate Chairman, Department of Physics, National Central University
- [2009/05–today] Committee Member, International Advisory Committee of International Conference on the Structure and the Interactions of the Photon
- [2013/07–2015/08] Level-3 Co-convener, the CMS Generator subgroup “Matrix Element and Future Generator”
- [2012/01–2012/12] Committee Member, International Advisory Committee of LHC Days in Split
- [2010/04–2011/12] Level-3 Co-convener, CMS QCD Photon Physics Group
- [2008/10–2009/07] Level-3 Co-convener, CDF Very Exotic Phenomena Group
- [2007/12–2009/07] Level-3 Convener, CDF Photon Group

Education

- [1997/09–2005/05] Ph.D., Department of Physics and Astronomy, University of Pennsylvania, USA
Dissertation: “First measurement of the ratio of branching fractions $BR(\Lambda_b \rightarrow \Lambda_c \mu \nu)/BR(\Lambda_b \rightarrow \Lambda_c \pi)$ at CDF II”
Thesis advisor: Prof. Nigel Lockyer
- [1993/09–1997/06] B.Sc., Department of Physics, National Taiwan University, Taiwan

Honors and Awards

- [2021] 2030 Cross-Generation Young Scholars Program, Excellent Young Scholars, Ministry of Science and Technology, Taiwan
- [2018] Chia-Lun Luo Award for Outstanding Junior Research Investigators, National Central University, Taiwan
- [2017] Taiwan Outstanding Junior Female Scientist Award, Chien-Shiung Wu Foundation, Taiwan
- [2017] Outstanding Research Award, National Central University, Taiwan
- [2016] Outstanding Research Award, National Central University, Taiwan
- [2015] Outstanding Research Award, National Central University, Taiwan
- [2014] Wu Ta-You Memorial Award, Ministry of Science and Technology, Taiwan
- [2013] SHKP Award(Honorable Mention): Monthly Science Magazine, World Chinese Science Popularization Writer Association, SHKP, Taiwan
- [2011] Academic Research Fund Subsidy for New Faculty and Researcher, National Central University, Taiwan

- [2009] Outstanding New Faculty Award, National Central University, Taiwan
- [1993-1997] Scholarship of National Gifted Students in Physics, Ministry of Education, Taiwan

Research since 2010

Research and Development of Detectors to Search for Axions

- [2019/11-now] **Axion haloscopes**
 Together with several professors in Taiwan, including Prof. Y.-H. Chang from Academia Sinica, Prof. Y.-F. Chen from National Central University, Prof. W.-Y. Chiang from National Synchrotron Radiation Research Center, and Prof. W. Kuo from National Chung Hsing University, we established the Taiwan Axion Search Experiment with a Haloscope (TASEH). TASEH is the first axion experiment and the first axion haloscope developed and built in Taiwan. The aim of TASEH is to search for axions with a mass of $\approx 20 \mu\text{eV}$ using a microwave cavity and super-conducting devices. My group is in charge of the simulations and the measurements of the cavity, the determination of the data-taking strategy, and the analysis of calibration and physics data. Our first results from the TASEH data collected in October-November 2021 are summarized in Ref. [3], with the instrumentation and analysis details in Ref. [4] and Ref. [5], respectively. I was the contact author of Refs. [3, 5].

The TASEH Collaboration is currently commissioning a large-volume conic-shell cavity and various types of Josephson Parametric Amplifiers that were produced in Taiwan. My student P.-I. Wu is the key person who simulates and measures the performance of conic-shell cavity, driving the details of the cavity design parameters. My group is also building a detector in which a lumped-element LC circuit replaces the microwave cavity; we plan to look for axions with a mass of $\approx 0.5 \mu\text{eV}$.

Research and Development of Detectors for Future Colliders

- [2015/12-2022/03] **Simulation study of calorimeters for future colliders**
 In collaboration with Dr. S. V. Chekanov from Argonne National Laboratory, Prof. A. V. Kotwal from Duke University, and Dr. N. V. Tran from Fermilab, we studied the performance of calorimeters for future 100-TeV colliders, with fully simulated physics events. My student and I focused on the understanding of jet energy resolution, jet mass, and the comparison of jet substructure variables with three different hadron calorimeter cell sizes. Our studies were presented in ICHEP 2016 and ICHEP 2018, published in JINST [21] and JINST [13], and included in the report for Snowmass 2022 [7]. In addition to the study of jet performance, we also investigated the timing information available in calorimeters. Our first preliminary results were published in JINST [9] and documented in the report for Snowmass 2022 [6].

CMS Physics Analyses, Operation, and Detector Studies

- [2022/09-now] **Operation and software integration of DQM-DC**
 As a Level-2 co-convener of the CMS DQM-DC group, I ensured a smooth operation of the central online DQM shifts, maintained the online DQM software, managed the software integration for data certification (DC), and pushed forward an upgrade of the computing resources for online DQM. Most recently I co-organized the effort of machine-learned DQM-DC (MLDQM) and helped the CMS ECAL team to commission and deploy their MLDQM framework in online DQM [1]. I reviewed the results of the data certification reports prepared by the DC team members every week, provided comments to their presentations in the weekly PPD and Run Organization meetings, and proactively contacted the experts of the detector

performance groups and physics object groups. We ultimately were able to recover more than 850/pb of the collision data taken in 2022 by employing an improved definition of the good-run criteria, and more granular application of them (per-lumisecion rather than per-run). On the software integration side, I debugged, optimized, re-wrote, and organized the scripts that were used to produce the plots of luminosity-loss and certified luminosity. For every DC task that involved multiple steps, I implemented scripts that automate procedures as much as possible, reducing the possibility of human errors. For example, the DCS-only JSON files, the lists of good runs/lumisecions based on only the monitoring information (e.g. high voltages) of CMS pixel and silicon strip detectors, was produced daily by the DC shifters manually in 2022; now they are produced and updated automatically with cron jobs using the scripts I designed and implemented. During the data taking period in 2022 and 2023, I also gave tutorials to the online DQM shifters regularly and took shifts to serve as a DQM expert on-call (DOC). Overall, I have trained about 100 DQM shifters. We are presently preparing for the data collection in 2024 and the upgrade of the online DQM machines.

- [2022/07-now] **Search for dark matter in mono-bb**
My postdoc Dr. P. C. Tiwari is working on a search for dark matter produced in association with a pair of bottom quarks (mono-bb) using the full Run-II CMS data. Our analysis has been pre-approved internally by the CMS Collaboration and is going for approval in early 2024. Our preliminary results indicate a large exclusion in the parameter space of the benchmark model 2HDM+a [12], particularly the region with large $\tan\beta$, i.e. the ratio of vacuum expectation values in the two Higgs doublet model.
- [2015/12-2022/07] **Search for dark matter in mono-h (bb)**
In collaboration with a CERN scientist Dr. M. de Gruttola, my group started and established the mono-h(bb) team at CMS. With the 2015 data, we proved that the bb channel dominated the sensitivity of mono-h searches [19]. My former postdoc Dr. R. Khurana was the contact of the 2015 and 2016 mono-h(bb) analyses [19, 14]. In addition to the bb analysis, we determined and studied various benchmark models, generated simulation samples and performed a statistical combination of the five Higgs decay channels as a service to the whole mono-h group. The combined results of the mono-h analyses have been published in JHEP [10]. I was also one of the CMS contacts of the LHC Dark Matter Working Group; we published our study of the 2HDM+a model presented in Ref. [12].
- [2015/01-2021/01] **Search for heavy resonances decaying into a pair of boosted Higgs bosons in 4b**
My group performed the di-Higgs(bb) resonance search with a bump-hunt technique in order to cross check the alphabet-assisted-bump-hunt result. In addition, we produced the signal simulation samples and analysis ntuples for the di-Higgs(bb) team. We derived corrections on the Higgs-mass distributions, optimized the selection criteria, and estimated several major systematic uncertainties. My student C.-W. Chen was chosen to give the pre-approval talk on behalf of the group. The analysis results using the 2016 data were published in Physics Letter B [18] and JHEP [15]. My group extended the analysis to a generic search for a heavy resonance decaying to a pseudo-scalar and the SM Higgs boson; both the pseudo-scalar and the Higgs boson decay to a pair of b quarks. After my student graduated, the di-Higgs group continued the effort; the final results have been published in Phys. Lett. B [2].
- [2016/08-2020/04] **Participation in test beams for the CMS High Granularity Calorimeter**
My group members, including my former postdocs, my students, and myself, took shifts for various test beams at the CERN H2 area for the CMS Phase II upgraded endcap calorimeter, the high granularity calorimeter (HGCAL). We analyzed the 2016 test beam data, studied

the linearity of the electronics response, and estimated the saturation point of the front-end electronics in high-gain mode. We also studied the stability of pedestals and provided an estimated pedestal value, which allowed all the test-beam analyzers to perform a consistent pedestal subtraction. Our analysis of the 2016 test beam was published in JINST [16]. We later worked on the rejection of electron-like pions and the calibration of energy scale/resolution using the longitudinal information of electromagnetic showers in HGCal; the analysis results were included in Ref. [8].

- [2014/04-2016/12/31] **Search for heavy resonances decaying to Vh and VV**
 The expertise we developed in V+jet measurements earned us an invitation to join the CMS diboson team. Together with my Ph.D. student and several master students, we contributed significantly to the search for diboson resonances using the 2015 and 2016 data. We studied several benchmark models, produced the corresponding signal simulation samples, and estimated the systematic uncertainties. The results of the CMS Vh and VV searches are published in Refs. [22, 23, 20]. My former Ph.D student Y.H. Chang further explored and applied the alphabet method of background estimation (developed in the diHiggs group) to the Vh analysis using the 2016 data; the limits he obtained are similar to those in Ref. [17].
- [2014/06-2014/12] **Study of digitized out-of-time hits in pixel/strip trackers**
 During these six months, my group studied the fraction of digitized out-of-time (OOT) hits coming from low- p_T particles. The goal was to estimate the loss of low- p_T particles if a time-based readout window was enforced in the electronics. Due to the strong magnetic field at CMS, particles with small values of transverse momentum can loop inside the CMS pixel or strip trackers and leave hits in the detector at a later time; some of these hits are digitized in later bunch crossings (OOT hits). We used simulated minimum-bias samples and assumed an electronics readout time of 3 ns; the hits would be digitized if the expected and measured arrival times had a difference of less than 3 ns. The fraction of OOT hits from primary low- p_T particles was found to range from 0.5 to 8%, while the fraction from secondary low- p_T particles was significantly larger. We reported our results in CMS Tracker Week meetings and implemented our code in the official CMS software.
- [2013/07-2015/08] **Establishing framework for the CMS generator group**
 While co-convening the Matrix Element and Future Generator Subgroup, I was also in charge of developing and maintaining the CMS software interface of the POWHEG generator. Whenever there was a new POWHEG release or a newly added physics process, I performed their validation. I also organized several POWHEG tutorials to make the interface more user-friendly. My postdoc and my own master students helped to validate the MADGRAPH and ALPGEN generators. In addition, I constructed new collections in the CMS data format: GENLUMIINFOPRODUCT and GENFILTERINFO; these collections save the information necessary to compute the cross section of a particular physics process from a generator. I also established a framework and an analyzer GENXSECANALYZER to properly take into account the averages and the uncertainties of cross sections.
- [2012/08-2013/12/31] **Search for high-mass Higgs in the ZZ(2l2q) channel**
 My group performed searches for the high-mass Higgs boson in the vector-boson-fusion production channel. Our analysis was a completely independent cross-check of the main CMS analysis, led by the INFN Florence Group, Our results are combined with all high-mass Higgs searches at CMS (including WW and ZZ channels) and reported in Ref. [24]
- [2012/08-2013/12/31] **Measurement of rapidity distribution in V+jets**
 My group and the groups from Florida International University (led by Dr. S. Linn) and from Texas Tech University (led by Prof. S.-W. Lee) performed measurements of rapidity

correlations using exclusive $Z+1\text{jet}$ and $\gamma+1\text{jet}$ events. We found that the predictions from SHERPA agreed with our data much better compared to MADGRAPH, particularly the rapidity difference between the vector boson and the jet. Our results [26] raised interest and discussions among theorists. The inclusion of higher-order corrections made MADGRAPH agree significantly better with our data.

- [2009/10-2011/12/31] **Measurements of photon cross sections**

My experience in measurements and searches with photons at CDF led to my appointment as a co-convenor of the CMS QCD photon group. In addition, I was also the analysis and paper contact of the first two CMS photon cross section papers [31, 30]. Our results extended the previous Tevatron measurements to the regions of higher rapidity, higher transverse momentum, and a much lower value of parton momentum fraction x_T . The inclusion of photon cross section in the gluon-PDF fit reduced the uncertainty by up to 20%. After performing the measurements within the CMS QCD photon group, my group also collaborated with the CMS heavy ion group and performed measurements in pp collisions at $\sqrt{s} = 2.76$ TeV [29]. Our results provided a reference to the photon cross-section measurement in PbPb collisions and helped the understanding of nucleon PDFs.

Conferences and Workshops

- [2023/12] “PPD Coordination Report”, plenary talk
CMS Week, CERN, Switzerland
- [2023/06] “Data Certification”, plenary talk
CMS Week, CERN, Switzerland
- [2021/01] “Taiwan Axion Search Experiment with Haloscope”, invited talk
Achievement Exhibition of TW HEP Meeting 2021, Tainan, Taiwan
- [2020/10] “Physics potential of timing layers in future collider detectors”, invited talk
Energy Frontier in Particle Physics: LHC and Future Colliders, National Taiwan University, Taipei, Taiwan
- [2018/01] “Ultralight Dark Matter (Axion or Axion-like Particles) Searches”, invited talk
Taiwan Physics Society Annual Meeting, National Taiwan University, Taipei, Taiwan
- [2017/08] “Searches for dark matter at CMS”, one-hour invited talk
Dark Matter at the LHC Workshop, National Center for Theoretical Sciences, Physics Division, Hsinchu, Taiwan
- [2017/07] “Dark matter searches at colliders”, review talk
The European Physical Society Conference on High Energy Physics (EPS-HEP) 2017, Venice, Italy
- [2016/09] “On the consistent use of mono-Higgs models”
LHC Dark Matter WG public meeting, CERN, Geneva, Switzerland
- [2016/08] “Search for dark matter in pp collisions with CMS”
The 38th International Conference on High Energy Physics (ICHEP), Chicago, IL, USA
- [2016/08] “Study of Boosted W-Jets and Higgs-jets with the SiFCC Detector”
The 38th International Conference on High Energy Physics (ICHEP), Chicago, IL, USA

- [2016/03] “CMS Searches with Boosted Higgs-jets”
LHC Physics Workshop, National Center for Theoretical Sciences, Physics Division, Hsinchu, Taiwan
- [2016/01] “Search for New physics in Boosted Di-Bosons Events at CMS”, invited talk
Taiwan Physics Society Annual Meeting, National Sun Yat-sen University, Kaohsiung, Taiwan
- [2016/01] “Search for New physics in Boosted Di-Bosons”, invited talk
IAS Program on High Energy Physics, The Hong Kong University of Science and Technology, Hong Kong
- [2015/06] “CMS Experience with the Modeling of SM Processes in the Context of Higgs Studies/BSM Searches”
GRC2015: Gordon Research Conference: Prospects of Particle Physics at the 13TeV Large Hadron Collider, The Hong Kong University of Science and Technology, Hong Kong
- [2014/02] “Vector Boson + Jets at CMS”
Lake Louise 2014: Lake Louise Winter Institute, University of Alberta, Chateau Lake Louise, Canada
- [2012/11] “Production of W/Z in association with jets (Tevatron+LHC)”
HCP 2012: Hadron Collider Physics Symposium 2012, Kyoto University, Kyoto, Japan
- [2011/06] “Prompt Photons at Hadron Colliders - Experimental Overview”, invited review talk
SM Benchmark Processes at High Energy Hadron Colliders, DESY, Zeuthen, Germany
- [2009/05] “Review of Jet, W/Z+Jets, and Heavy Flavor Production at the Tevatron”
Photon 09, DESY, Hamburg, Germany
- [2009/03] “Searches in Photon and Jet States”
Rencontres de Moriond EWK 2009, La Thuile, Italy
- [2008/05] “Other Beyond Standard Model Searches at the Tevatron”, plenary talk
Hadron Collider Physics, Galena, IL, USA
- [2007/07] “Search for New Physics with Photons at the Tevatron”
The Europhysics Conference on High Energy Physics, Manchester, England, UK
- [2006/06] “Search for Higgs at CDF”
SUSY06, Irvine, CA, USA
- [2005/05] “ Λ_b Physics at CDF”
Frontiers in Contemporary Physics, Nashville, TN, USA
- [2002/04] “Particle ID with dE/dx Measurement from CDF Central Outer Tracker”
Annual APS Meeting, Albuquerque, NM, USA
- [1999/04] “ASDQ Performance”
CDF COT Workshop, Philadelphia, PA, USA

Colloquia and Seminars

- [2022/01] “Search for dark matter in pp collisions with CMS”
Department Colloquium, Department of Physics, The Catholic University of America, N.E. Washington, DC, USA
- [2021/11] “A Ghost Hunt: Search for Dark Matter via Ground-based Experiments”
High Energy Physics Seminar, Department of Physics, University of Maryland, College Park, MD, USA
- [2021/05] “Search for dark matter with the mono-h channel at CMS”
Journal Club, Institute of Astronomy, National Central University, Taoyuan, Taiwan
- [2020/12] “Search for dark matter in pp collisions with CMS”
Department Colloquium, Department of Physics, National Tsing Hua University, Hsinchu, Taiwan
- [2020/12] “Search for dark matter in pp collisions with CMS”
ASIAA/CCMS/IAMS/LeCosPA/NTU-Phys/NTNU-Phys Joint Colloquia, Department of Physics, National Taiwan University, Taipei, Taiwan
- [2019/11] “Search for dark matter in pp collisions with CMS”
Department Colloquium, Department of Physics, National Cheng Kung University, Tainan, Taiwan
- [2019/11] “Search for dark matter with the mono-h channel at CMS”
High Energy Physics Seminar, Department of Physics, University of Washington, Seattle, WA, USA
- [2018/12] “Search for dark matter in pp collisions with CMS”
LeCosPA Cosmology and Particle Astrophysics Seminar, LeCosPA, National Taiwan University, Taipei, Taiwan
- [2018/11] “Search for dark matter with the mono-h channel at CMS”
High Energy Physics Seminar, Department of Physics, National Taiwan University, Taipei, Taiwan
- [2018/10] “Search for new physics with boosted Higgs Bosons at CMS”
Department Seminar, Department of Physics, National Taiwan University, Taipei, Taiwan
- [2017/10] “Search for dark matter in mono-h channel at CMS”
High Energy Physics Seminar, Department of Physics, Chung Yuan Christian University, Taoyuan, Taiwan
- [2017/06] “Search for associated production of dark matter with a Higgs boson at CMS”
High Energy Physics Seminar, Institute of Physics, National Chiao Tung University, Hsinchu, Taiwan
- [2016/06] “CMS Searches with Boosted Higgs-jets”
Department Seminar, Department of Physics, National Taiwan University, Taipei, Taiwan
- [2015/06] “Search for new particles in boosted di-boson events at CMS”
Department Colloquium, Department of Physics, National Tsing Hua University, Hsinchu, Taiwan

- [2013/12] “ γ + Jets and Z + Jets at CMS, Building Foundations for Looking into Unknown”
Department Colloquium, Graduate Institute of Applied Physics, National Chengchi University, Taipei, Taiwan
- [2013/03] “ γ + Jets and Z + Jets at CMS, Building Foundations for Looking into Unknown”
Department Colloquium, Department of Physics, National Central University, Taoyuan, Taiwan
- [2009/03] “Invisible Light from the Unknown”
Department Colloquium, Department of Physics, National Central University, Taoyuan, Taiwan
- [2009/03] “Invisible Light from the Unknown”
High Energy Physics Seminar, Department of Physics, National Tsing Hua University, Hsinchu, Taiwan
- [2009/02] “Invisible Light from the Unknown”
Department Colloquium, Department of Physics, National Taiwan University, Taipei, Taiwan
- [2009/01] “Invisible Light from the Unknown”
Department Colloquium, Department of Physics, Kansas State University, Manhattan, KS, USA
- [2008/03] “Searches for New Physics with Photons at CDF”
High Energy Physics Seminar, Department of Physics, National Taiwan University, Taipei, Taiwan
- [2008/03] “Searches for New Physics with Photons at CDF”
High Energy Physics Seminar, Department of Physics, National Cheng-Kung University, Tainan, Taiwan
- [2007/01] “Measurement of Λ_b Branching Fractions and Search for Diphoton + e/μ ”
High Energy Physics Seminar, Institute of Physics, Academia Sinica, Taipei, Taiwan

Lectures in Particle Physics Schools

- [2018/08] “Experimental methods and physics at the LHC”, seven 90-minute lectures
24th Vietnam School of Physics: Particles and Cosmology, Quy Nhon, Vietnam
- [2013/09] “Detector Simulation and Experimental Techniques”,
Madgraph School, Department of Physics, National Taiwan Normal University, Taipei, Taiwan
- [2010/10] “How to Measure the Properties of Photon, W, and Z Bosons?”,
LHC Physics: W, Z, and Beyond, National Center for Theoretical Sciences, Physics Division, Hsinchu, Taiwan

Outreach

Talk

- “Search for Dark Matter at the Large Hadron Collider”, Chia-Lun Luo Lecture, members of the audience are first-year undergraduate students, National Central University, Taoyuan, Taiwan (June 2018)

Articles

- “Boosted di-boson events”, Physics Bimonthly, vol. 37, iss. 6 (December 2015)
- “The variation of acceleration, exploring the fundamental particles – Large Hadron Collider”, Science Monthly, iss. 509 (May 2012)
- “Large Hadron Collider and the experiments”, Physics Bimonthly, vol. 32, iss. 6 (December 2010)
- “The research activity of the High Energy Physics group at National Central University”, Physics Bimonthly, vol. 32, iss. 6 (December 2010)

Media Contribution

Books

- S. Fernández-Vidal, “Los Cinco Reinos Eternos/ The Five Eternal Realms”, reviewed by S.-S. Yu (2021 1st Taiwanese edition), ISBN 978-986-0695-25-0.
- S. Fernández-Vidal, “La Senda de las cuatro fuerzas/ The Path of the Four Forces”, reviewed by S.-S. Yu (2020 1st Taiwanese edition), ISBN 978-986-9861-73-1.
- S. Fernández-Vidal, “La puerta de los tres cerrojos / The Door with Three Locks”, reviewed by S.-S. Yu (2020 1st Taiwanese edition), ISBN 978-986-9861-71-7.
- I. Sulung, “hala saku la pinsgayan na Tayal”, English translation by S.-S. Yu (2015 1st edition, 2018 2nd edition), ISBN 978-986-8645-11-0.

Teaching, Mentoring, and Advising

Courses Taught

- PH1032-H General Physics A, Spring 2021
- PH1004-P General Physics Laboratory, Spring 2021
- PH1031-H General Physics A, Fall 2020
- PH1003-I General Physics Laboratory, Fall 2020
- PH3026 Experimental Modern Physics, Fall 2019
- PH6017 Colloquium I, Fall 2019
- PH2035 Introduction to Modern Physics, Spring 2019
- PH6018 Colloquium II, Spring 2019
- PH1035A General Physics A, Fall 2018
- PH1032C General Physics A, Spring 2018
- PH1031C General Physics A, Fall 2017
- PH3026 Experimental Modern Physics, Fall 2017
- PH1032D General Physics A, Spring 2017

- PH1036A General Physics A, Spring 2017
- PH2035 Introduction to Modern Physics, Spring 2017
- PH1032D General Physics A, Spring 2016
- PH1036A General Physics A, Spring 2016
- PH2035 Introduction to Modern Physics, Spring 2016
- PH1032C General Physics, Spring 2015
- PH1032E General Physics, Spring 2015
- PH2035 Introduction to Modern Physics, Spring 2015
- PH1002G General Physics, Spring 2014
- PH1002Y General Physics, Spring 2014
- PH6018 Colloquium II, Spring 2014
- PH1001G General Physics, Fall 2013
- PH1002Y General Physics, Spring 2013
- PH1002C General Physics, Spring 2013
- PH6018 Colloquium II, Spring 2013
- PH1001Y General Physics, Fall 2011
- PH1001C General Physics, Fall 2011
- PH3037 Electronics (with Experiments) I, Fall 2011
- PH6018 Colloquium II, Spring 2011
- PH1002C General Physics, Spring 2011

Mentoring and Advising

- High school students
 - [2020/09–2021/05] Po-En Tsai
 - [2020/09–2021/05] Rei-Tse Hu
- Undergraduate
 - [2019/07–2021/06] Yueh-Shun Li
 - [2019/07–2021/06] Ti-Kai Chou
 - [2019/07–2020/09] Wei-Hung Yang
 - [2017/07–2019/08] Chih-Hsiang Yeh
 - [2016/07–2018/08] Shu-Xiao Liu
 - [2014/07–2016/08] Ching-Wei Chen
 - [2014/07–2015/08] Chih-Shen Liao

- [2013/06–2014/08] Henry Yee-Shian Tong
- [2011/08–2013/08] Ji-Kong Huang
- [2010/08–2011/08] Fang-Ying Tsai, Jie-Chen Lin
- [2010/01–2011] Yi-Kai Wu
- Master
 - [2021/09–2024/07] Po-Chi Chiu
 - [2021/07–today] Yueh-Shun Li
 - [2020/09–2024/07] Ping-I Wu
 - [2020/09–2023/07] Kuan-Yu Chen
 - [2020/09–2022/07] Ming-Wei Ouyang
 - [2019/09–2021/07] Chih-Hsiang Yeh
 - [2019/09–2022/08] Kung-Hsiang Chen
 - [2018/09–2021/01] Shu-Xiao Liu, Ph.D. student at National Taiwan University
 - [2018/09–2021/01] Fasya Khuzaimah, Ph.D. student at National Taiwan University
 - [2016/09–2017/07] Ching-Wei Chen
 - [2014/09–2017/10] Gregorio III Tabbu de Leon
 - [2014/09–2016/11] Henry Yee-Shian Tong, Taiwan Semiconductor Manufacturing Company (TSMC)
 - [2013/09–2017/06] Ji-Kong Huang
 - [2013/09–2016/06] Jun-Yi Wu
 - [2012/09–2014/07] Yu-Hsiang Chang, National Synchrotron Radiation Research Center
 - [2011/09–2013/07] Fang-Ying Tsai, Postdoc at Stony Brook University, New York and Brookhaven National Laboratory
- Doctoral
 - [2014/09–2019/08] Yu-Hsiang Chang, National Synchrotron Radiation Research Center
 - [2009/08–2012/08] Yun-Ju Lu, Scientist at the Department of Physics, National Tsing Hua University
- Research Assistant
 - [2022/03–2023/02] Fasya Khuzaimah
 - [2020/01–2022/01] Ching-Fang Chen
 - [2015/07–2016/07] Fang-Ying Tsai
- Post-doctoral
 - [2022/07–] Praveen Chandra Tiwari
 - [2021/11–2022/07] Jui-Yin Lin, Okinawa Institute of Science and Technology
 - [2019/10–2021/07] Tanmay Sarkar, Postdoc at INFN Pisa, Italy
 - [2016/02–2017/11] Vieri Candelise, Ricercatore a Tempo Determinato, University of Trieste & INFN Trieste, Italy
 - [2015/03–2018/09] Raman Khurana, Research Associate at McCormick School of Engineering, Northwestern University, U.S.A.

- [2012/12-2014/08] Marco Cardaci, Senior Data Scientist at the Specialist Works
- [2012/10-2015/08] Yun-Ju Lu, Scientist at the Department of Physics, National Tsing Hua University
- [2012/01-2012/08] Anil Pratap Singh, Senior Associate at PwC
- [2009/11-2012/04] Darko Mekterović, Assistant Professor at the University of Rijeka, Croatia

Journal Papers

“*” indicates that I am the contact author of this paper

“★” indicates that my postdoc or my student is the contact author of this paper

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