Curriculum Vitae

Personal information

Name	Hao-Ren Jheng
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Education

Sep 2021 – Present **Massachusetts Institute of Technology - Physics,** *Ph.D. student*

Sep 2017 – Jun 2019 **National Central University - Physics,** *M.S.,*
Title of the M.S thesis: *Search for rare decays of Z and Higgs bosons to J/ψ and a photon in proton-proton collisions at $\sqrt{s} = 13$ TeV*
Supervised by Professor Chia-Ming Kuo

Sep 2013 – Aug 2017 **National Central University - Physics,** *B.S.*

Experience

Sep 2021 – Present **Research assistant** (part-time) in Relativistic Heavy-Ion Group at Massachusetts Institute of Technology

- Develop the analysis framework to measure the charged particle multiplicity in Au-Au collisions at the sPHENIX detector at Relativistic Heavy Ion Collider (RHIC)
- Department of Energy proposal *Intelligent experiments through real-time AI: Fast Data Processing and Autonomous Detector Control for sPHENIX*. Involve in the projects of the intermediate tracker data unpacking and the online triggering for the heavy flavor physics

Jun 2020 – May 2021 **Research assistant** (full-time) of Professor Chia-Ming Kuo at National Central University and Center of High-energy and High-field Physics

- Developed simulations of background events in the search for the Higgs boson decaying into the $\ell\ell\gamma$ channel
- Developed the analysis strategy in the search for the Higgs boson decaying into the $\gamma^*\gamma$ in the electron channel
- Organizer and lecturer of One-Day High Energy Physics School for Taiwanese high school students

Jan 2020 – May 2020 **Military service/Private**, Republic of China Army

Jun 2019 **Teaching assistant** for the course *Machine Learning in High Energy Physics*, hosted in Taiwan, of Professor Gunther Roland at Massachusetts Institute of Technology

Sep 2017 – Jun 2019 **Research assistant** (part-time) of Professor Chia-Ming Kuo at National Central University

- Participated in the October 2018 beam test of High Granularity Calorimeter (HGCal) for the future upgrade of Compact Muon Solenoid (CMS) experiment
- Electron veto efficiency and scale factor measurements for data collected in 2017 and 2018

Sep 2017 – Jun 2018 **Teaching assistant** for the course *Experimental Method and Experimental Physics* of Professor Chia-Ming Kuo at National Central University

Jul 2015 – Aug 2015 **Summer student** – *University Consortium of ALMA–Taiwan Summer Student Program*, supervised by Professor Chorng-Yuan Hwang at Graduate Institute of Astronomy, National Central University

- Studied the star formation efficiency in Centaurus A with information from Atacama Large Millimeter/Submillimeter Array and Spitzer Space Telescope

Other responsibilities/activities

2016, 2017, 2018 **Shifts in CMS beam tests for the HGCal**

- Took shifts in the beam tests of HGCal hold at CERN in 2016, 2017 and 2018

Feb 2016 **Compact Muon Solenoid Data Analysis School 2016, Taipei, Taiwan**

Gaps

Jun 2021 – Aug 2021 Took time off to study and relocate prior to attending the Ph.D. program at MIT

Jul 2019 – Dec 2019 Took time off to study and prepare for the enlistment of mandatory military service

Selected publications & Oral presentations

Papers

⋆ indicates that I am the contact author of this paper

1 **Response of a CMS HGCAL silicon-pad electromagnetic calorimeter prototype to 20-300 GeV positrons**, JINST 17 (2022) 05, P05022, doi:10.1088/1748-0221/17/05/P05022, arXiv:2111.06855v3

2 **Electron and photon reconstruction and identification with the CMS experiment at the CERN LHC**, JINST 16 (2021) P05014, CMS-EGM-17-001, CERN-EP-2020-219, doi:10.1088/1748-0221/16/05/P05014, arXiv:2012.06888

3 **Construction and commissioning of CMS CE prototype silicon modules**, submitted to JINST, arXiv:2012.06336

4 **The DAQ system of the 12,000 Channel CMS High Granularity Calorimeter Prototype**, JINST 16 (2021) 04, T04001, doi:10.1088/1748-0221/16/04/T04001, arXiv:2012.03876

⋆ 5 **Search for rare decays of Z and Higgs bosons to J/ψ and a photon in proton-proton collisions at $\sqrt{s} = 13$ TeV**, Eur. Phys. J. C 79 (2019) 94, CMS-SMP-17-012, CERN-EP-2018-250, doi:10.1140/epjc/s10052-019-6562-5, arXiv:1810.10056

6 **Search for the decay of a Higgs boson in the $\ell\ell\gamma$ channel in proton-proton collisions at $\sqrt{s} = 13$ TeV**, JHEP 11 (2018) 152, CMS-HIG-17-007, CERN-EP-2018-092, doi:10.1007/JHEP11(2018)152, arXiv:1806.05996

7 **Beam tests of prototype silicon modules for the CMS High Granularity Endcap Calorimeter**, JINST 13 (2018) no.10, P10023, FERMILAB-CONF-18-595-CMS, doi:10.1088/1748-0221/13/10/P10023

Poster presentations

1 **Rare decays of the Higgs boson in the $\ell\ell\gamma$ final states in pp collisions at $\sqrt{s} = 13$ TeV**, 2019 Annual Meeting of the Physical Society of Taiwan, National Chiao Tung University, Hsinchu, Taiwan

2 **Search for Z and Higgs boson decaying into J/ψ + photon in pp collisions at 13 TeV**, 39th International Conference on High Energy Physics (ICHEP) 2018, Seoul, Korea

3 **Study of Z and Higgs boson decaying into (J/ψ)γ in pp collisions at $\sqrt{s} = 13$ TeV**, 2018 Annual Meeting of the Physical Society of Taiwan, National Taiwan University, Taipei, Taiwan

4 **Study of a Higgs boson decaying into a J/ψ + γ in pp collisions at $\sqrt{s} = 13$ TeV**, Annual Meeting of the Physical Society of the Republic of China (Taiwan) 2017, Tamkang University, Taipei, Taiwan

5 **Study of a Higgs boson decaying into J/ψ + γ in pp collisions at $\sqrt{s} = 13$ TeV**, Annual Meeting of the Physical Society of the Republic of China 2016, National Sun Yat-Sen University, Kaohsiung, Taiwan

Oral presentations

1 **Searches for rare decays of the Higgs boson at CMS**, Phenomenology Symposium 2019, University of Pittsburgh

2 **Study of Higgs and Z boson decaying into J/ψ + γ in pp collisions at $\sqrt{s} = 13$ TeV**, Taiwan Korea joint workshop on particle physics 2017, Seoul National University

Internal analysis notes

CMS Collaboration

1 **Search for $H \to \gamma^*\gamma \to ee\gamma$ with full Run-2 data**, CMS AN-2021/053

2 **Performance of e/γ reconstruction and identification with the CMS detector in proton-proton collisions at $\sqrt{s}$ =13 TeV**, CMS AN-2020/075

3 **Search for the Z and Higgs boson decaying into J/ψ + γ in pp collisions at $\sqrt{s}$ =13 TeV with 2016 data**, CMS AN-2017/283

4 **Search for Higgs boson Dalitz Decay to $\gamma^*\gamma \to \mu\mu\gamma$ at $\sqrt{s}$ =13 TeV with 2016 data**, CMS AN-2016/493

Awards

2020 **Excellent Graduate Thesis Award, The Physical Society of Taiwan 2020**
Awarded to master or PhD students graduated in physics-related fields from domestic universities and colleges

2017, 2019 **The Phi Tau Phi Scholastic Honor Society of the Republic of China (2 times)**
Awarded to up to 1% of undergraduate graduands or 3% of master's graduands in every domestic university that are excellent in academic performance as well as moral conduct

2018 **FOCI Fiber Optic Communications, Inc. Scholarship**
Financial assistance for students studying, doing research, and attending conferences abroad

2017 **Excellent Poster Award, Annual Meeting of the Physical Society of the Republic of China (Taiwan) 2017**
Awarded to up to 10% of the total number of papers accepted for the poster competition that are excellent in layout design, academic value, and on-site presentation.

2017 **SYSAGE Technology Scholarship**
Financial assistance for students studying, doing research, and attending conferences abroad

2016 **Zhu-Shun Yi He Qin Scholarship**
Awarded to twelve students with most outstanding academic performance in the university

2013 – 2017 **Academic Excellence Award (7 times)**
Awarded to students with the top 5% GPA for that semester

Skills

Language Chinese (native), English (fluent)

Programming/Software C, C++, Python, LaTeX, MATLAB (beginner), LabVIEW (beginner), Mathematica (beginner)