

Curriculum Vitae
Toyoko J. Orimoto

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Education

- Dec 2006: Ph.D., Physics, University of California, Berkeley; Thesis Title: “Study of rare B-meson decays related to the CP observable $\sin(2\beta + \gamma)$ at the BaBar experiment”
- May 2002: M.A., Physics, University of California, Berkeley
- May 2000: B.A., Physics, University of California, Berkeley

Employment

- Sep 2019 - present: Associate Professor, Northeastern University, Boston, MA
- Oct 2012 - Aug 2019: Assistant Professor, Northeastern University, Boston, MA
- Oct 2009 - Sep 2012: CERN Fellow, CERN, Geneva, Switzerland
- Sep 2006 - Sep 2009: Robert A. Millikan Postdoctoral Fellow, California Institute of Technology, Pasadena, CA
- May 2001 - Aug 2006: Graduate Student Researcher, University of California, Berkeley & Lawrence Berkeley National Laboratory, Berkeley, CA

Awards & Fellowships

- 2013 - 2018: US Department of Energy Early Career Award
- 2009 - 2012: CERN COFUND Fellowship
- 2009: CMS Achievement Award for decisive leadership in ECAL prompt feedback
- 2006 - 2009: Robert A. Millikan Postdoctoral Fellowship in Experimental Physics
- 2000 - 2002 & 2005: UC Berkeley Chancellor’s Opportunity Graduate Fellowship
- 2000: National Science Foundation Graduate Fellowship (Honorable Mention)
- 1996 - 2000: UC Berkeley Chancellor’s Undergraduate Scholarship
- 1996 - 2002 & 2005: Japanese American Women Alumnae of UC Berkeley Scholarship

Current Research Areas

- Experimental Particle Physics
- Exploring the high energy frontier with the Compact Muon Solenoid (CMS) Experiment at the CERN Large Hadron Collider (LHC)
- Upgrading the CMS Experiment for the High-Luminosity phase of the LHC (HL-LHC)
- Discovering or constraining new beyond-the-standard-model (BSM) physics
- Utilizing the newly discovered Higgs boson as a potential portal to further discoveries
- Operating the CMS electromagnetic calorimeter (ECAL), maintaining its excellent performance, and upgrading it for HL-LHC; Serving as Deputy System Manager of CMS ECAL
- Developing a new precision minimum-ionizing particle (MIP) timing detector (MTD) to bring new capabilities to CMS for HL-LHC

Research Funding

- National Science Foundation (Aug 2020-Jul 2023): “Experimental Particle Physics Research at High Energies,” NSF PHY-2011848, \$1,860,000, co-PI ($\sim 25\%$).
- National Science Foundation (Apr 2020-Dec 2026): “U.S. CMS Upgrades for the High-Luminosity Large Hadron Collider,” NSF sub-award PHY-1946735, \$1,104,887, co-PI.
- Department of Energy (Sep 2021-Dec 2022): “U.S. CMS Operations,” DOE sub-award, \$89,890, PI.
- National Science Foundation (Aug 2018-Jul 2021): “Exploring the High Energy Frontier with the CMS Electromagnetic Calorimeter,” NSF PHY-1806561, \$660,000, PI.
- National Science Foundation (Jan 2017-Dec 2021): “U.S. CMS Operations at the Large Hadron Collider,” NSF sub-award PHY-1624356, \$203,517, co-PI ($\sim 25\%$).
- Department of Energy Early Career Award (Jul 2013-Jun 2018): “Search for the Higgs and Physics Beyond the Standard Model with the CMS Electromagnetic Calorimeter,” DE-SC0010349, \$750,000, PI.

Research Leadership

- **CMS Electromagnetic Calorimeter (ECAL):**
 - 2021 - present: Deputy System Manager for CMS ECAL
 - 2012 - present: CMS ECAL Institution Board Member
 - 2013 - 2022: CMS ECAL Editorial Board Chair
 - 2009, 2019, 2020, 2022: CMS ECAL Awards Committee Member
 - 2013 - 2014: CMS ECAL Documentation Coordinator

- 2012 - 2013: CMS ECAL Editorial Board Member
- 2009 - 2010: ECAL representative for CMS Physics Validation Team
- 2008 - 2010: Coordinator for the CMS ECAL Prompt Analysis Group
- 2006 - 2009: ECAL laser monitoring expert

- **CMS MIP Timing Detector (MTD)**

- 2021 - present: US CMS L2 Resources Manager for MTD
- 2020 - present: Member of US MTD Advisory Task Force
- 2018 - present: Chair of MTD Conference Committee
- 2018 - present: Member of MTD Editorial Board
- 2020: Co-editor of US CMS MTD Technical Design Report
- 2018: Co-editor of US CMS MTD Conceptual Design Report
- 2018: Manager of US CMS MTD Barrel Timing Layer System Testing

- **CMS Upgrades**

- 2017: Member of US CMS Phase II Upgrade Advisor Board

- **CMS Physics:**

- 2017 - 2019: Member of CMS SUSY Publications Committee
- 2012 - 2013: Dataset Definition Team contact for CMS Higgs Physics Group
- 2011 - 2012: Contact for CMS SUSY Razor diphoton search
- 2009 - 2012: Leader of CMS Exotica high-mass diphoton resonance search
- 2010 - 2011: CMS Physics Dataset Working Group member
- 2011: Photon contact for CMS Exotica Physics Analysis Group
- 2011: Contact for CMS $e\text{-}\gamma$ Physics Object Group γ misidentification measurement
- 2010: Contact for CMS QCD Photons working group data-MC validation task
- 2010: ECAL contact for CMS QCD Photons working group
- 2010: Coordinator for CMS ECAL/ $e\text{-}\gamma$ supercluster commissioning
- 2008 - 2009: Co-convener of the CMS QCD Photons working group
- Editor of CMS PAS: EXO-11-037, EXO-10-019, EGM-10-001, EXO-09-009
- Member of CMS Analysis Review Committees: HIG-20-002, EXO-16-053, SUS-16-012, EXO-12-047, EXO-12-028

- **CMS Management (General):**

- 2014 - present: Deputy Representative to the CMS Collaboration Board
- 2020 - present: Co-chair of CMS Diversity Office
- 2020 - present: Fermilab LHC Physics Center (LPC) Coordinator Selection Committee
- 2020: US CMS Constitution Review Committee
- 2018 - 2020: Member of CMS Diversity Office

Research Advising

- Postdoctoral Researchers:
 - Badder Marzocchi (2018 - present)
 - Andrea Massironi (2013 - 2017), now permanent staff at INFN Milano-Bicocca
- PhD students:
 - JP Dervan (2021 - present)
 - Amrutha Krishna (2020 - present)
 - Abraham Tishelman-Charny (Physics 2022), “Search for Higgs Boson Pair Production at the CMS Experiment with Run 2 LHC Data”; to be postdoctoral researcher with Brookhaven National Laboratory ATLAS group
 - Tanvi Wamorkar (Physics 2021), “Search for exotic decays of the Higgs boson using photons with the Compact Muon Solenoid experiment”; now postdoctoral researcher with Argonne National Laboratory ATLAS group
 - Rafael Teixeira De Lima (Physics 2017), “Shedding Light: Beyond the Standard Model Higgs Physics with Photons at CMS”; now postdoctoral researcher with SLAC ATLAS group
- PhD thesis committees: Bingran Wang (Physics 2022), Andrew Wisecarver (Physics 2021), Chad Freer (Physics 2021), Amin Abou Ibrahim (Physics 2020), Andrew Spisak (Physics 2017), David Nash (Physics 2016), David Francescone (Physics 2015), Sujeet Akula (Physics 2014),
- External Ph.D. thesis committee member for: Abishek Sharma (University of Adelaide, Australia, 2020), Andrew Buccilli (University of Alabama, 2019)
- MSc students: Daniel Abadjiev (Physics 2023), Megan Stark (Physics 2018), Martin Franke (2014, exchange student from Germany)
- Undergraduate coop students: Isabel Kain (Physics 2020), Michael Plessner (Physics 2019), Kelsey Yee (Physics 2018), Kathryn Larkin (Physics 2019), William Benoit (Physics 2019), Marko Lazarevic (Physics 2019), Alexander Coda (Physics 2017)

Publication Metrics

- Detailed publication list under “Select Publications & Reports”
- INSPIRE HEP; Google Scholar h-index: 176
- Total number of publications: 1636

Presentation Summary

- Detailed list of presentations under “Conference Presentations, Colloquia, and Seminars”

- Plenary conference presentations (7): Miami 2018, US LHC Users Association Annual Meeting 2016, TeV-scale physics workshop at CERN 2011, Hadron Collider Physics Symposium 2011, Symmetries and Spin 2010, Lake Louise Winter Institute 2009, International Workshop on Discoveries in Flavor Physics at e^+e^- Colliders 2006
- Parallel conference presentations (13): Higgs 2021, IEEE NSS-MIC 2020, APS April Meeting 2018, IEEE NSS-MIC 2017, International Conference on High Energy Physics 2016, APS Division of Particles & Fields 2015, Phenomenology Symposium 2015, Astroparticle 2014, Innovative Particle and Radiation Detectors 2010, Europhysics Conference on High Energy Physics 2009, APS Division of Particles & Fields 2006, APS April meeting 2005, APS Division of Particles & Fields 2002
- Poster conference presentations (2): IEEE NSS-MIC 2008, ICATPP Conference on Astroparticle, Particle, Space Physics, Detectors & Medical Physics Applications 2007
- Colloquia (6): Oct 2012-present (2): FSU, Drexel; before Oct 2012 (4): UT Austin, Univ. Oregon Eugene, Northeastern, UA Tuscaloosa
- Seminars (13): Oct 2012-present (4): Tufts, UMass Amherst, Univ. of Chicago, Boston Univ.; before Oct 2012 (9): UT Austin, U. Oregon, MIT, UC Davis, NYU, Northwestern, LBNL, U. Minnesota, Caltech

Professional Service

• Professional Societies

- 2017 - 2019: APS Forum for International Physics Executive Committee Member (Elected)
- 2015 - 2017: US LHC Users Association Executive Committee Member (Elected)
- 2014: Observer member to the US LHC Users Association Executive Committee

• Conference Organization

- 2020 & 2021: Co-chair of the 5th & 6th Annual Women of Color in the Academy Conference, Northeastern University, Boston, MA
- 2019: Co-chair Meeting of APS Division of Particles and Fields (DPF2019), Northeastern University, Boston, MA
- 2018: Session convener for 2018 Conference on the Interactions of Particle and Nuclear Physics (CIPANP2018), Palm Springs, CA
- 2015: Organizer for 2015 USLUA Annual Meeting at Fermilab
- 2015: Session convener for Detector R&D session at the APS Division of Particles and Fields Meeting (DPF2015), Ann Arbor, MI
- 2012: Session convener for Standard Model and Higgs Physics at the 36th International Conference on High Energy Physics (ICHEP12), Melbourne, Australia
- 2010: Session convener at 12th Topical Seminar on Innovative Particle and Radiation Detectors (IPRD10), Siena, Italy

• Schools

– 2012: Instructor at CMS Data Analysis School, Pisa, Italy

● **Grant Proposal Reviews/Panels**

- National Science Foundation proposal reviewer
- Department of Energy Early Career proposal reviewer
- Department of Energy and National Science Foundation comparative review panel member
- Natural Sciences and Engineering Research Council (NSERC) of Canada reviewer
- New Frontiers in Research Fund for the Tri-agency Institutional Programs Secretariat of the Social Sciences and Humanities Research Council of Canada reviewer

Departmental Service

● Diversity, Equity, & Inclusion

- 2020 - present: Chair of Physics Department Diversity, Equity, & Inclusion Committee
- 2014 - present: Advisor to NU Women in Physics group

● Awards

- 2019 - present: Chair of Undergraduate Awards Committee member
- 2015 - 2019: Member of Undergraduate Awards Committee

● Search Committees

- 2019: Chair of Search Committee for experimental particle physics faculty
- 2018: Member of Search Committee for high energy experimental faculty
- 2015: Member of Search Committee for high energy theory faculty

● Student Engagement, Recruitment, & Admissions

- 2013 - 2019: Advisor to Society of Physics Students
- 2013 - present: Undergraduate & Graduate Recruitment
- 2013 - 2015: Graduate Committee member

● Colloquia & Seminars

- 2017 - 2019: Chair of Colloquium & Seminar Committee
- 2012 - 2019: Member of Colloquium & Seminar Committee

● Other Departmental Service

- 2016 - present: Executive Committee representative for the HEE group
- 2012 - 2016: Executive Committee alternate representative for the HEE group

College & University Service

- 2017 - present: College of Science Equity, Diversity, Inclusion, & Justice Committee member

- 2015 - present: University Development/Advancement
- 2017 - present: Member of organizing committee for the Women of Color in the Academy Conference

Teaching

- PHYS1145 (Physics for Life Sciences 1): Fall 2013 & 2015
- PHYS1157 (Physics for Engineers, Interactive Learning Seminar): Fall 2020, 2021
- PHYS1161 (Physics 1): Fall 2016
- PHYS1165 (Physics 2): Spring 2014, 2016, 2017, 2018, 2021

Selected Outreach Activities

- 2021: “Exploring the Smallest Scales with the World’s Biggest Science Experiments” presentation for NU College of Science Connects
- 2019: “Exploring the Smallest Scales with the World’s Biggest Science Experiments” presentation HubWeek Open Days
- 2019: Keynote talk for Girl Scout STEM Conference
- 2019: Keynote talk for ADSE Community College Conference
- 2015-2018: QuarkNet Master Classes
- 2014: The Music of the Higgs Boson guest lecture at Berklee College of Music
- 2014: Panel member for “Looking Back & Moving Forward - Future of the Women’s Movement” Strong Women Strong Girls Panel Discussion
- 2014: Symmetry magazine “Physicist to Follow” on Twitter
- 2012: Contributor for Adopt-A-Physicist
- 2012: “The Art of the Higgs Boson” presentation for TEDxUNIGE, “Empowering the Limitless Mind”, Geneva, Switzerland
- 2010 - 2011: Outreach lectures at the Anderson Middle School, New York, NY

Conference Presentations, Colloquia, and Seminars

1. *Search for non-resonant Higgs boson pair production in the $b\bar{b}\gamma\gamma$ final state at CMS.*
Parallel talk presented at the Higgs 2021 Conference, Stony Brook, NY, Oct 2021 (virtual).
2. *Optimizing the performance of the CMS Electromagnetic Calorimeter for LHC Phases I & II.*
Parallel talk presented at the IEEE Nuclear Science Symposium and Medical Imaging Conference, Boston, MA, Oct 2020 (virtual).
3. *Higgs as a Tool for New Physics.*
Invited parallel talk presented at the APS April Meeting, Denver, CO, April 2019.
4. *Exploring the High Energy Frontier with Precision Electromagnetic Calorimetry: CMS ECAL & the Search for di-Higgs Production.*
Colloquium presented at Florida State University Physics Department, April 2018.
5. *Exploring the High Energy Frontier with Precision Electromagnetic Calorimetry.*
Seminar presented at Tufts University, Malden, MA, Dec 2017.
6. *Results from CMS.*
Invited talk presented at the Miami Conference, Fort Lauderdale FL, Dec 2017.
7. *High precision electromagnetic calorimetry with 40 MHz readout: the CMS crystal ECAL for the High-Luminosity LHC.*
Parallel talk presented at the IEEE Nuclear Science Symposium and Medical Imaging Conference, Atlanta, GA, Oct 2017.
8. *Recent Run 2 Results from the CMS Collaboration.*
Invited plenary talk presented at the US LHC Users Association (USLUA) Annual Meeting, Berkeley, CA, Nov 2016.
9. *Design studies for the Phase II upgrade of the CMS Barrel Electromagnetic Calorimeter.*
Parallel talk presented at the International Conference for High Energy Physics (ICHEP), Chicago, IL, Aug 2016.
10. *Search for New Physics in the Low MET Monophoton Channel with the CMS Detector.*
Seminar presented at the University of Massachusetts, Amherst, MA, Oct 2015.
11. *Search for New Physics in the Low MET Monophoton Channel with the CMS Detector.*
Parallel talk presented at the APS Division of Particles and Fields Meeting 2015, Ann Arbor, MI, Aug 2015.
12. *Search for New Physics in the Low MET Monophoton Channel with the CMS Detector.*
Seminar presented at the University of Chicago, Chicago, IL, Mar 2015.
13. *Search for New Physics in the Low MET Monophoton Channel with the CMS Detector.*
Parallel talk presented at the Phenomenology Symposium 2015, Pittsburgh, PA, May 2015.
14. *Mono- and Di-photon Searches at the LHC.*
Invited parallel talk presented at Astroparticle Physics 2014, Amsterdam, NL, June 2014.
15. *Search for Higgs Boson Decays to $Z+\gamma$ with the CMS Detector.*
Seminar presented at Boston University, Boston, MA, USA, Nov 2013.

16. *Hunting for the Higgs with the CMS Detector.*
Colloquium presented at Drexel University, Philadelphia, PA, USA, Mar 2013.
17. *Diphotons with the CMS Detector: Probes for Discovery at the LHC.*
Seminar presented at the University of Texas, Austin, USA, Mar 2011.
18. *The Search for the Higgs in the Two Photon Decay Channel with the CMS Detector.*
Colloquium presented at the University of Texas, Austin, USA, Mar 2011.
19. *Diphotons with the CMS Detector: Probes for Discovery at the LHC.*
Colloquium presented at the University of Texas, Dallas, USA, Mar 2011.
20. *Photons with the CMS Detector: A Probe for Discovery at the LHC.*
Seminar presented at the University of Oregon, Eugene, OR, USA, Mar 2011.
21. *The Search for the Higgs in the Diphoton Channel with the CMS Detector.*
Colloquium presented at the University of Oregon, Eugene, OR, USA, Mar 2011.
22. *Photons with the CMS Detector: A Probe for Discovery at the LHC.*
Seminar presented at the Massachusetts Institute of Technology, Cambridge, MA, USA, Mar 2011.
23. *Photons with the CMS Detector: A Probe for Discovery at the LHC.*
Colloquium presented at Northeastern University, Boston, MA, USA, Mar 2011.
24. *Other Exotic Signatures.*
Plenary talk presented for the CMS Collaboration at the Implications of LHC results for TeV-scale physics: WG3 meeting, CERN, Geneva, Switzerland, Dec 2011.
25. *High Mass Resonance Searches with the CMS Experiment.*
Plenary talk presented for the CMS Collaboration at the Hadron Collider Physics Symposium 2011, Paris, France, Nov 2011.
26. *Extra Dimensions at the LHC: Searches with Diphotons with the CMS Detector.*
Colloquium presented at University of Alabama, Tuscaloosa, AL, USA, Mar 2011.
27. *Diphotons with the CMS Detector: Early Searches with 7 TeV LHC Data.*
Seminar presented at University of California, Davis, CA, USA, Mar 2011.
28. *Diphotons with the CMS Detector: Early Searches with 7 TeV LHC Data.*
Seminar presented at New York University, New York, NY, USA, Mar 2011.
29. *Diphotons with the CMS Detector: Early Searches with 7 TeV LHC Data.*
Seminar presented at Northwestern University, Evanston, IL, USA, Mar 2011.
30. *Status of the CMS Experiment.*
Plenary talk presented for the CMS Collaboration at Symmetries and Spin 2010 (SPIN-Praha-2010), Prague, Czech Republic, July 2010.
31. *Commissioning of the CMS Electromagnetic Calorimeter with First Collisions.*
Parallel talk presented for the CMS Collaboration at the 12th Topical Seminar on Innovative Particle and Radiation Detectors (IPRD10), Siena, Italy, June 2010.

32. *The CMS Experiment: First Collisions and Plans for Early Data.*
Seminar (Research Progress Meeting), Lawrence Berkeley National Laboratory, Berkeley, CA, USA, Feb 2010.
33. *The CMS Electromagnetic Calorimeter: Construction, Commissioning and Calibration.*
Parallel talk presented for the CMS ECAL Group at the 2009 Europhysics Conference on High Energy Physics (EPS-HEP), Krakow, Poland, July 2009.
34. *Photon Physics with the CMS Detector.*
Seminar at the University of Minnesota, Minneapolis, MN, USA, Feb 2009.
35. *First beam at LHC as seen by CMS.*
Plenary talk presented for the CMS Collaboration at the Lake Louise Winter Institute, Lake Louise, Canada, Feb 2009.
36. *The Commissioning of the CMS Electromagnetic Calorimeter Light Monitoring System.*
Poster presented for the CMS ECAL Group at the IEEE Nuclear Science Symposium and Medical Imaging Conference, Dresden, Germany, Oct 2008.
37. *The CMS ECAL Laser Monitoring System.*
Poster presented for the CMS ECAL Group at the 10th ICATPP Conference on Astroparticle, Particle, Space Physics, Detectors and Medical Physics Applications, Villa Olmo, Como, Italy, Oct 2007.
38. *Nanometer Resolution Beam Position Monitors for the ILC.*
Parallel talk presented for the NanoBPM Collaboration at the American Physics Society Division of Particles and Fields Joint Meeting of Pacific Region Particle Physics Community, Honolulu, Hawaii, Oct 2006.
39. *New Measurements of the Angle γ from the Babar Experiment.*
Invited plenary talk presented for the Babar Collaboration at the International Workshop on Discoveries in Flavour Physics at e^+e^- Colliders, Frascati, Italy, Feb 2006.
40. *The NanoBPM Project: Nanometer resolution beam position monitors for the International Linear Collider.*
Seminar at the California Institute of Technology, Pasadena, CA, USA, Jan 2006.
41. *Study of the Decay $B^0 \rightarrow D_s^+ \rho^-$ at the Babar Detector.*
Parallel talk presented for the Babar Collaboration at the April Meeting of American Physics Society, Tampa, FL, April 2005.
42. *Study of the Decays $B^0 \rightarrow D_s^{(*)+} \pi^-$.*
Parallel talk presented for the Babar Collaboration at *DPF2002*, the Meeting of the Division of Particles and Fields of the American Physics Society, Williamsburg, VA, May 2002.

Select Publications & Reports

Articles with significant contributions from the Orimoto group are listed below. For a full list of publications, please see: http://inspirehep.net/search?ln=en&p=find+a+orimoto&of=hb&action_search=Search

Refereed Articles

- [1] A. M. Sirunyan *et al.* [CMS Collaboration], “Reconstruction of signal amplitudes in the CMS electromagnetic calorimeter in the presence of overlapping proton-proton interactions,” JINST **15**, no.10, P10002 (2020), doi:10.1088/1748-0221/15/10/P10002.
- [2] A. M. Sirunyan *et al.* [CMS Collaboration], “Search for Higgs boson pair production in the $\gamma\gamma b\bar{b}$ final state in pp collisions at $\sqrt{s} = 13$ TeV,” Phys. Lett. B **788**, 7-36 (2019) doi:10.1016/j.physletb.2018.10.056.
- [3] V. Khachatryan *et al.* [CMS Collaboration], “Search for exotic decays of a Higgs boson into undetectable particles and one or more photons,” Phys. Lett. B **753**, 363 (2016) doi:10.1016/j.physletb.2015.12.017.
- [4] T. Adams *et al.*, “Beam test evaluation of electromagnetic calorimeter modules made from proton-damaged PbWO₄ crystals,” JINST **11**, no. 04, P04012 (2016). doi:10.1088/1748-0221/11/04/P04012
- [5] ATLAS and CMS Collaborations, “Measurements of the Higgs boson production and decay rates and constraints on its couplings from a combined ATLAS and CMS analysis of the LHC pp collision data at $\sqrt{s} = 7$ and 8 TeV,” JHEP **1608**, 045 (2016) doi:10.1007/JHEP08(2016)045 [arXiv:1606.02266 [hep-ex]].
- [6] V. Khachatryan *et al.* [CMS Collaboration], “Measurement of the W^+W^- cross section in pp collisions at $\sqrt{s} = 8$ TeV and limits on anomalous gauge couplings,” Eur. Phys. J. C **76**, no. 7, 401 (2016) doi:10.1140/epjc/s10052-016-4219-1 [arXiv:1507.03268 [hep-ex]].
- [7] V. Khachatryan *et al.* [CMS Collaboration], “Search for supersymmetry with photons in pp collisions at $\sqrt{s}=8$ TeV,” Phys. Rev. D **92**, no. 7, 072006 (2015) [arXiv:1507.02898 [hep-ex]].
- [8] V. Khachatryan *et al.* [CMS Collaboration], “Search for a Higgs Boson in the Mass Range from 145 to 1000 GeV Decaying to a Pair of W or Z Bosons,” JHEP **1510**, 144 (2015) doi:10.1007/JHEP10(2015)144 [arXiv:1504.00936 [hep-ex]].
- [9] V. Khachatryan *et al.* [CMS Collaboration], “Performance of Photon Reconstruction and Identification with the CMS Detector in Proton-Proton Collisions at $\sqrt{s} = 8$ TeV,” JINST **10**, no. 08, P08010 (2015) [arXiv:1502.02702 [physics.ins-det]].
- [10] V. Khachatryan *et al.* [CMS Collaboration], “Performance of Electron Reconstruction and Selection with the CMS Detector in Proton-Proton Collisions at $s = 8$ TeV,” JINST **10**, no. 06, P06005 (2015) [arXiv:1502.02701 [physics.ins-det]].
- [11] V. Khachatryan *et al.* [CMS Collaboration], “Precise determination of the mass of the Higgs boson and tests of compatibility of its couplings with the standard model predictions using proton collisions at 7 and 8 TeV,” Eur. Phys. J. C **75**, no. 5, 212 (2015) doi:10.1140/epjc/s10052-015-3351-7 [arXiv:1412.8662 [hep-ex]].

- [12] S. Chatrchyan *et al.* [CMS Collaboration], “Energy Calibration and Resolution of the CMS Electromagnetic Calorimeter in pp Collisions at $\sqrt{s} = 7$ TeV,” JINST **8**, P09009 (2013) [JINST **8**, 9009 (2013)] [arXiv:1306.2016 [hep-ex]].
- [13] S. Chatrchyan *et al.* [CMS Collaboration], “Observation of a new boson with mass near 125 GeV in pp collisions at $\sqrt{s} = 7$ and 8 TeV,” JHEP **1306**, 081 (2013) [arXiv:1303.4571 [hep-ex]].
- [14] S. Chatrchyan *et al.* [CMS Collaboration], “Search for the standard model Higgs boson decaying into two photons in pp collisions at $\sqrt{s} = 7$ TeV,” Phys. Lett. B **710**, 403 (2012) [arXiv:1202.1487 [hep-ex]].
- [15] S. Chatrchyan *et al.* [CMS Collaboration], “Search for signatures of extra dimensions in the diphoton mass spectrum at the Large Hadron Collider,” Phys. Rev. Lett. **108**, 111801 (2012) [arXiv:1112.0688 [hep-ex]].
- [16] A. Lyapin *et al.*, “Results from a prototype chicane-based energy spectrometer for a linear collider,” JINST **6**, P02002 (2011) [arXiv:1011.0337 [physics.acc-ph]].
- [17] S. Chatrchyan *et al.* [CMS Collaboration], “Performance and Operation of the CMS Electromagnetic Calorimeter,” JINST **5**, T03010 (2010) [arXiv:0910.3423 [physics.ins-det]].
- [18] S. Abdullin *et al.* [USCMS and ECAL/HCAL Collaborations], “The CMS barrel calorimeter response to particle beams from 2-GeV/c to 350-GeV/c,” Eur. Phys. J. C **60**, 359 (2009) Erratum: [Eur. Phys. J. C **61**, 353 (2009)].
- [19] M. Slater *et al.*, “Cavity BPM system tests for the ILC energy spectrometer,” Nucl. Instrum. Meth. A **592**, 201 (2008).
- [20] P. Adzic *et al.* [CMS Electromagnetic Calorimeter Group Collaboration], “Intercalibration of the barrel electromagnetic calorimeter of the CMS experiment at start-up,” JINST **3**, P10007 (2008).
- [21] S. Chatrchyan *et al.* [CMS Collaboration], “The CMS experiment at the CERN LHC,” JINST **3**, S08004 (2008).
- [22] S. Walston *et al.*, “Resolution of a High Performance Cavity Beam Position Monitor System,” Conf. Proc. C **070625**, 4090 (2007) [IEEE Nucl. Sci. Symp. Conf. Rec. , 4090 (2007)].
- [23] B. Aubert *et al.* [BaBar Collaboration], “Observation of Decays $B^0 \rightarrow D_s(^*) + \pi^-$ and $B^0 \rightarrow D_s(^*) - K^+$,” Phys. Rev. Lett. **98**, 081801 (2007) [hep-ex/0604012].
- [24] B. Aubert *et al.* [BaBar Collaboration], “A study of the rare decays $B^0 \rightarrow D_s^{(*)+}\pi^-$ and $B^0 \rightarrow D_s^{(*)-}K^+$,” Phys. Rev. Lett. **90**, 181803 (2003) [hep-ex/0211053].

Non-refereed Articles

- [1] CMS Collaboration, “Search for exotic decay of the Higgs boson into two light pseudoscalars with four photons in the final state at $\sqrt{s} = 13$ TeV,” CMS-HIG-21-003, <http://cds.cern.ch/record/2776775?ln=en>.
- [2] CMS Collaboration, “A MIP Timing Detector for the CMS Phase-2 Upgrade,” CERN-LHCC-2019-003, <https://cds.cern.ch/record/2667167>.

- [3] US CMS Collaboration, Conceptual Design Report for the US HL-LHC Upgrade of the Compact Muon Solenoid, <https://cms-docdb.cern.ch/cgi-bin/DocDB/ShowDocument?docid=13151>.
- [4] CMS Collaboration, The Phase-2 Upgrade of the CMS Barrel Calorimeters, CERN-LHCC-2017-011/CMS-TDR-015, <https://cds.cern.ch/record/2283187>.
- [5] CMS Collaboration, “Search for Higgs boson pair production in the final state containing two photons and two bottom quarks in proton-proton collisions at $\sqrt{s} = 13$ TeV,” CMS-PAS-HIG-17-008.
- [6] CMS Collaboration, “The Phase-2 Upgrade of the CMS Barrel Calorimeters Technical Design Report,” CERN-LHCC-2017-011. CMS-TDR-015.
- [7] D. de Florian *et al.* [LHC Higgs Cross Section Working Group], “Handbook of LHC Higgs Cross Sections: 4. Deciphering the Nature of the Higgs Sector,” doi:10.23731/CYRM-2017-002 arXiv:1610.07922 [hep-ph].
- [8] CMS Collaboration, “Higgs to WW measurements with 15.2 fb^{-1} of 13 TeV proton-proton collisions,” CMS-PAS-HIG-16-021.
- [9] CMS Collaboration, “Measurements of properties of the Higgs boson decaying to a W boson pair in pp collisions at $\sqrt{s} = 13$ TeV,” CMS-PAS-HIG-16-042.
- [10] CMS Collaboration, “Search for H(bb)H(gammagamma) decays at 13TeV,” CMS-PAS-HIG-16-032.
- [11] CMS Collaboration, “Search for high mass Higgs to WW with fully leptonic decays using 2015 data,” CMS-PAS-HIG-16-023.
- [12] CMS Collaboration, “First results on Higgs to WW at $\sqrt{s} = 13$ TeV,” CMS-PAS-HIG-15-003.
- [13] CMS Collaboration, “Measurement of the WW cross section pp collisions at sqrt(s)=13 TeV,” CMS-PAS-SMP-16-006.
- [14] G. Aad *et al.* [ATLAS and CMS Collaborations], “Measurements of the Higgs boson production and decay rates and constraints on its couplings from a combined ATLAS and CMS analysis of the LHC *pp* collision data at $\sqrt{s} = 7$ and 8 TeV,” arXiv:1606.02266 [hep-ex].
- [15] V. Khachatryan *et al.* [CMS Collaboration], “Measurement of the transverse momentum spectrum of the Higgs boson produced in pp collisions at sqrt(s) = 8 TeV using H to WW decays,” arXiv:1606.01522 [hep-ex].
- [16] V. Khachatryan *et al.* [CMS Collaboration], “Search for Higgs boson off-shell production in proton-proton collisions at 7 and 8 TeV and derivation of constraints on its total decay width,” arXiv:1605.02329 [hep-ex].
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