

ARAM APYAN

CURRICULUM VITAE

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Physics Department, MS 057
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Education

- **Massachusetts Institute of Technology**-Cambridge, MA
 - ▷ Ph.D., Physics, 2017
 - ▷ Dissertation: *Electroweak physics and evidence for a Higgs boson decaying to a pair of tau leptons with the CMS detector*
 - ▷ Advisor: Professor Markus Klute
- **Illinois Institute of Technology**-Chicago, IL
 - ▷ BS, Physics, 2011
 - ▷ BS, Applied Mathematics, 2011

Professional Experience

- Assistant Professor of Physics, Brandeis University, Waltham, MA, 2021-present
- Research Associate, Fermi National Accelerator Laboratory, Batavia, IL, 2016-2021
- Research Assistant, Massachusetts Institute of Technology, Cambridge, MA, 2011-2016

Selected Professional Activities

- ATLAS Standard Model W/Z group convener, 2025-present
- Level 3 Manager of ATLAS ITk Stave Assembly, 2023-present
- LHC Precision Electroweak Working Group Convener, 2018-present
- Multiboson Interactions Conference, chair of LOC committee, Brandeis, 2025
- Higgs 2025 Conference, member of ProgrM Committee, Brown, 2025
- Member of LHCP 2024 Conference Steering Committee, Northeastern, 2023-2024
- Referee for Physics Journals - JHEP, European Physical Journal C
- NSF AI Institute for Artificial Intelligence and Fundamental Interactions (IAIFI) Affiliate, 2022-present
- CMS Hadron Calorimeter Detector Performance Group Convener, 2019-2021

- CMS Hadron Calorimeter Operations Coordinator, 2018
- CMS Standard Model Vector Boson Group Convener, 2016-2018
- CMS Computing Operations Data Transfer Coordinator, 2014-2016
- CMS Higgs group Data Manager, 2014-2016
- Electroweak Physics and Beyond the Standard Model working group convener, DIS, 2021
- Top Quark and Electroweak Physics session convener, ICHEP, 2020

Fellowships & Awards

- CMS LHC Physics Center Distinguished Researcher, 2021
- CMS Achievement Award, 2015
- Whiteman Fellow, Massachusetts Institute of Technology, 2011-2012
- Camras Scholar, Illinois Institute of Technology, 2007-2011

Postdoctoral Researchers Advised

- Shalu Solomon, 2022-present
- Daniel Camarero Muñoz, 2022-present

Graduate Students Advised

- Todd Zenger, 2022-2024, Dissertation: "Observation of Double Parton Scattering Same-Sign WW Using the ATLAS Detector at $\sqrt{s} = 13$ TeV", now a postdoctoral fellow at Fermilab
- Michael Cardiff, 2022-present
- Siddharth Singh, 2023-present
- Abdullah Sayed, 2024-present

Teaching

- *Particle Physics*, Brandeis Phys 107B/167B, 2024
- *Vibrations and Waves*, Brandeis Phys 20A, 2024
- *Advanced Introductory Physics II*, Brandeis Phys 15B, 2022, 2023, 2025
- *Advanced Introductory Physics I*, Brandeis Phys 15A, 2021, 2022, 2024

- *Higgs and Electroweak Physics - Experiment*, 17th Fermilab-CERN Hadron Collider Physics Summer School, 2022

Service and Committee Work

- Brandeis Physics Department Colloquium committee chair, 2021-2022, 2024-2025
- Brandeis Physics Department Qualifying Exam committee, 2024-2025
- Brandeis Physics Department Undergraduate Curriculum committee, 2024
- Brandeis Physics Department Graduate Admissions and Recruiting committee, 2021-2023
- Brandeis SURF selection committee, 2025
- Physics Ph.D. thesis committee member for Sagar Addepalli, April 2024
- Physics Ph.D. thesis committee member for Francesca Capocasa, June 2023
- Physics Ph.D. thesis committee member for Prajita Bhattari, January 2023
- Physics Ph.D. thesis review committee member for Valerio Bertacchi, July 2021
- Physics Ph.D. thesis review committee member for Hicham Atmani, December 2020
- Physics Ph.D. thesis review committee member for Mykola Khandoga, September 2020
- Physics Ph.D. thesis review committee member for Tairan Xu, September 2019
- Organizing committee for the 1st COFI workshop on Precision Electroweak, 2019
- Organizer of the LHC Precision Electroweak workshop at CERN, 2018, 2019
- Organizer of the LHC Precision Electroweak workshop in Durham, 2019
- Organizer of the LHC Precision Electroweak workshop at LLR, 2018

Media Outreach

- Interview with symmetrismagazine.org, [LHC scientists find relics of early universe living in particle spins](#), July 2025
- ATLAS Physics Briefing, [ATLAS probes the Higgs mechanism in the scattering of W boson](#), April 2025
- ATLAS Physics Briefing, [ATLAS hunts for new physics in the scattering of W bosons](#), August 2023
- Brandeis at 75, [Coming Full Circle at the Large Hadron Collider](#), July 2023
- CERN Courier article, [Vector-boson scattering probes quartic coupling](#), July/August Issue, 2020
- Interview with symmetrismagazine.org, [The large boson-boson collider](#), April 2020

- CMS Physics Briefing, [Probing the Standard Model with a Boson-Boson collider](#), March 2020

Publications

List of selected publications to which I made a substantial contribution:

- ATLAS Collaboration, "Observation of double parton scattering in same-sign W boson pair production in pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector", Accepted at PLB (2025), arXiv:2505.08313
- ATLAS Collaboration, "Evidence for longitudinally polarized W bosons in the electroweak production of same-sign W boson pairs in association with two jets with the ATLAS detector", Phys. Rev. Lett. 135 (2025) 111802, arXiv:2503.11317
- A. Apyan et al., "Performance measurements of the electromagnetic calorimeter and readout electronics system for the DarkQuest experiment", NIM A, Volume 1080, 2025, 170792, arXiv:2502.20590
- A. Apyan et al., "Sensitivity to longitudinal vector boson scattering in $W^\pm W^\pm jj$ at future hadron colliders", Accepted by PRD (2025), arXiv:2203.07994
- ATLAS Collaboration, "Combination of searches for singly and doubly charged Higgs bosons produced via vector-boson fusion in proton-proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector", Phys. Lett. B 860 (2025), arXiv:2407.10798
- CMS Collaboration, "Measurement of the inclusive cross sections for W and Z boson production in proton-proton collisions at $\sqrt{s} = 5.02$ and 13 TeV", JHEP 04 (2025) 162, arXiv:2408.03744
- ATLAS Collaboration, "Search for heavy Majorana neutrinos in $e^\pm e^\pm$ and $e^\pm \mu^\pm$ final states via WW scattering in pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector", Phys. Lett. B 856 (2024), arXiv:2403.15016
- ATLAS Collaboration, "Measurement and interpretation of same-sign W boson pair production in association with two jets in pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector", JHEP 04 (2024) 026, arXiv:2312.00420
- Brad Abbott, et al., "Anomalous production of massive gauge boson pairs at muon colliders", Phys. Rev. D 108 093009 (2023), arXiv:2203.08135
- ATLAS Collaboration, "Search for Majorana neutrinos in same-sign WW scattering events from pp collisions at $\sqrt{s} = 13$ TeV", Eur. Phys. J. C 83 (2023) 824, arXiv:2305.14931
- Accettura Carlotta, et al., "Towards a Muon Collider", Eur. Phys. J. C 83 (2023) 864, arXiv:2303.08533
- CMS Collaboration, "Search for charged Higgs bosons produced in vector boson fusion processes and decaying into vector boson pairs in proton-proton collisions at $\sqrt{s} = 13$ TeV", Eur. Phys. J. C 81 (2021) 723, arXiv:2104.04762

- CMS Collaboration, "Measurement of the Z boson differential production cross section in the invisible decay mode in proton-proton collisions at $\sqrt{s} = 13$ TeV", JHEP 05 (2021) 205, arXiv:2012.09254
- CMS Collaboration, "Measurements of production cross sections of polarized same-sign W boson pairs in association with two jets in proton-proton collisions at $\sqrt{s} = 13$ TeV", Phys. Lett. B 812 (2021) 136018, arXiv:2009.09429
- CMS Collaboration, "Measurements of production cross sections of WZ and same-sign WW boson pairs in association with two jets in proton-proton collisions at 13 TeV", Phys. Lett. B 809 (2020) 135710, arXiv:2005.01173
- Aram Apyan, et al, "Opportunities and challenges of Standard Model production cross section measurements at $\sqrt{s} = 8$ TeV using CMS open data", JINST 15 P01009 (2020), arXiv:1907.08197
- CMS Collaboration, "Measurements of differential Z boson production cross sections in proton-proton collisions at $\sqrt{s} = 13$ TeV", JHEP 12 (2019) 061, arXiv:1909.04133
- CMS Collaboration, "Search for anomalous electroweak production of vector boson pairs in association with two jets in proton-proton collisions at 13 TeV", Phys. Lett. B 798 (2019) 134985, arXiv:1905.07445
- CMS Collaboration, "Measurement of electroweak WZ boson production and search for new physics in WZ + two jets events in pp collisions at $\sqrt{s} = 13$ TeV", Phys. Lett. B 795 (2019) 281, arXiv:1901.04060
- CMS Collaboration, "Search for charged Higgs bosons produced via vector boson fusion and decaying into a pair of W and Z bosons using pp collisions at $\sqrt{s} = 13$ TeV", Phys. Rev. Lett. 119 (2017) 141802, arXiv:1705.02942
- CMS Collaboration, "Search for exotic decays of a Higgs boson into undetectable particles and photons", Phys. Lett. B, 753 (2016), arXiv:1507.00359
- CMS Collaboration, "Study of vector boson scattering and search for new physics in events with two same-sign leptons and two jets", Phys. Rev. Lett. 114, 051801 (2015), arXiv:1410.6315
- CMS Collaboration, "Evidence for the direct decay of the 125 GeV Higgs boson to fermions", Nature Phys. 10, (2014), arXiv:1401.6527
- CMS Collaboration, "Measurement of inclusive W and Z boson cross sections in pp collisions at $\sqrt{s} = 8$ TeV", Phys. Rev. Lett. 112, 191802 (2014), arXiv:1402.0923
- CMS Collaboration, "Search for neutral MSSM Higgs bosons decaying to a pair of tau leptons in pp collisions", JHEP 1408,160 (2014), arXiv:1408.3316
- CMS Collaboration, "Evidence for the 125 GeV Higgs boson decaying to a pair of τ leptons", JHEP 1405, 104 (2014), arXiv:1401.5041
- CMS Collaboration, "Observation of a new boson at a mass of 125 GeV with the CMS experiment at the LHC", Phys. Lett. B, 716 (2012), arXiv:1207.7235

- Aram Apyan, Armen Apyan, Michael Schmitt, "Detecting neutrino magnetic moments with conducting loops", Phys. Rev. D 77, 037901 (2008), arXiv:0709:3636

Technical reports and proceedings

List of selected reports to which I made a substantial contribution:

- S. Amoroso et al., "Snowmass 2021 whitepaper: Proton structure at the precision frontier", in 2022 Snowmass Summer Study (2022), arXiv:2203.13923
- A. Apyan et al., "DarkQuest: A dark sector upgrade to SpinQuest at the 120 GeV Fermilab Main Injector", in 2022 Snowmass Summer Study (2022), arXiv:2203.08322
- CMS Collaboration, "Prospects for the measurement of vector boson scattering production in leptonic $W^\pm W^\pm$ and WZ diboson events at $\sqrt{s} = 14$ TeV at the High-Luminosity LHC", CMS-PAS-FTR-21-001 (2021)
- CMS Collaboration, "The Phase-2 Upgrade of the CMS Endcap Calorimeter", Technical Report CERN-LHCC-2017-023 (2017)
- Aram Apyan, "Electroweak Precision Measurements with Z Bosons at the LHC", 52nd Rencontres de Moriond on Electroweak Interactions and Unified Theories: La Thuile (2017)
- CMS Collaboration, "Higgs pair production at the High Luminosity LHC", Technical Report CMS-PAS-FTR-15-002 (2015)
- CMS Collaboration, "CMS Phase II Upgrade Scope Document", Technical Report CERN-LHCC-2015-019 (2015)
- CMS Collaboration, "Technical Proposal for the Phase-II Upgrade of the CMS Detector", Technical Report CERN-LHCC-2015-010 (2015)
- CMS Collaboration, "Measurements of inclusive W and Z boson cross sections in pp collisions at $\sqrt{s} = 13$ TeV", Technical Report CMS-PAS-SMP-15-004 (2015)

Conference, Seminar, & Workshop Presentations

- **Multiboson physics, [invited plenary]**, US ATLAS Summer Workshop, University of Michigan, July 2025
- **A window to New Physics with Collisions of W and Z bosons , [invited seminar]**, SLAC FPD seminar, June 2025
- **A window to New Physics with Collisions of W bosons [invited colloquium]**, Texas Tech, April 2025
- **Experimental overview of EFT, [invited parallel]**, LHCP2024, Northeastern University, June 2024
- **Precision measurements at LHC, [invited plenary]**, DPF-PHENO 2024, Pittsburgh, May 2024

- **Window to New Physics with Collisions of W bosons**, [invited seminar], Boston University, October 2023
- **Direct Searches for New Physics in Multiboson final states**, [invited plenary], MBI2023: Multi-Boson Interactions 2023, UC San Diego, August 2023
- **Precision W and Z measurements**, [invited plenary], Standard Model at the LHC 2023, Fermilab, July 2023
- **Boson Collider for Stress Testing the Standard Model of Elementary Particles**, [invited seminar], University of Massachusetts Amherst, November 2022
- **Charged Higgs Boson Searches**, [invited plenary], ATLAS HDBS Workshop, Uppsala, September 2022
- **Electroweak precision measurements at hadron colliders**, [invited plenary], LoopFest XX, University of Pittsburgh, May 2022
- **VBS and VVV studies at future colliders**, [invited plenary], Energy Frontier Workshop at Brown University, March 2022
- **Boson Collider for Stress Testing the Standard Model of Elementary Particles**, [invited colloquium], Texas A&M University, March 2021
- **Electroweak multi-boson new measurements**, [plenary], 55th Rencontres de Moriond EW, March 2021
- **Vector Boson Scattering Measurements at CMS** [invited seminar], Fermilab Joint Experimental-Theoretical Physics Seminar, February 2021
- **Boson Collider for Stress Testing the Standard Model of Elementary Particles**, [invited colloquium], Brandeis University, February 2021
- **Vector Boson Scattering Measurements at CMS**, [invited seminar], Brookhaven National Laboratory, September 2020
- **Probing the Standard Model with Vector boson scattering processes**, [invited seminar], University of California Santa Barbara, September 2020
- **Probing the Standard Model with Vector boson scattering processes**, [invited seminar], University of Minnesota, September 2020
- **Probing the Standard Model with Vector boson scattering processes**, [invited seminar], Argonne National Laboratory, September 2020
- **Putting the Electroweak sector to the test**, [invited colloquium], University of Notre Dame, March 2020
- **Putting the Electroweak sector to the test - from high energy probes to precision measurements**, [invited seminar], University of Notre Dame, March 2020
- **High-mass Drell-Yan measurements**, [invited plenary], Ultimate Precision at Hadron Colliders workshop at Institut Pascal, December 2019
- **Measurements of Drell-Yan cross sections at 13 TeV with CMS**, [plenary], James Stirling Memorial Conference, September 2019

- **Measurements of the W and Z p_T spectra as needed for W mass measurements, [invited plenary]**, 1st COFI Workshop on Precision Electroweak, July 2019
- **Updated proposal for Analytic Resummation Benchmarking, [plenary]**, LHC EW Precision workshop in Durham, March 2019
- **Charged Higgs searches in Higgs isospin triplet models**, CMS Exotic Higgs Workshop, November 2018
- **Precision Tests of the Electroweak Sector of the Standard Model, [invited seminar]**, Massachusetts Institute of Technology, November 2018
- **Precision Tests of the Electroweak Sector of the Standard Model, [invited colloquium]**, Illinois Institute of Technology Physics Department, November 2018
- **Standard Model Results from the LHC, [invited seminar]**, Northwestern University, October 2018
- **Semi-leptonic VBS measurements, [invited plenary]**, VBS Polarization Workshop LLR, October 2018
- **Vector Boson Scattering results and perspectives, [plenary]**, 2018 LHC Days in Split, September 2018
- **Electroweak precision measurements in CMS, [plenary]**, 53rd Recontres de Moriond EW, March 2018, the slides presented by Josh Bendavid due to family emergency
- **Direct measurement of W transverse momentum, [plenary]**, ElectroWeak W mass Workshop, October 2017
- **Measurement of W and W/Z transverse momentum spectra at 8 TeV, [plenary]**, W mass topical meeting, June 2017
- **Electroweak precision measurements with Z and W bosons at the LHC, [plenary]**, 52nd Recontres de Moriond EW, March 2017
- **SM Higgs measurements at FCC-ee, [plenary]**, 1st FCC Physics Workshop, January 2017
- **Vector Boson studies with CMS**, Fourth Annual Large Hadron Collider Physics Conference, June 2016
- **Inclusive W and Z production cross sections at $\sqrt{s}=13$ TeV**, All US CMS Meeting, January 2016
- **SM Higgs Pair-production prospects at the HL-LHC**, HH searches with CMS, January 2016
- **Higgs CP measurements**, First FCC-ee workshop on Higgs physics, September 2015
- **Physics Results at HL-LHC, [plenary]**, 18th Annual RDMS CMS Collaboration Conference, August 2015
- **Experimental projections for sensitivity to HH production in the Standard Model**, Physics at the High-Luminosity LHC, May 2015

- **Prospects on Higgs Physics at the HL-LHC, [plenary]**, ECFA HL-LHC 2014, October 2014
- **Search for MSSM neutral Higgs bosons decaying to a pair of tau leptons**, All US CMS Meeting, July 2014
- **Evidence for the 125 GeV Higgs boson decaying to a pair of tau leptons, [plenary]**, Lake Louise 2014, February 2014
- **Direct evidence of 125 GeV Higgs boson coupling to fermions**, MIT LNS student seminar, February 2014
- **Measurement of inclusive W and Z boson cross sections at 8 TeV**, All US CMS Meeting, August 2012
- **Detecting Field Emission in Superconducting Cavities Using Cherenkov Radiation**, 2009 Meeting of the Division of Particles and Fields of the American Physical Society, July 2009