Cristina Mantilla-Suarez

cmantill@virginia.edu | updated Mar. 2026

My goal is to push the boundaries of searches for elusive and anomalous new particle interactions with particle accelerators. I am a member of the CMS experiment and work with data from the Large Hadron Collider. I am also a member of the proposed LDMX experiment at SLAC and active contributor to the CMS HGCAL detector upgrade.

Employment

Assistant Professor, Department of Physics, University of Virginia — 2024 - present

Postdoctoral Fellow, Fermilab — 2020 - 2024

Education

Johns Hopkins University, Ph.D. Physics — 2020

Awards

Breakthrough Prize in Fundamental Physics (awarded to co-authors of CERN LHC Run-2 publications at ATLAS, CMS, ALICE, and LHCb) — 2025

Rising Stars in Physics, Workshop for outstanding young women physicists — 2023

Mitsuyoshi Tanaka Dissertation Award, American Physical Society — 2021

Lederman Postdoctoral Fellow, Fermilab — 2020

Graduate Scholar, LHC Physics Center Fermilab — 2019

ExternalGrants and Funding

Key Personnel for 4 year DOE Award, UVA Experimental and Theoretical Particle Physics, $300k from $1.75M — 2025

URA Visiting Scholar for student Gabriela Machado, $6k — 2025

LPC Distinguished Researcher for postdoc Clara Ramon, $48k — 2025

Selected Research

CMS experiment, LHC: Higgs Boson Measurements — 2020 - present

HH production: Lead author; analyses targeting high p_T Higgs bosons in the four-b final state and the all-hadronic $b\bar{b}WW^*$ final state.

HHH production: Contributing author; first CMS search in the six-b final state.

$H \to WW^*$: Lead author; first search in the merged semi-leptonic topology.

$H \to b\bar{b}/c\bar{c}$ + jet: Contributing author; searches for inclusive single-Higgs production at high p_T.

$H + \gamma$: Contributing author; constraints on light-quark Yukawa couplings and anomalous photon couplings.

Dark sector searches with accelerators — 2020 - present

DarkQuest: Sensitivity studies for visible dark photon searches using full detector simulation [6, 4].

LDMX: Technical Design Report studies [1].

Trigger and data acquisition for calorimeters — 2020 - present

LDMX: Lead contributor to frontend and backend electronics testing for "vertical slice test".

HGCAL: Lead tester of ASIC prototypes for the concentration of HGCAL data in the trigger and DAQ paths. Tested functionality and radiation hardness [2, 3].

HGCAL: Tester of an encoder implementation on-chip for data compression [5].

Recent Publications Relevant to Research Proposal

[1] LDMX Collaboration, *LDMX - The Light Dark Matter eXperiment*, Aug. 2025.

[2] G. Bergamin, "ECON-T and ECON-D: Endcap Concentrator ASICs for the CMS HGCAL", J. Instrum. **20**, C03054 (2025).

[3] D. Braga, "First test results of the HGCAL concentrator ASICs: ECON-T and ECON-D", JINST **19**, C03050 (2024).

[4] D. Forbes, C. Herwig, Y. Kahn, G. Krnjaic, C. Mantilla Suarez, N. Tran, and A. Whitbeck, "New searches for muonphilic particles at proton beam dump spectrometers", Phys. Rev. D **107**, 116026 (2023).

[5] R. Shenoy, J. Duarte, C. Herwig, J. Hirschauer, D. Noonan, M. Pierini, N. Tran, and C. Mantilla Suarez, "Differentiable Earth mover's distance for data compression at the high-luminosity LHC", Mach. Learn. Sci. Tech. **4**, 045058 (2023).

[6] A. Apyan, "DarkQuest: A dark sector upgrade to SpinQuest at the 120 GeV Fermilab Main Injector", in Snowmass 2021 (Mar. 2022).

Current Funding Sources for Relevant Period

- **GR104644 Experimental HEP**, $16k (0.5 months summer salary, 1 graduate student for summer 2026). Personnel in the DOE HEP group can and do contribute across all of our projects. April 2026 - Mar 2027
- **Startup Graduate Student Support**, $264k left until Aug 2029 (planned for 1 graduate student for summer, fall, and spring of 2026) April 2026 - Mar 2027
- **Startup Research Discretionary Support**, $160k left until Aug 2029
- **Startup Research Personnel Support**, $182k left until Aug 2029
- **Fermilab LPC DR Personnel Support**, $48k for postdoc Clara Ramon Jan 2026 - Dec 2026
- **UVA Catalyst Program**, $3.8k for travel