TANVI WAMORKAR

Postdoctoral Research Associate | Argonne National Laboratory

✉ tanvi.wamorkar@cern.ch | in tanvi-wamorkar | 🎓 scholar.google/tanvi | 🔗 https://wamorkart.github.io/

RESEARCH INTERESTS

Beyond the Standard Model searches, Higgs physics with colliders, Silicon pixel detectors, Silicon detector R&D

EMPLOYMENT

Argonne National Laboratory   2021 - Present
Postdoctoral Research Associate in High Energy Experimental Physics (ATLAS)
Supervisor: Dr. Jessica Metcalfe

EDUCATION

Northeastern University   2021
Ph.D. Physics
Thesis: *Search for exotic decays of the Higgs boson using photons with the Compact Muon Solenoid experiment*
Supervisor: Prof. Toyoko Orimoto

University of Delhi   2014
M.Sc. Physics

University of Delhi   2012
B.Sc. Physics

AWARDS

Dissertation Completion Fellowship   2020
Awarded final semester of funding to complete dissertation

2019 APS DPF Poster Session Award   2019
For poster presentation on "Characterization of Hamamatsu LGADs for the
CMS endcap timing layer and discussion of the test beam result"

University Research Association Fellowship   2019 - 2020
For developing precision timing upgrade of the CMS detector at Fermi National Laboratory

Northeastern University Lawrence Award   2017
For excellence in teaching

Indira Gandhi Scholarship   2012 - 2014
Awarded for excellence in M.Sc. Physics

RESEARCH EXPERIENCE

ATLAS Run 3 WWW production   Aug 2021 - present
- Appointed as **analysis contact** for a working group of 16 members from 5 institutes
- Responsible for developing PHYSLITE-based analysis framework
- Applying ML-based techniques to improve sensitivity in the semi & fully-leptonic final states

ATLAS Run 2 Anomalous Quartic Gauge Couplings using WWW   Aug 2021 - present
- Leading analysis to probe anomalous quartic gauge couplings (aQGC) sensitive to WWW
- Responsible for integrating WWW process in the combined aQGC ATLAS analysis

ATLAS ITk Pixel Phase-II upgrade   Aug 2021 - present
- Responsible for ITk pixel module assembly and testing at Argonne
- Developed automation techniques responsible for improving the module metrology procedure at Argonne
- Technical expertise in running DAQ and coldbox software for module testing
- Reviewer for module assembly site qualification process across 15 institutes

ATLAS ITk Inner System design review   Aug 2021 - present
- Appointed liaison to coordinate effort for the final design review of Local Supports and Services
- Created production diagrams, defined QC stages in ITk production database, drafted QC documents for multiple Inner System components

CMS Search for exotic decay of the Higgs Boson using photons   2018 - 2021
- Analysis contact of the first search on CMS for $h \to aa \to \gamma\gamma\gamma\gamma$
- Designed a full run 2 analysis framework, including trigger studies, event selection criteria, data-driven background estimation strategy, and sensitivity optimization
- Delivered CMS-wide analysis review talks and primary author and editor of the analysis internal note, CMS PAS (Physics Analysis Summary), and peer-reviewed journal publication

CMS Phase-II Endcap Timing Layer upgrade with Fermilab CMS Timing Group   2019 - 2021
- Built a lab at Fermilab's Silicon Detector and Test Beam Facilities to develop low gain avalanche diodes (LGADs) and related precision timing technologies
- Built a cold box to methodically study prototype sensors and front-end electronics, and developed the software system for efficient data taking during test beam
- Led test beam measurements to characterize LGAD sensor performance, measuring hit efficiency and time resolution

CMS Photon Scouting for LHC Run 3   2020
- Performed studies aimed at lowering CMS Level 1 trigger thresholds of EGamma objects
- Trigger studies performed especially in context of light pseudoscalars that decay into soft (low p_T) photons

CMS ECAL Monitoring Tool Development   2017-2019
- Designed and developed a JavaScript-based payload monitor for ECAL electronics, using Node JS
- Used by ECAL operation experts and contributed to improvement of over 6% in luminosity loss by ECAL during LHC Run 2

CMS ECAL Operations during LHC Run 2   2017-2019
- Performed shift duties in the CMS ECAL Prompt Feedback Group during pivotal time of LHC Run 2 commencement
- Served as ECAL DAQ and trigger on-call expert and undertook multiple ECAL Detector On Call and Detector Guru Lieutenant shift responsibilities

CMS ECAL-Tracker Alignment during LHC Run 2   2016-2019
- Responsible for performing alignment of ECAL with respect to tracker during LHC Run 2 operations
- Developed Python-based tool for monitoring ECAL-tracker alignment status during LHC Run 2

PRESENTATIONS

Measurement of electroweak gauge boson production in association with jets in ATLAS   2023
QCD@LHC 2023

Module assembly and testing for the ATLAS Phase-II Inner Tracker Pixel Detector   2023
APS April Meeting

Module Metrology   2023
US ITk Pixels Workshop

Exotic Higgs decays at CMS   2021
Higgs 2021

Search for exotic decays of the Higgs Boson using photons with the CMS experiment   2021
European Physical Society Conference on High Energy Physics

Searches for new physics in Extended Higgs Sectors in CMS   2021
Phenomenology 2021 Symposium

Precision Timing with Low Gain Avalanche Detectors for the CMS MTD Endcap Timing Layer 2020
IEEE NSS MIC Conference

Characterization of Hamamatsu LGADs for the CMS endcap timing layer and discussion of the test beam results 2019
Meeting of APS the Division of Particle and Fields

Test beam characterization of Hamamatsu LGADs for the CMS endcap timing layer 2019
Fermi National Laboratory 52nd Annual Users Meeting

Calibration and Alignment of the CMS Electromagnetic Calorimeter 2019
APS April Meeting

CMS Electromagnetic Calorimeter and Alignment in LHC Run 2 2018
14th Pisa Meeting on Advanced Detectors

Performance of the CMS Electromagnetic Calorimeter data acquistion systerm at LHC Run 2 2018
14th Pisa Meeting on Advanced Detectors

SEMINARS

Development of the ATLAS Pixel Detector for the HL-LHC 2022
Argonne National Laboratory, Young Scientists Symposium

Exotic decays of the Higgs with photons with the CMS detector 2020
University of California Santa Barbara, Special HEP Seminar

PUBLICATIONS

This section contains publications in which I was a primary analyzer or made significant contributions. Some results were released as CMS or ATLAS public results, which undergo review within the collaboration, but are not reviewed externally. I am an author on 559 papers by the CMS and ATLAS collaborations, as of 5 October 2023.

Search for the exotic decay of the Higgs boson into two light pseudoscalars with four photons in the final state in proton-proton collisions at $\sqrt{s} = 13$ TeV 2023
The CMS collaboration, Journal of High Energy Physics 2023, 148

The CMS MTD Endcap Timing Layer: Precision timing with Low Gain Avalanche Diodes 2022
The CMS Collaboration, Nucl.Instrum.Meth.A 1032 (2022) 166627

Test beam characterization of sensor prototypes for the CMS Barrel MIP Timing Detector 2021
The CMS MTD Collaboration, JINST 2021 16 P07023

Electron and photon reconstruction and identification with the CMS experiment at the CERN LHC 2021
The CMS Collaboration, JINST 16, 05 (2021) pp.P05014

Combined analysis of HPK 3.1 LGADs using a proton beam, beta source, and probe station towards establishing high volume quality control 2021
Heller et. al, NIMA 1018 (2021) 165828

Reconstruction of signal amplitudes in the CMS electromagnetic calorimeter in the presence of overlapping proton-proton interactions 2020
The CMS Collaboration, JINST 15, no.10,P10002 (2020)

A MIP Timing Detector for the CMS Phase-2 Upgrade 2019
The CMS Collaboration, CERN-LHCC-2019-003

CMS electromagnetic calorimeter calibration and alignment 2019
Tanvi Wamorkar, Nucl.Instrum.Meth.A 936 (2019) 121-123

Performance of the CMS ECAL data acquisition system at LHC Run 2 2019
Tanvi Wamorkar, Nucl.Instrum.Meth.A 936 (2019) 346-348

SERVICE

US ATLAS Workshop	2023
Career panel and DEI session co-organizer	
APS April DPF Meeting	2023
Chair of the Beyond Standard Model Physics session	
Young Scientists Symposium at Argonne National Laboratory	2022
Committee member and symposium co-organizer	
Northeastern Women in Physics Alumnae Panel event *[YouTube Link]*	2021
Facilitator and host	
LPC Data Analysis School	2020
Exercise developer and instructor	

MENTORING

Aonan Wang (PhD student, University of Science and Technology of China), ATLAS run 3 WWW	2023
Xingyu Wu (PhD student, University of Science and Technology of China), ATLAS run 3 WWW	2023
Runxuan Wang (PhD student, University of Michigan), ATLAS run 3 WWW	2023
Daniel Aceves (Undergraduate student University of Illinois, Chicago), ATLAS ITk pixel upgrade	2023
Jon Dale Nichols (PhD student, University of Oklahoma), ATLAS ITk pixel upgrade	2023
Matias Mantiñan (PhD student, University of Chicago), ATLAS ITk pixel upgrade	2023
Tate Flicker (Undergraduate student, University of Chicago), ATLAS ITk pixel upgrade	2023
Tanvi Rao (Undergraduate student, University of Chicago), Anomalous quartic gauge couplings	2023
Daniel Perez (Undergraduate student, Susquehanna University), ATLAS ITk pixel upgrade	2022
Calvin Ainsworth (PhD student, Oklahoma State University), ATLAS ITk pixel upgrade	2022
Amrutha Krishna (PhD student, Northeastern University), CMS ECAL operations	2020

TEACHING

Northeastern University	2015-2017

Undergraduate Courses
- Physics for Life Sciences and Physics for Engineering: Laboratory instructor
- Electricity and Magnetism: Tutored and graded quizzes and exams
- Classical Mechanics: Taught recitation class for Physics for Engineering students

OUTREACH

Panelist on Northeastern University Graduate Women in Physics Alumni Career Panel	2023
Introduce a Girl to Engineering Day @ Argonne National Lab	2023
Letters to a Pre-Scientist: Pen Pal Program	2022
Science Careers in Search of Women	2022
Introduce a Girl to Engineering Day @ Argonne National Lab	2022