TANVI WAMORKAR

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EMPLOYMENT

Argonne National Laboratory, Lemont, IL 10/18/2021 - Present
Postdoctoral Research Associate in High Energy Experimental Physics (ATLAS)
Research topics: Beyond the Standard Model searches, Higgs physics with colliders, Silicon based Pixel Modules for ATLAS HL-LHC upgrade
Supervisor: Dr. Jessica Metcalfe

EDUCATION

Northeastern University, Boston, MA Aug 2015 - Aug 2021
Ph.D. in High Energy Experimental 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 Jul 2012 - May 2014
M.Sc. Physics

University of Delhi Aug 2009 - May 2012
B.Sc. Physics

RESEARCH EXPERIENCE

Argonne National Lab ATLAS Group 2021 - Present

Anomalous Quartic Gauge Couplings using Triboson processes

- Leading the full Run 2 analysis of probing anomalous quartic gauge couplings using the WWW process.
- Designing and developing analysis strategy, software framework, event selection criteria, and limit setting procedure.

ITk Pixel Module Assembly and Testing

- Designing ITk Pixel module assembly and testing protocols.
- Coordinating readiness and preparation of the clean room for ITk pixel module pre-production and production.

ITk Pixels Inner System Design Review

- Appointed liaison between various Inner System teams to coordinate effort for the Final Design Review.
- Leading the effort to define production diagrams, production database, and quality control documents for all the Inner System components.

Northeastern University CMS Group 2017-2021

Search for exotic decay of the Higgs Boson using photons

- 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 lead author on the CMS publication.
- Primary author and editor of the analysis internal note, CMS PAS, and journal paper.

Endcap Timing Layer for CMS Phase 2 Upgrade, Fermilab CMS Timing Group

- Built a lab at Fermilab's Silicon Detector and Test Beam Facilities to develop low gain avalanche detectors (LGADs) and related precision timing technologies.
- Built a cold box to methodically study prototype sensors and front-end electronics, and developed the software architecture for efficient data taking during test beam.
- Led test beam measurements to characterize LGAD sensor performance, measuring hit efficiency and time resolution.

Development of photon scouting for Run 3 at CMS

- Studied EGamma Level 1 thresholds, in context of low mass pseudoscalar searches during run 3 of LHC.

CMS ECAL monitoring tool

- Designed and developed a monitoring tool for ECAL electronics using JavaScript.
- Used by on-call ECAL experts in the CMS control room and contributes to low ECAL down-time.

ECAL DAQ and on-call operations

- ECAL DAQ and trigger expert during LHC Run 2.
- On-call Expert : Performed Prompt Feedback Group, Detector On Call and Detector Guru Lieutenant services during Run 2 for CMS ECAL.

ECAL-Tracker Alignment during LHC Run 2

- Performed alignment of ECAL with respect to Tracker during data-taking for CMS.
- Developed a tool for monitoring the alignment status for the entire duration of data-taking.

PRESENTATIONS

CONFERENCE TALKS AND POSTERS

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

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 Master's in Physics

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.

Peer Reviewed Publications 2021 - Present

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

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

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

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

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

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

Author on 437 papers by the CMS and ATLAS collaborations, as of 4 July 2022

Public Results 2021 - Present

Search for exotic decay of the Higgs boson into two light pseudoscalars with four photons in the final state at $\sqrt{s} =$ 13 TeV. The CMS collaboration *CMS-PAS-HIG-21-003*

WORKSHOP ORGANIZATION

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 facilitator

MENTORING

Argonne National Laboratory
Daniel Perez (Undergraduate Student), ATLAS pixel module assembly 2022
Calvin Ainsworth (PhD Student), ATLAS pixel module assembly 2022
Northeastern University, Boston, MA
Kelsey Yee (Undergraduate Student), CMS Electromagnetic Calorimeter 2018

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

Letters to a Pre-Scientist: Pen Pal Program 2022
Communicated with middle and high school students through a pen pal program

Science Careers in Search of Women 2022
Mentored high school students to encourage to pursue careers in STEM

Introduce a Girl to Engineering Day 2022
Served as a mentor for 8th grade young women to provide guidance on engineering careers