

# TANVI WAMORKAR

Postdoctoral Research Associate | Argonne National Laboratory | Lemont, IL, USA

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## EMPLOYMENT

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**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

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**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

## AWARDS

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*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

## RESEARCH EXPERIENCE

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**Argonne National Lab ATLAS Group** 2021 - Present  
*WWW production in run 3 of the LHC*

- Developing run 3 analysis

*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.

*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

<i>Module assembly and testing for the ATLAS Phase-II Inner Tracker Pixel Detector</i>	2023
APS April Meeting	
<i>Module Metrology</i>	2023
US ITk Pixels Workshop	
<i>Exotic Higgs decays at CMS</i>	2021
Higgs 2021	
<i>Search for exotic decays of the Higgs Boson using photons with the CMS experiment</i>	2021
European Physical Society Conference on High Energy Physics	
<i>Searches for new physics in Extended Higgs Sectors in CMS</i>	2021
Phenomenology 2021 Symposium	
<i>Precision Timing with Low Gain Avalanche Detectors for the CMS MTD Endcap Timing Layer</i>	2020
IEEE NSS MIC Conference	
<i>Characterization of Hamamatsu LGADs for the CMS endcap timing layer and discussion of the test beam results</i>	2019
Meeting of APS the Division of Particle and Fields	
<i>Test beam characterization of Hamamatsu LGADs for the CMS endcap timing layer</i>	2019
Fermi National Laboratory 52nd Annual Users Meeting	
<i>Calibration and Alignment of the CMS Electromagnetic Calorimeter</i>	2019
APS April Meeting	

<i>CMS Electromagnetic Calorimeter and Alignment in LHC Run 2</i> 14th Pisa Meeting on Advanced Detectors	2018
<i>Performance of the CMS Electromagnetic Calorimeter data acquisition system at LHC Run 2</i> 14th Pisa Meeting on Advanced Detectors	2018

## SEMINARS

<i>Development of the ATLAS Pixel Detector for the HL-LHC</i> Argonne National Laboratory, Young Scientists Symposium	2022
<i>Exotic decays of the Higgs with photons with the CMS detector</i> University of California Santa Barbara, Special HEP Seminar	2020

## PUBLICATIONS

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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

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

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](#)

## SERVICE

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

## MENTORING

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## Argonne National Laboratory

*Daniel Perez (Undergraduate Student), ATLAS pixel module assembly* 2022

*Calvin Ainsworth (PhD Student), ATLAS pixel module assembly* 2022

## TEACHING

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### 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

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Served as a 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