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**Davide Pietro Mungo**  
**CURRICULUM VITAE**

**INFORMAZIONI PERSONALI**

COGNOME	MUNGO
NOME	DAVIDE PIETRO
DATA DI NASCITA	27/GIUGNO/1993

Il curriculum, composto da 10 pagine, è riportato a partire dalla pagina seguente.

Data 23/Marzo/2024

Luogo Ginevra, Svizzera

# Davide Mungo — CV

ORCID: 0000-0002-2567-7857

23 March 2024

## Education and scientific career

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### Scientific career

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#### University of Toronto

Postdoctoral research associate

Geneve (CH)

05/2022–ongoing

### Education

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#### Philosophiae Doctor (PhD) in Physics

Università degli Studi di Milano

Milan (IT)

10/2018–03/2022

**Thesis title:** Measurement of the SM Higgs boson production properties in the di-photon decay channel with the ATLAS Run 2 dataset

**Supervisors:** Prof. L. Carminati, Dott. R. Turra

#### Master degree in Physics

Università degli Studi di Milano

Milan (IT)

10/2015–10/2018

**Thesis title:** Measurement of Higgs boson couplings in the diphoton decay channel with  $80\text{ fb}^{-1}$  of  $pp$  collisions at  $\sqrt{s} = 13\text{ TeV}$  with the ATLAS detector

**Supervisors:** Prof. L. Carminati, Dott. R. Turra, Dott. S. Manzoni

**Final mark:** 110/110 cum laude

#### Bachelor degree in Physics

Università degli Studi di Milano

Milan (IT)

10/2012–10/2015

**Thesis title:** Background evaluation of jets misidentified as photons, searching for Dark Matter in the Mono-photon channel with the ATLAS detector

**Supervisors:** Prof. L. Carminati, Dott.ssa S. Resconi, Dott.ssa M. G. Ratti

**Final mark:** 110/110 cum laude

## Main research areas

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I am an *experimental particle physicist* and my research activity is mainly carried out within the *ATLAS experiment*, located on the Large Hadron Collider accelerator at CERN (Geneva). My research activities cover the following main topics

- Measurements of Higgs boson properties and Higgs boson potential, mainly in the diphoton decay channel
- Search for Beyond Standard Model physics in final states with photons
- Reconstruction and calibration of photons and electrons in the ATLAS experiment
- Data taking operation and maintenance of the Liquid Argon (LAr) Calorimeter
- Determination and calibration of the luminosity collected by the ATLAS experiment with

Liquid Argon High Voltage currents data

## Leadership in experimental projects

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<b>Convener of E/Gamma reconstruction and software group</b> <i>ATLAS E/Gamma Combined Performance group</i>	<b>ATLAS experiment</b> 10/2023 – ongoing
<b>LAr Online software coordinator</b> <i>Liquid Argon Calorimeter group</i>	<b>ATLAS experiment</b> 10/2023 – ongoing
<b>LAr Detector Control System coordinator</b> <i>Liquid Argon Calorimeter group</i>	<b>ATLAS experiment</b> 04/2023 – ongoing

## Scholarship and funding

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<b>Cooperation Associate</b> <i>ATLAS Liquid Argon Calorimeter group</i>	<b>Geneve (CH)</b> 8/2021 – 3/2022
<b>Project Associate</b> <i>CERN&amp;INFN</i>	<b>Geneve (CH)</b> 8/2020 – 8/2021
<b>Doctorate student scholarship</b> <i>Università degli Studi di Milano</i>	<b>Milan (IT)</b> 10/2018 – 03/2022
<b>Cooperation Associate</b> <i>ATLAS Liquid Argon Calorimeter group</i>	<b>Geneve (CH)</b> 01/2019 – 12/2018
<b>Summer internship</b> <i>DESY</i>	<b>Hamburg (DE)</b> 6-9/2016

## Didactic activities

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### Teaching duties.....

<b>Teaching Assistant (Art.45)</b> <i>Università degli Studi di Milano</i> <b>Course:</b> Numerical treatment of Experimental Data, 2nd year Bachelor program in Physics	<b>Milan (IT)</b> A.A. 2019/20
<b>Teaching Assistant (Art.45)</b> <i>Università degli Studi di Milano</i> <b>Course:</b> Physics laboratory with Statistical elements, 1st year Bachelor program in Physics	<b>Milan (IT)</b> A.A. 2019/20
<b>Teaching Assistant (Art.45)</b> <i>Università degli Studi di Milano</i> <b>Course:</b> Numerical treatment of Experimental Data, 2nd year Bachelor program in Physics	<b>Milan (IT)</b> A.A. 2015/16

### PhD student supervision.....

05/2022 – ongoing, Kyle Amirie, *LAr-based long term stability and calibration transfer analysis for*

*the luminosity determination at the ATLAS experiment*

## Master student supervision.....

09/2020 – 10/2021, Andrea Visibile, *Search for di-photon resonances in the 65 to 110 GeV invariant mass range using  $140 \text{ fb}^{-1}$  of pp collisions at  $\sqrt{s} = 13 \text{ TeV}$  with the ATLAS detector*

09/2019 – 10/2020, Alessandro Demela, *Measurement of the Higgs boson mass in the diphoton decay channel with  $140 \text{ fb}^{-1}$  of pp collisions at  $\sqrt{s} = 13 \text{ TeV}$  using the ATLAS detector*

## Bachelor student supervision.....

09/2023–03/2024, Davide Riva, *Selection of the primary vertex in the Run3 pp collision dataset with the ATLAS experiment*

06/2022–04/2023, Giorgia Pisoni, *Measurement of the primary vertex identification efficiency in Run2 diphoton events with the ATLAS detector at the LHC*

08–12/2020, Denise Tantucci, *Measurement of the jets faking photons background in the search for Higgs boson decays into a photon and a dark photon in p-p collisions with the ATLAS detector*

04–12/2020, Riccardo Brambilla, *Measurement of the electron faking photon background searching for invisible Higgs decays in the VBF plus photon channel*

04–10/2002, Pietro Daniele, *A machine learning approach to the electrons and photons classification with the ATLAS detector at the LHC*

09/2019 – 02/2020, Edoardo Tronconi, *Electrons and photons classification using machine learning techniques with the ATLAS detector at the LHC*

09–12/2019, Eleonora Foschino, *Photon identification optimization using machine learning techniques with the ATLAS detector at the LHC*

03–10/2019, Gianluca Fugante, *Measurement of the jets faking photons background for the Dark Matter search in the Mono-Photon channel with the ATLAS detector*

03–07/2019, Andrea Visibile, *Determination of the primary vertex in diphoton events with the ATLAS detector at the LHC*

## Conference communications

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### International conferences.....

**International Conference on High Energy Physics (ICHEP 2022)**

**Bologna (IT)**

*Parallel session talk*

*07/2022*

**Title:** Measurements of the Higgs boson couplings and their interpretations in bosonic final states at the ATLAS experiment ([link](#))

**European Physical Society - High Energy Physics (EPS-HEP 2021)**

**Online (COVID)**

*Parallel session talk*

*07/2021*

**Title:** ATLAS LAr Calorimeter Commissioning for LHC Run-3 ([link](#))

## Higgs 2020

*Parallel session talk*

**Online (COVID)**

10/2020

**Title:** Combination of Higgs measurements:  $\kappa$  modifiers, STXS framework and MSSM interpretation  
([link](#))

## International workshops

### ATLAS Higgs workshop

*Plenary talk*

**Tokyo (JP)**

10/2023

**Title:** Statistical tools presentation and hands-on tutorial

### ATLAS Collaboration week

*Plenary talk*

**Lisbon (PT)**

10/2022

**Title:** Liquid Argon Calorimeter status report

## National conferences

### Incontri di Fisica delle Alte Energie (IFAE 2019)

*Poster*

**Naples (IT)**

04/2019

**Title:** Measurement of  $t\bar{t}H$  production cross section times branching ratio in the diphoton decay channel with the full Run2 pp collision dataset collected by the ATLAS experiment at 13 TeV ([link](#))

### Società Italiana di Fisica (SIF 2018)

*Parallel session talk*

**Cosenza (IT)**

09/2019

**Title:** Measurement of the  $t\bar{t}H$  signal strength in the diphoton decay channel with Run2 pp collision data collected by the ATLAS experiment at 13 TeV

## Scientific revision activities

**Editorial board member within the ATLAS Collaboration:** Paper title: *Search for diphoton resonances in the  $H \rightarrow aa \rightarrow \gamma\gamma\tau_{\text{hard}}\tau_{\text{hard}}$  channel using  $139\text{ fb}^{-1}$  of pp collision data collected by the ATLAS experiment (in preparation)*

## Training activities

### XV Fermilab-CERN Hadron Collider Physics Summer School

*Summer school*

**Chicago (Online)**

8/2020

### WinCC-OA/JCOP course

*Course*

**CERN**

7/2019

### INFN School of Statistics

*Summer school*

**Paestum (IT)**

6/2019

### XXVII Studying days on Detectors

*Winter school*

**Cogne (IT)**

2/2018

## Outreach

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<b>IPPOG International Masterclass</b> <i>Students tutor for ATLAS data analysis</i>	<b>Milan (IT)</b> 03/2021
<b>Focus Live at Milan Science Meseum</b> <i>INFN stand presenter</i>	<b>Milan (IT)</b> 11/2019
<b>IPPOG International Masterclass</b> <i>Students tutor for ATLAS data analysis</i>	<b>Milan (IT)</b> 03/2019
<b>IPPOG International Masterclass</b> <i>Students tutor for ATLAS data analysis</i>	<b>Milan (IT)</b> 03/2016

## Awards

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<b>Machine Learning Hackathon winner</b> <i>INFN School of Statistics</i>	<b>Paestum (IT)</b> 06/2019
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## Detailed summary of the scientific activities

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I am an active member of ATLAS Collaboration from my bachelor thesis, and I am an author of the Collaboration from 2019. My research activities spans from Higgs boson related measurement to Beyond Standard Model searches, with deep involvements in the study of the photon reconstruction and calibration performances. I am vigorously participating in the ATLAS data taking operations as a member of the Liquid Argon Calorimeter group. The wide range of my scientific activities made me develop and sharpen a range of abilities and proficiencies in the field, contributing to create a complete experimental particle physicist profile. The wide range of my activities made me sharpening and developing a range of abilities and proficiencies in the field, which contribute to create a complete experimental particle physicist profile.

### Physics research activities.....

My research activity focuses primarily on Higgs boson property measurements and searches for Beyond Standard Model physics in final states with photons. The contributions to the ATLAS physics program are reported below, with brief descriptions.

## Higgs coupling and STXS measurements in the $H \rightarrow \gamma\gamma$ channel

*H  $\rightarrow \gamma\gamma$  physics sub-group*

2017–2022

Along the years, I have worked in multiple analyses measuring Higgs production cross sections in the diphoton decay channel. For these analyses I have study the data selection, optimized production mode signal identification and modelling, and carried out the statistical inference on data.

During my PhD, from 2019 onward, I have developed the event categorization for the full Run2 coupling and Simplified Template Cross Section (STXS) analysis: I have employed advanced machine learning algorithms and an innovative approach based on the determinant of the covariance matrix of the measurement to data, in order to optimize the categorization selections targeting different STXS regions, directly during the optimization process. These developments deliver a great improvement with respect to partial Run2 analyses both in terms of sensitivity and in number of regions of the Higgs production phase space probed [1].

## Higgs mass and width measurement in the $H \rightarrow \gamma\gamma$ channel

*H  $\rightarrow \gamma\gamma$  physics sub-group*

2020–2023

I have worked on the Higgs boson mass measurement in the diphoton decay channel, as main analyser and analysis contact within the Collaboration. I have developed a new event categorization selection to reduce the impact of the systematic uncertainties from the photon calibration on the results, which was the limiting factor for the mass measurement. I have carefully estimated the impacts a large number of systematic uncertainties on the measurement. Thanks also to the dramatic improvements on the photon energy calibration, this the most precise measurement of the Higgs boson mass from a single decay channel published as of today, with an astonishing precision of 0.11% [2]. I am actively participating in the Higgs boson decay width measurement, to be obtained with interferometry of the  $H \rightarrow \gamma\gamma$  signal and QCD  $\gamma\gamma$  background (paper in preparation).

## Higgs boson properties combinations

*Higgs combination sub-group*

2018–2023

I have taken part in the ATLAS combination analyses for Higgs coupling measurements, where the  $H \rightarrow \gamma\gamma$  represents one of the leading experimental channel. I have provided support for the diphoton statistical workspaces along the years, I have developed tools to check the correctness of the inclusion of STXS acceptances factors or to re-write Run1 statistical likelihood, and to carry out the inference to the data. I have taken part in the Higgs coupling combination [3] and in the Higgs mass combination [4].

## Searches in the low mass diphoton spectrum

*H  $\rightarrow \gamma\gamma$  physics sub-group*

2019–ongoing

I am contributing to the search of new phenomena in the low mass diphoton spectrum ( $60 < m_{\gamma\gamma} < 120$  GeV). In this region, a number of theoretical models, extending the Higgs boson sector, predicting the presence of light boson similar to the Higgs, decaying in two photons, The main contribution to this analysis is the addition of an innovative BDT used to classify  $e/\gamma$  “ambiguous” objects, which mostly dominate the  $Z \rightarrow e^+e^-$  mass region, and the estimation of the electron faking photons background. Analysis internally reviewed, now in journal submission phase.

## Determination of the Higgs boson self-coupling

*Di-Higgs physics sub-group*

2022–2023

I have participated in the search for non-resonant Higgs boson pair production in the  $b\bar{b}\gamma\gamma$  decay channel with the  $pp$  Run2 dataset [5]. I provided support for the analysis team in order to define the analysis event categorization strategy, to understand the photon vertex selection performance and to produce the samples needed by the analysis. I have also taken part in the combination of single Higgs and di-Higgs analysis in the determination of Higgs boson self-coupling [6].

## Dark matter search in the monophoton channel

*Jet and Dark Matter physics sub-group*

2015 and 2018

I was in charge of estimating the jet faking photon background for the  $\gamma$ +MET dark matter search at the start of Run2 [7] and for the full Run2 analysis [8]. The ATLAS Collaboration granted me an exceptional authorship for the former journal paper.

## Other Beyond Standard Model searches in final states with photons

*Exotic physics sub-group*

2018–2020

I have contributed to few other BSM searches, also through the supervision of students who were estimating different and specific backgrounds for those analyses. In particular, I have studied the electron faking photon background for an analysis tarding Higgs invisible decay, produced in a Vector Boson Fusion mode, and with a photon in the final state [9]. The electron faking photon and the jet faking photon backgrounds have been estimated in the  $H \rightarrow \gamma\gamma_D$  analysis [10].

## Support for $H \rightarrow \gamma\gamma$ sub-group activities

*$H \rightarrow \gamma\gamma$  physics sub-group*

2018–ongoing

I have supported  $H \rightarrow \gamma\gamma$  physics sub-group activities along the years. I am one of the main software developers of the analysis framework used in the group, and I have acted as backup responsible for the datasets produced by the group. I have acted as liaison between  $H \rightarrow \gamma\gamma$  and Higgs combination sub-groups.

## Photon performance activities.....

To carry out analysis with photons in the final state, the precise reconstruction, calibration and identification of these physical objects in the ATLAS detector is of paramount importance and the real part of the physic data analysis. I am involved in the E/Gamma Combined Performance group, which defines and provides the algorithms for the reconstruction of electron and photons candidates from calorimetric deposits in the Liquid Argon calorimeter, and release recommendations for the energy calibration and  $e/\gamma$  identification to the whole collaboration.

## Electron and photon reconstruction sub-group convener

*E/Gamma Combined Performance group*

2023–ongoing

I am the responsible and the maintainer of the E/Gamma reconstruction software. I am currently study the impact of the new calorimetric cell timing cut introduced for Run3, updating the reconstruction for the change in Run3 Transition Radiation Tracker conditions, and coordinating the work on the reconstruction software to be use for the High Luminosity phase of the LHC.

## Study and optimization of the primary vertex selection

*$H \rightarrow \gamma\gamma$ , E/Gamma, Tracking subgroups*

2019–ongoing

I have been involved in the characterization of the performance and optimization of the custom  $H \rightarrow \gamma\gamma$  vertex selection method, based on the photon calorimetric pointing. In particular, I have proposed a re-optimization of the algorithm based on machine learning algorithms for the full Run2  $pp$  collision dataset, and compared the performance in data for  $Z \rightarrow e^+e^-$  events, where electrons are treated as photons. Recently, I am proposing a new vertex selection method based on machine learning techniques, in the attempt to unify the algorithm used by the majority of the ATLAS physics analyses with the custom one used for  $H \rightarrow \gamma\gamma$ , which is currently under evaluation within the Collaboration.



## Electron and photon energy calibration

*E/Gamma calibration subgroup*

2020–2023

I have participated in the definition and the software validation of the precision recommendations for the  $e/\gamma$  energy calibration [11]. This final precision energy calibration for Run2  $pp$  collision dataset presents a four-fold improvements for 60 GeV photons with respect to the preliminary calibration release in 2018.

## Photon identification optimization and ambiguous classification

*Photon identification subgroup*

2019–2020

Concerning photon reconstruction and identification performances, I have worked in developing two multivariate techniques: the former is used to improve the tight identification working point for photons, while the second is used to classify the objects that are reconstructed as both electron and photon (“ambiguous”) in ATLAS, therefore providing the analyses a tool to define the optimal working point to remove the ambiguity.

## Operation activities.....

I am involved in the operation, maintenance and upgrade of the Liquid Argon (LAr) calorimeter of the ATLAS experiment. Within the LAr calorimeter group, I am taking two different leadership roles: the first concerns coordinating the developments of the online software infrastructure, the second the coordination of the Detector Control and Safety system. Moreover, I am actively participating to the expert on-call shifts, I am a the primary in-loco expert of the High Voltage system of the Liquid Argon calorimeter and I am the Online luminosity contact between the Luminosity and the LAr groups.

### LAr Online software coordinator

*LAr calorimeter group*

10/2023 – ongoing

Development and maintenance of the LAr online software infrastructure. The online software is responsible to configure the front- and -back-end boards for data taking operations, to provide trigger decision at Level1, communicate with ATLAS TDAQ central processes and it is responsible to produce online monitoring for data quality in the control room. I am co-coordinating a group of around 15 people to maintain the main data acquisition capabilities of the LAr detector.

### LAr Detector Control System (DCS) coordinator

*LAr calorimeter group*

04/2023 – ongoing

Development and maintenance of the LAr DCS system. The DCS system is responsible for the control and the safety of the LAr detector components. It interacts with ATLAS Central DCS system and it is fundamental to protect and monitor the hardware over the years. I am co-coordinating a group of around 10 people.

### Expert on-call shift crew

*LAr calorimeter group*

2018–ongoing

I am part of expert on-call crew for the LAr Calorimeter, taking one-week-long shifts during data taking periods. Expert shifters ensure good data acquisition efficiency and promptly react to any issues concerning a particular domain. I started in 2018 as a Hardware on-call expert, and from 2022 I am also taking Software on-call and, more importantly, Run Coordinator shifts. In four years of data taking I have cumulated more than 45 weeks of expert shifts.

## LAr High voltage expert

LAr calorimeter group

2018–ongoing

I am the primary in-loco maintainer of the HV system for the LAr calorimeter. My duties span from hardware work in the USA15 service cavern (firmware updates for modules, modules replacement and management, cables refurbishment) to software development of the DCS. In particular, I was in charge to update the full HV system during the Long Shutdown 2 (2019-2021), in order to cope with the new server that reads and controls the HV modules and controllers. Moreover, I am responsible to keep update and calibrate the online luminosity measurement of the LAr detector, obtained from the current draw of the HV modules.

## Publications

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I am an author of the ATLAS Collaboration from June 2019 and, at the time of writing, I have published 310 articles in peer-reviewed journals. The full up-to-date list of my publications can be found with [this InspireHEP search](#). A brief list of the publications that I present for this application is reported below. These are publications that most representative of my scientific activities.

### Peer-reviewed journal papers.....

- [1] Georges Aad et al. “Measurement of the properties of Higgs boson production at  $\sqrt{s} = 13$  TeV in the  $H \rightarrow \gamma\gamma$  channel using  $139 \text{ fb}^{-1}$  of  $pp$  collision data with the ATLAS experiment”. In: *JHEP* 07 (2023), p. 088. DOI: [10.1007/JHEP07\(2023\)088](#). arXiv: [2207.00348 \[hep-ex\]](#).
- [2] Georges Aad et al. “Measurement of the Higgs boson mass with  $H \rightarrow \gamma\gamma$  decays in  $140 \text{ fb}^{-1}$  of  $s=13$  TeV  $pp$  collisions with the ATLAS detector”. In: *Phys. Lett. B* 847 (2023), p. 138315. DOI: [10.1016/j.physletb.2023.138315](#). arXiv: [2308.07216 \[hep-ex\]](#).
- [3] Georges Aad et al. “A detailed map of Higgs boson interactions by the ATLAS experiment ten years after the discovery”. In: *Nature* 607.7917 (2022). [Erratum: *Nature* 612, E24 (2022)], pp. 52–59. DOI: [10.1038/s41586-022-04893-w](#). arXiv: [2207.00092 \[hep-ex\]](#).
- [4] Georges Aad et al. “Combined Measurement of the Higgs Boson Mass from the  $H \rightarrow \gamma\gamma$  and  $H \rightarrow ZZ^* \rightarrow 4\ell$  Decay Channels with the ATLAS Detector Using  $s=7, 8$ , and 13 TeV  $pp$  Collision Data”. In: *Phys. Rev. Lett.* 131.25 (2023), p. 251802. DOI: [10.1103/PhysRevLett.131.251802](#). arXiv: [2308.04775 \[hep-ex\]](#).
- [5] Georges Aad et al. “Studies of new Higgs boson interactions through nonresonant  $HH$  production in the  $b\bar{b}\gamma\gamma$  final state in  $pp$  collisions at  $\sqrt{s} = 13$  TeV with the ATLAS detector”. In: *JHEP* 01 (2024), p. 066. DOI: [10.1007/JHEP01\(2024\)066](#). arXiv: [2310.12301 \[hep-ex\]](#).
- [6] Georges Aad et al. “Constraints on the Higgs boson self-coupling from single- and double-Higgs production with the ATLAS detector using  $pp$  collisions at  $s=13$  TeV”. In: *Phys. Lett. B* 843 (2023), p. 137745. DOI: [10.1016/j.physletb.2023.137745](#). arXiv: [2211.01216 \[hep-ex\]](#).
- [7] Morad Aaboud et al. “Search for new phenomena in events with a photon and missing transverse momentum in  $pp$  collisions at  $\sqrt{s} = 13$  TeV with the ATLAS detector”. In: *JHEP* 06 (2016), p. 059. DOI: [10.1007/JHEP06\(2016\)059](#). arXiv: [1604.01306 \[hep-ex\]](#).

- [8] Georges Aad et al. “Search for dark matter in association with an energetic photon in  $pp$  collisions at  $\sqrt{s} = 13$  TeV with the ATLAS detector”. In: *JHEP* 02 (2021), p. 226. DOI: [10.1007/JHEP02\(2021\)226](https://doi.org/10.1007/JHEP02(2021)226). arXiv: [2011.05259](https://arxiv.org/abs/2011.05259) [hep-ex].
- [9] Georges Aad et al. “Observation of electroweak production of two jets in association with an isolated photon and missing transverse momentum, and search for a Higgs boson decaying into invisible particles at 13 TeV with the ATLAS detector”. In: *Eur. Phys. J. C* 82.2 (2022), p. 105. DOI: [10.1140/epjc/s10052-021-09878-z](https://doi.org/10.1140/epjc/s10052-021-09878-z). arXiv: [2109.00925](https://arxiv.org/abs/2109.00925) [hep-ex].
- [10] Georges Aad et al. “Search for dark photons from Higgs boson decays via  $ZH$  production with a photon plus missing transverse momentum signature from  $pp$  collisions at  $\sqrt{s} = 13$  TeV with the ATLAS detector”. In: *JHEP* 07 (2023), p. 133. DOI: [10.1007/JHEP07\(2023\)133](https://doi.org/10.1007/JHEP07(2023)133). arXiv: [2212.09649](https://arxiv.org/abs/2212.09649) [hep-ex].
- [11] Georges Aad et al. “Electron and photon energy calibration with the ATLAS detector using LHC Run 2 data”. In: *JINST* 19.02 (2024), P02009. DOI: [10.1088/1748-0221/19/02/P02009](https://doi.org/10.1088/1748-0221/19/02/P02009). arXiv: [2309.05471](https://arxiv.org/abs/2309.05471) [hep-ex].

#### PhD thesis.....

- [12] Davide Pietro Mungo. “Measurement of the SM Higgs boson properties in the diphoton decay channel with the ATLAS Run 2 dataset”. Presented 11 Mar 2022. PhD Thesis. Università degli Studi di Milano, 2022. URL: <https://cds.cern.ch/record/2840788>.